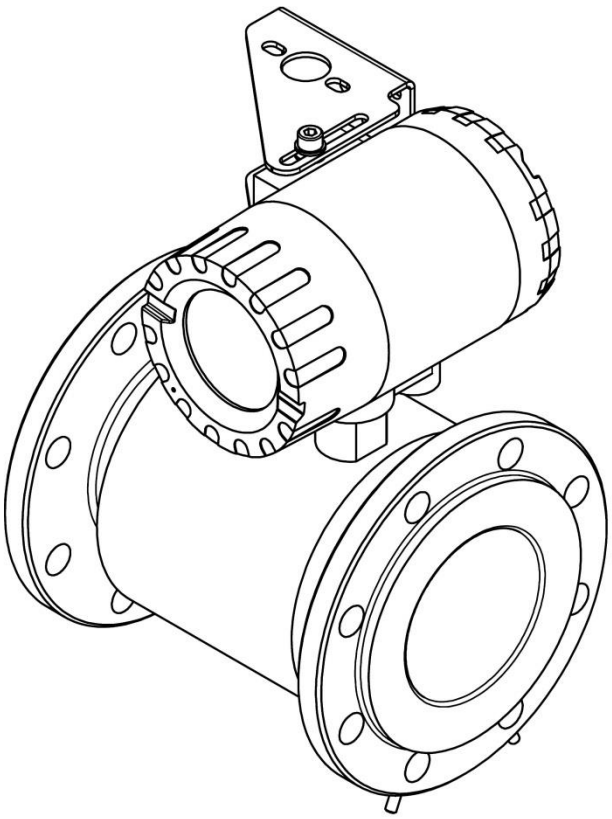
USER'S MANUAL

ELECTROMAGNETIC FLOWMETER

PEM-1000



APLISENS S.A., 03-192 Warszawa, ul. Morelowa 7
tel. +48 22 814 07 77; fax +48 22 814 07 78
www.aplisens.pl, e-mail: aplisens@aplisens.pl

Used markings

Symbol	Description
	Warning signifying that it is necessary to follow the information in the documentation precisely in order to ensure device safety and complete functionality.
	Information particularly useful during device installation and operation.
	Information concerning dealing with used equipment.

BASIC REQUIREMENTS AND SAFETY OF OPERATION

- The manufacturer is not responsible for damage caused by improper installation of the device, not maintaining the device in good technical condition and operating the device contrary to its intended use.
- Installation should be carried out by qualified personnel authorized to install electrical devices and control and measuring equipment. The installer is responsible for carrying out the installation in accordance with this manual as well as safety and electromagnetic compatibility standards and regulations applicable to a given type of installation.
- In case of an installation with control and measuring equipment, in the event of a leak, medium under pressure causes a risk to the personnel. During device installation, operation and inspection all safety and precautionary requirements must be taken into account.
- If the device malfunctions, it should be disconnected and handed over to the manufacturer or to a body authorized by the manufacturer for repairs.

In order to minimize probability of failure and resultant danger to personnel, avoid installing the device under particularly unfavourable conditions when the following dangers are present:

- Danger of mechanical impacts, excessive shocks and vibrations.
- Excessive temperature variations.
- Vapour condensation, dust, icing.

Changes in product manufacture may precede an update to the user's paper documentation. Up-to-date operating manuals can be found on manufacturer's website at www.aplisens.pl

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1. INTRODUCTION

This manual concerns electromagnetic flow meters, manufactured in two versions:

- A compact version designated **PEM-1000ALW** - with converter placed directly on the measuring sensor**;**
- A separable version designated **PEM-1000NW** - with converter connected via cable and placed up to 50 m from measuring sensor.

The manual contains data, guidelines and recommendations concerning installing and operating, as well as procedure in the event of a failure.

2. SAFETY

- Installation and start-up of the device, as well as any actions related to operation, should be carried out only after carefully reading this manual.
- Installation and maintenance should be carried out by qualified personnel authorized to install electrical devices and control and measuring equipment.
- Device should be used in accordance with intended use (item 6.1) and within permissible parameters.
- Protections ensuring device safety utilized by the manufacturer may be less effective if the device is operated contrary to its intended use.
- Before installing or removing the device make absolutely sure that it is disconnected from power source.
- Repairing or otherwise tampering with the electronic system of the device is not permitted. Only the manufacturer or a body authorized by the manufacturer may carry out damage assessment and necessary repairs.
- Do not use damaged equipment. In case of malfunction, the device should be removed from operation.

3. COMPLETENESS LIST

Along with the flow meter, the user receives:

a) Product Certificate, which also acts as a warranty card;
b) Declaration of conformity (on request);
c) Operating Manual designated "IO.PEM-1000"
d) Calibration certificate

Items b) and c) are available on-line at www.aplisens.pl

4. TRANSPORT AND STORAGE

4.1. Transport

Flow meters should be transported in individual packages via means which provide cover. Packages should be protected against moving and direct exposure to weather.

4.2. Storage

The flow meter should be stored in factory-provided packaging, in a covered room with no vapors or aggressive substances, at temperature and relative humidity within permissible conditions (see item 11.6).

5. WARRANTY

The manufacturer grants warranty on terms and conditions stated in the Product Certificate which also acts as a warranty card.

Warranty shall be revoked if the device is used contrary to its intended use, this operating manual is not followed, the device is operated by unqualified personnel or the device has been tampered with.

6. DESIGN

6.1. Intended use and properties

The PEM-1000 electromagnetic flow meter is a precise device for measuring flow of conducting liquids within pipeline installations.

The electromagnetic flow meter converter is intended to work only with the sensor with which it was provided.
Replacing any of these elements on one's own is not permitted. Contact the manufacturer if either the converter or the sensor requires replacing.

Flow meter sensor has no internal mechanical elements, which ensures uninterrupted flow of measured medium through the entire section of the pipeline. Flow measurement does not depend on:

- liquid pressure,
- viscosity,
- density,
- temperature,
- electrical conductivity (above minimal value).

The flow meter can measure the flow of purified liquids, slurries, pulps and solutions of varying chemical aggressivity. The lack of mechanical elements ensure a long service life of the instrument even in the case of media with strong abrasive properties. The basic areas of application are:

- water management, the measurements of drinking water and wastewater,
- the chemical, textile, paper industries as well as mining,
- the food industry,
- energy and heating installations,
- agriculture.

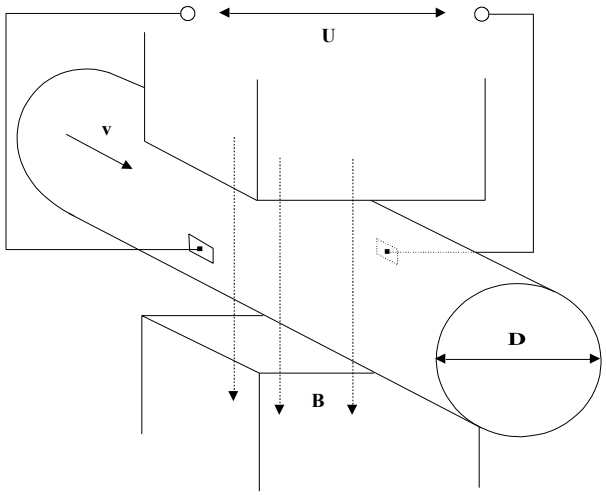
The converter processes the measuring signal from the measuring sensor into the 4...20 [mA] signal and Modbus RTU/RS 485.

6.2. The operating principle

The measurement flow uses the phenomenon of electromagnetic induction. In accordance with the law of Faraday the conductor moving in the magnetic field induces the electrical voltage. To designate the induced voltage the following equation is applied:

$$U=B \times D \times v$$

where:
U – induced voltage
v – the average flow velocity vector
D – diameter of the pipe
B – magnetic flux density



If magnetic flux density B and the pipe diameter D are constant the induced voltage is proportional to the average flow velocity. The fluid flows through the flow meter perpendicularly to the magnetic field. The electrical voltage, which is controlled by two electrodes, placed at right angles to both the magnetic field and the flow, is induced by the stream of the electrical conductive fluid. The excitation of the rectangular-wave shape current is generated in the converter and fed to the spool coils of the measuring sensor, producing the magnetic field of the flow meter. The power supply provides the coil with constant excitation in all working condition of the flow meter.

6.3. Design and dimensions

The electromagnetic flow meter PEM-1000 comprises the converter and the measuring sensor. In the compact version the converter placed in the aluminum housing is embedded directly on the sensor. In the separate version the converter is mounted using the assembly equipment to the pipe or flat surface.

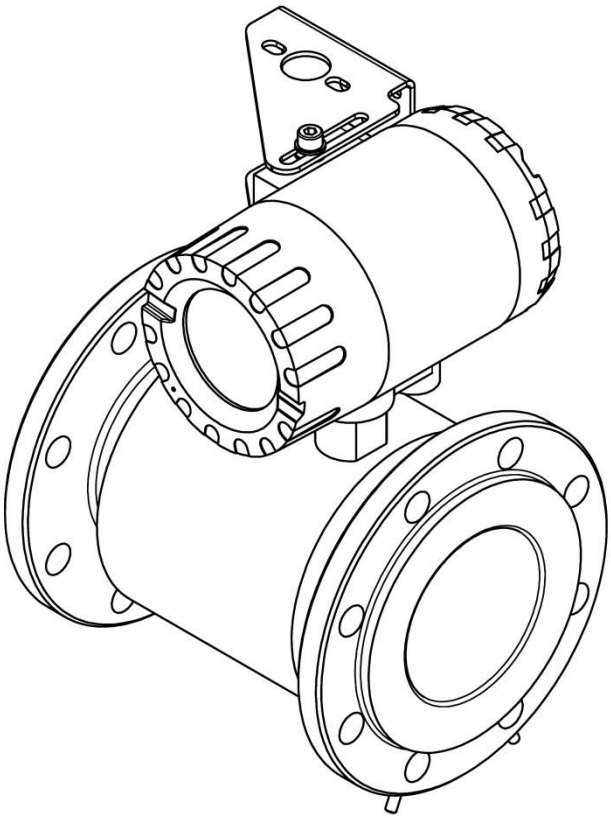


Figure1. The flow meter PEM-1000ALW. The compact version

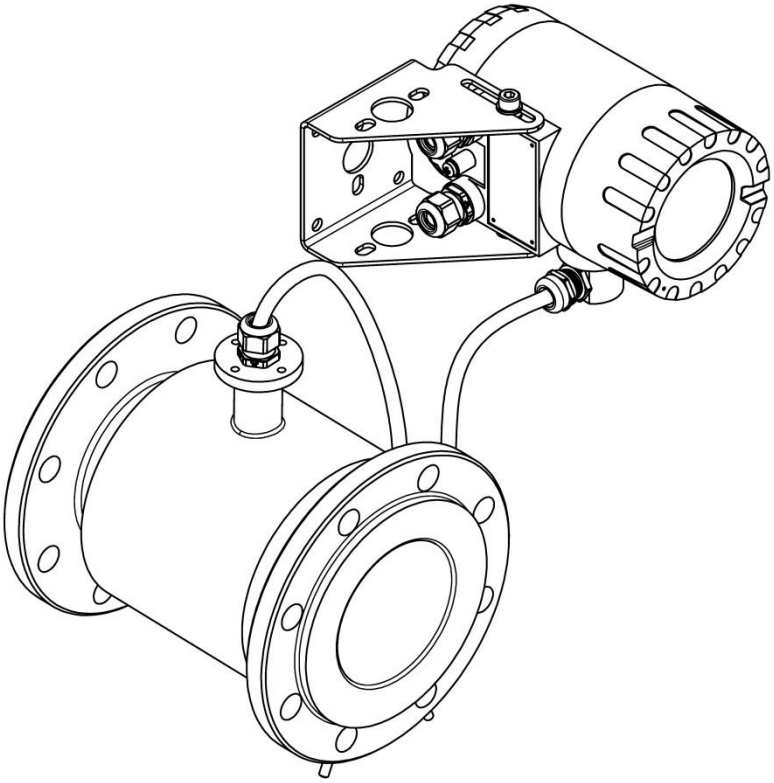


Figure2. The flow meter PEM-1000NW. The separate version.

6.3.1. The sensor design

The housing of the sensor is made of non-magnetic material, welded with flanges and fasteners. The insulating insert of the required properties is installed inside the pipe (compatible with the medium type). The system of the electromagnet coils generating the required magnetic field is mounted directly on the measuring pipe.
A pair of electrodes placed opposite to each other and passing through the lined measuring pipe is made of acid-resistant steel (standard) or of other electrically conductive materials matched to the properties of the measured medium.
The electrical system of the sensor is welded in the steel housing with the internal wiring lead.

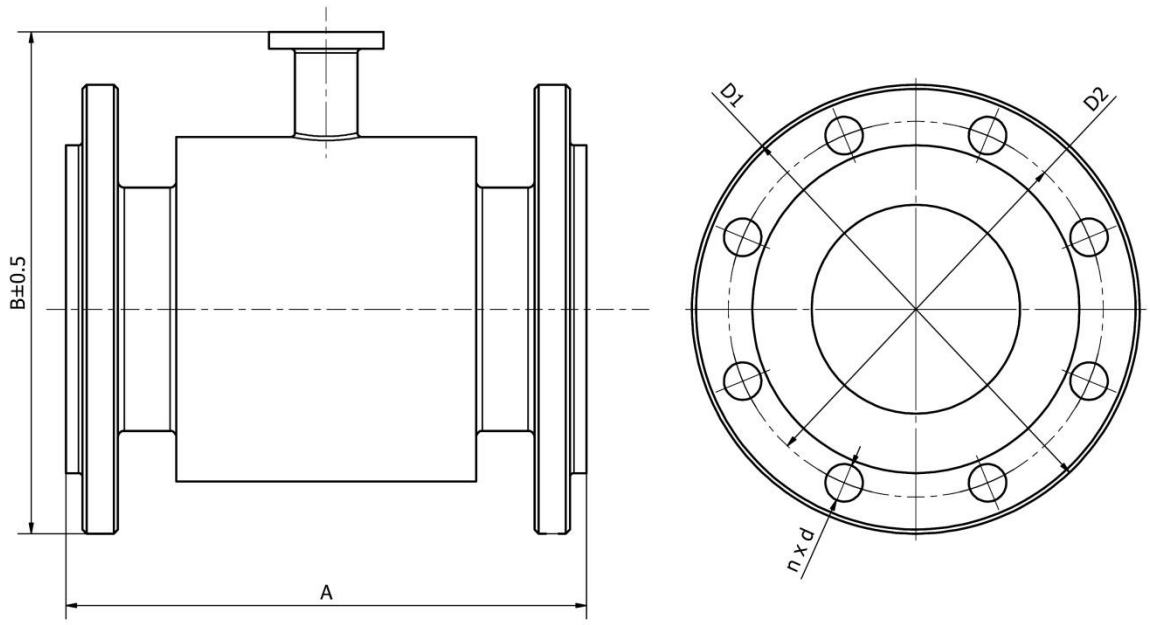


Figure3. The flow meter sensor. Overall dimensions

Mechanical data of the sensor PN16								
		Dimensions [mm]						**Weight**
DN	PN	A	B	D1	D2	d	n	kg
10	16	150	153	90	60	14	4	2.5
15		or 200	155	95	65	14	4	2.5
20			160	105	75	14	4	3
25			167	115	85	14	4	3.5
32			180	140	100	18	4	5
40			185	150	110	18	4	6
50		200	191	165	125	18	4	7
65			209	185	145	18	4	8
80			224	200	160	18	8	9.5
100		250	245	220	180	18	8	12
125			276	250	210	18	8	15

150		300	305	285	240	22	8	20
200		350	375	340	295	22	12	36
250		400	430	405	355	26	12	58
300		500	487	460	410	26	12	70
350			542	520	470	26	16	85
400		600	615	580	525	30	16	100
450			657	640	585	30	20	120
500			750	715	650	33	20	160
600			870	840	770	36	20	190
700		700	927	910	840	36	24	260
800		800	1050	1025	950	39	24	350
900		900	1145	1125	1050	39	28	450
1000		1000	1285	1255	1170	42	28	550

Table 1. Mechanical data of the sensor – PN 16

Mechanical data of the PN 25 sensor								
		Dimensions [mm]						**Weight**
DN	PN	A	B	D1	D2	d	n	kg
10	25	150	153	90	60	14	4	2.5
15		or 200	155	95	65	14	4	2.5
20			160	105	75	14	4	3
25			167	115	85	14	4	3.5
32			180	140	100	18	4	5
40			185	150	110	18	4	6
50		200	191	165	125	18	4	7
65			209	185	145	18	4	8
80			224	200	160	18	8	9.5
100		250	245	235	190	22	8	12
125			276	270	220	26	8	15
150		300	305	300	250	26	8	20
200		350	375	360	310	26	12	36
250		400	430	425	370	30	12	58
300		500	487	485	430	30	16	70
350			542	555	490	33	16	85
400		600	615	620	550	36	16	100
450			657	670	600	36	20	120
500			750	730	660	36	20	160
600			870	845	770	39	20	190
700		700	927	960	875	42	24	260
800		800	1050	1085	990	48	24	350
900		900	1145	1185	1090	48	28	450
1000		1000	1285	1320	1210	56	28	550

Table 2. Mechanical data of the sensor – PN 25

Mechanical data of the PN 40 sensor								
		Dimensions [mm]						Weight
DN	PN	A	B	D1	D2	d	n	kg
10	40	150	153	90	60	14	4	2.5
15		or 200	155	95	65	14	4	2.5
20			160	105	75	14	4	3
25			167	115	85	14	4	3.5
32			180	140	100	18	4	5
40			185	150	110	18	4	6
50		200	191	165	125	18	4	7
65			209	185	145	18	4	8
80			224	200	160	18	8	9.5
100		250	245	235	190	22	8	12
125			276	270	220	26	8	15
150		300	305	300	250	26	8	20
200		350	375	375	320	30	12	36
250		400	430	450	385	33	12	58
300		500	487	515	450	33	16	70
350			542	580	510	36	16	85
400		600	615	660	585	39	16	100
450			657	685	610	39	20	120
500			750	755	670	42	20	160
600			870	890	795	48	20	190

Table 3. Mechanical data of the sensor – PN 40

6.3.2. Electrodes

- The material of the flow meter electrodes should be matched according to its chemical resistance to the liquid in which the electrodes are immersed.
- The cleanliness of the electrodes may affect the precision of the measurement, and the accumulation of the impurities may have impact on the measurement process (isolation form the liquid).
- The cleaning of the electrodes is conducted together with the cleansing of the pipeline. Any damage to the liner must be avoided.
- The electrodes must be cleansed directly after the delivery, right before the installation.
- For most liquids, the electrodes do not require cleansing throughout the entire service period, the self-cleaning by the flowing liquid is sufficient. Self-cleaning is particularly effective at the flow speed of about 3m/s.

6.3.3. The converter design

The electronic module of the converter is placed in a solid aluminum housing. The housing has two screwed-off covers. The cover with a glass pane allows for the permanent, local data view on the display. The unscrewing of the lid enables the access to the three buttons of the local device operation.

The unscrewing of the cover located opposite to the glass pane secures the access to the connecting terminals (see: p.8.1).

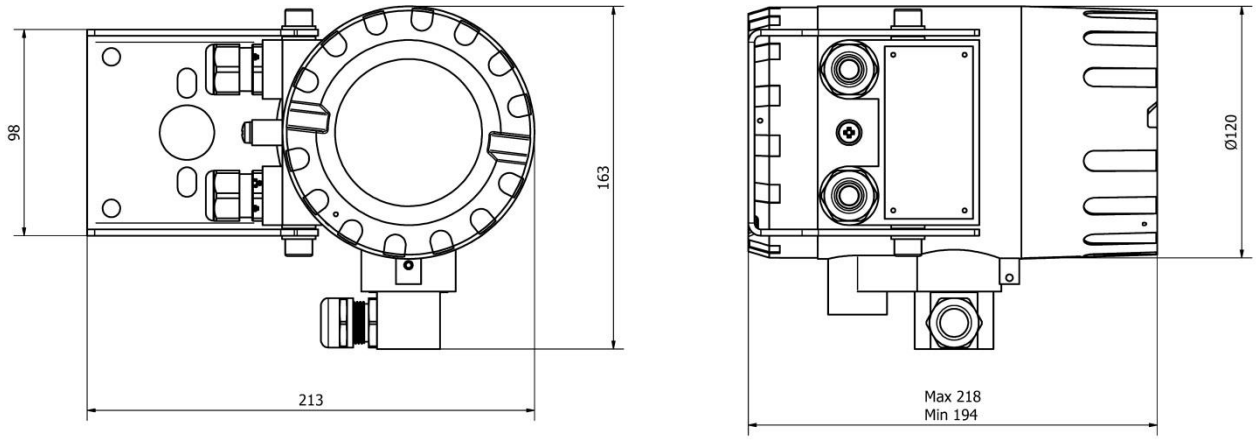


Figure4. Converter of the flow meter PEM-1000 with the mounting bracket. Overall dimensions

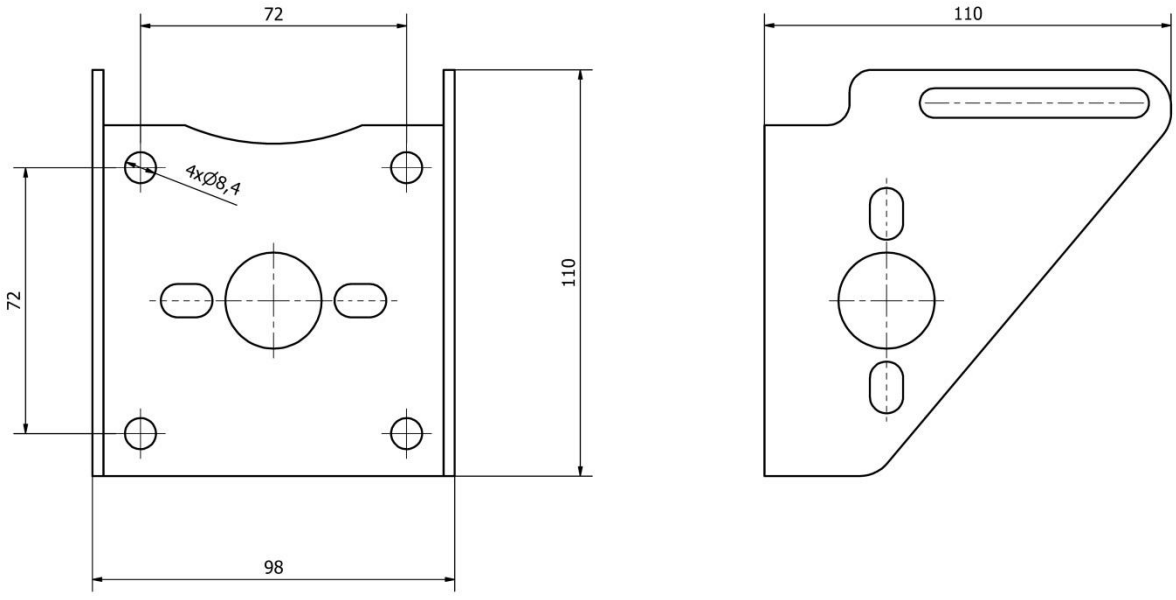


Figure5. Mounting bracket. Overall dimensions

6.4. Identification markings

Each converter is equipped with the rating plate containing the following data:

1. Logotype or name of the manufacturer;
2. The marking of the flow meter;
3. Product code;
4. CE Marking;
5. Serial number;
6. Maximum flow – Qmax;
7. Supply parameters;
8. Output signal;
9. IP class according to EN 60529;
10. Year of manufacture;
11. "Caution" Symbol. See important information contained in the service manual,
12. The information symbol concerning dealing with used equipment.

Each sensor is equipped with a plate containing the following data:

1. Logotype or name of the manufacturer;
2. CE Mark
3. Product code
4. Name and type of the sensor
5. Nominal diameter DN
6. Serial number of the sensor;
7. Year of manufacture;
8. Maximum pressure;
9. Liner material;
10. IP class according to EN 60529;
11. "Caution" Symbol. See important information contained in the service manual;
12. Marking of flow direction.

7. ASSEMBLY

7.1. General recommendations

- Sensor of the electromagnetic flowmeter can be installed in any position in accordance with the requirements but in case of vertical installation axis of the electrodes should be always horizontal.
- Entire space inside the sensor should be filled with the measured liquid during the measurements.
- It is recommended to ensure that direction of flow is consistent with direction of the arrow on cover of the sensor; converter is factory set for operation in this direction. It is possible to reverse direction of flow on operating device but then also direction of flow in converter parameters should be changed.
- It needs to be checked before the assembly whether there is enough space at the flange to mount the flow meter using the available screws and nuts.
- To avoid the influence on the vibration measurement as well as on the deflection installation, the piping system must be fixed on both sides of the flow meter.
- If the flow meter is installed on the pipeline with an greater inside diameter, a reducer must be applied to ensure the axial fastening without the increase of stress in pipes and flanges of the sensor.
- During installation the straight sections should be of nominal diameter of the sensor (DN) with lengths of at least 5DN before and 3DN after the sensor.
- When installing the sensor on an insulated pipe (e.g. glass, plastics etc.) please insulate the system with earthing rings connected with ground terminal of the sensor - (fig. 15).
- Conductive connection between ground (enclosure) of the sensor and liquid is necessary for correct measurements.
- It is essential to assemble the seal on both sides of the earthing ring during the installation. It must be ascertained that no element of the seal is not included in the clearance of the pipeline, as it may generate turbulence and disturb the flow meter operation.

7.2. Recommended assembly method for the sensor

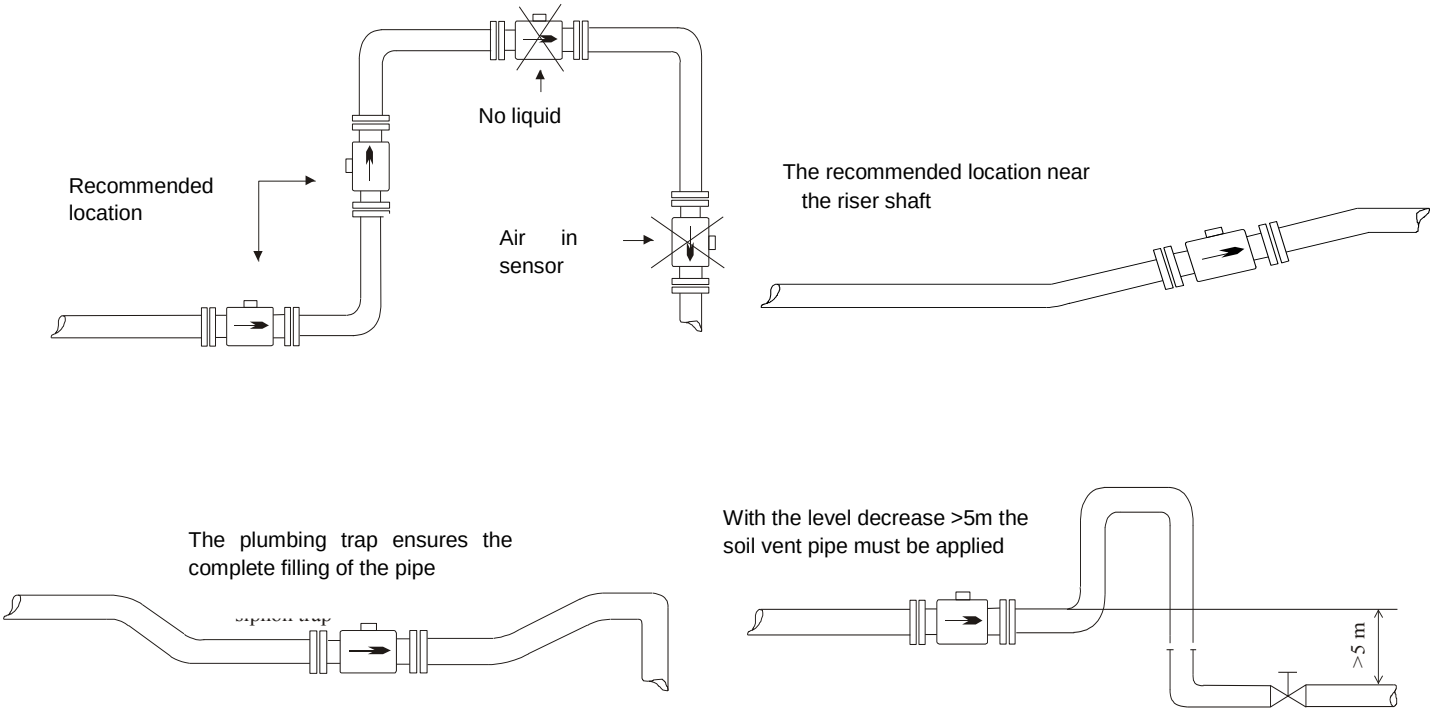


Figure6. Recommended assembly method for the sensor

To avoid metrological errors caused by air bubbles or liner damage, consider the following recommendations:

- During the assembly set the sensor properly, tighten the screws of the flanges, placed opposite each other, evenly one after another.
- The properly selected seal of the flanges ensures better effect than the excessive compressive force which may deform the flanges.
- The sensor should be mounted on the pipe to guarantee the axis of the measuring electrodes of the sensor to be always horizontal.
- Teflon liner requires particular attention during servicing and assembly. During the installation process the excessive negative pressure in the pipeline should be avoided. The stub-ups of the liner to the external surfaces of the flanges on both sides of the sensor must not be damaged. The sensors are supplied by the manufacturer containing special covers, which prevent deformation of the Teflon liner. The covers must be removed directly before the assembly, right before the insertion between the counter flanges.
- Seal – the part of the liner extended to the external surfaces of flanges fails to function as a seal, hence it must be placed between the flanges of the sensor and the pipeline. The seal protruding inside the pipe generates the flow turbulence and reduces the accuracy of measurements.

7.3. Assembly of the compact version of the converter

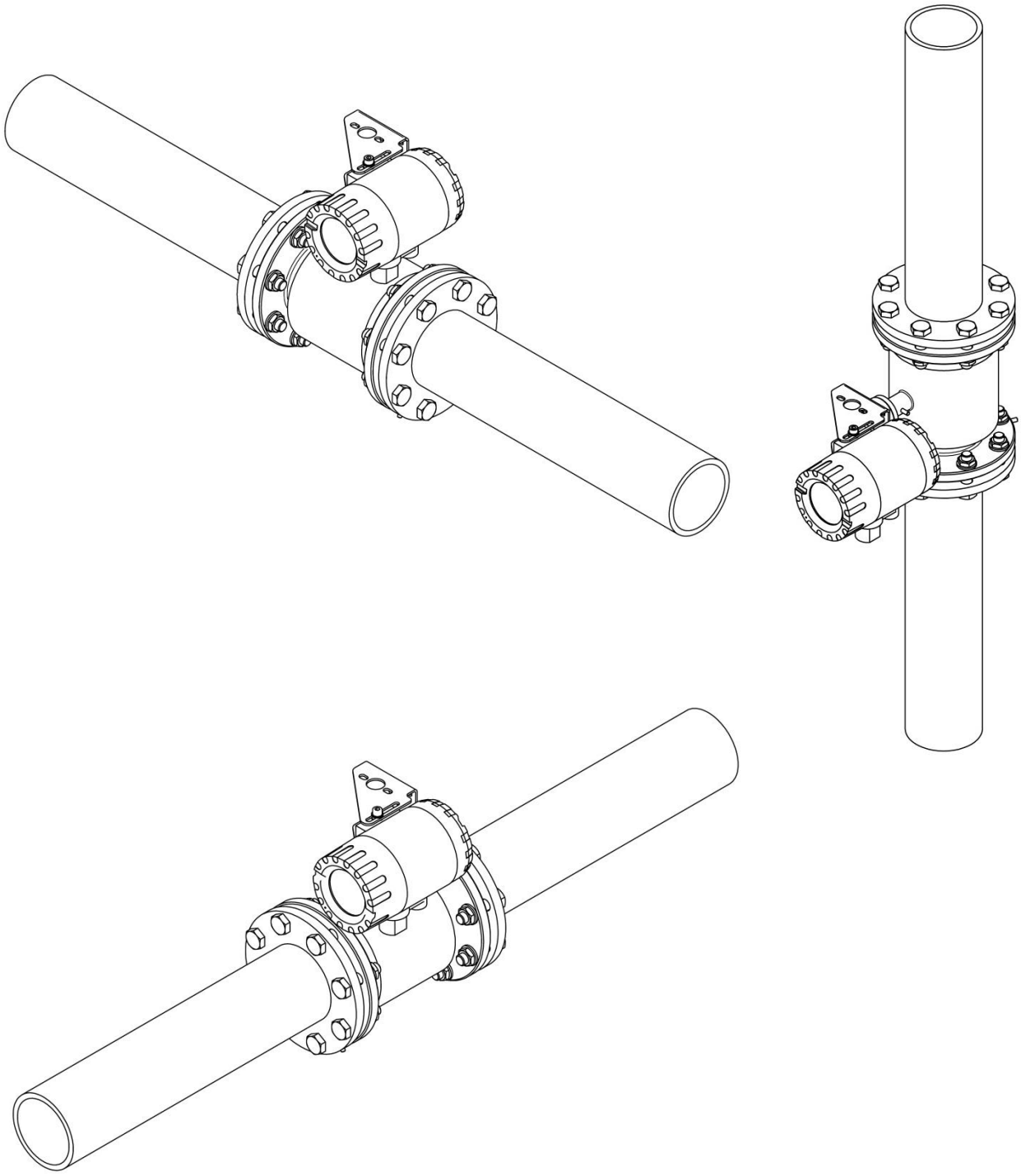


Figure7. Assembly of the flow meter PEM-1000ALW – examples.

7.4. Assembly of the separate version of the flow meter

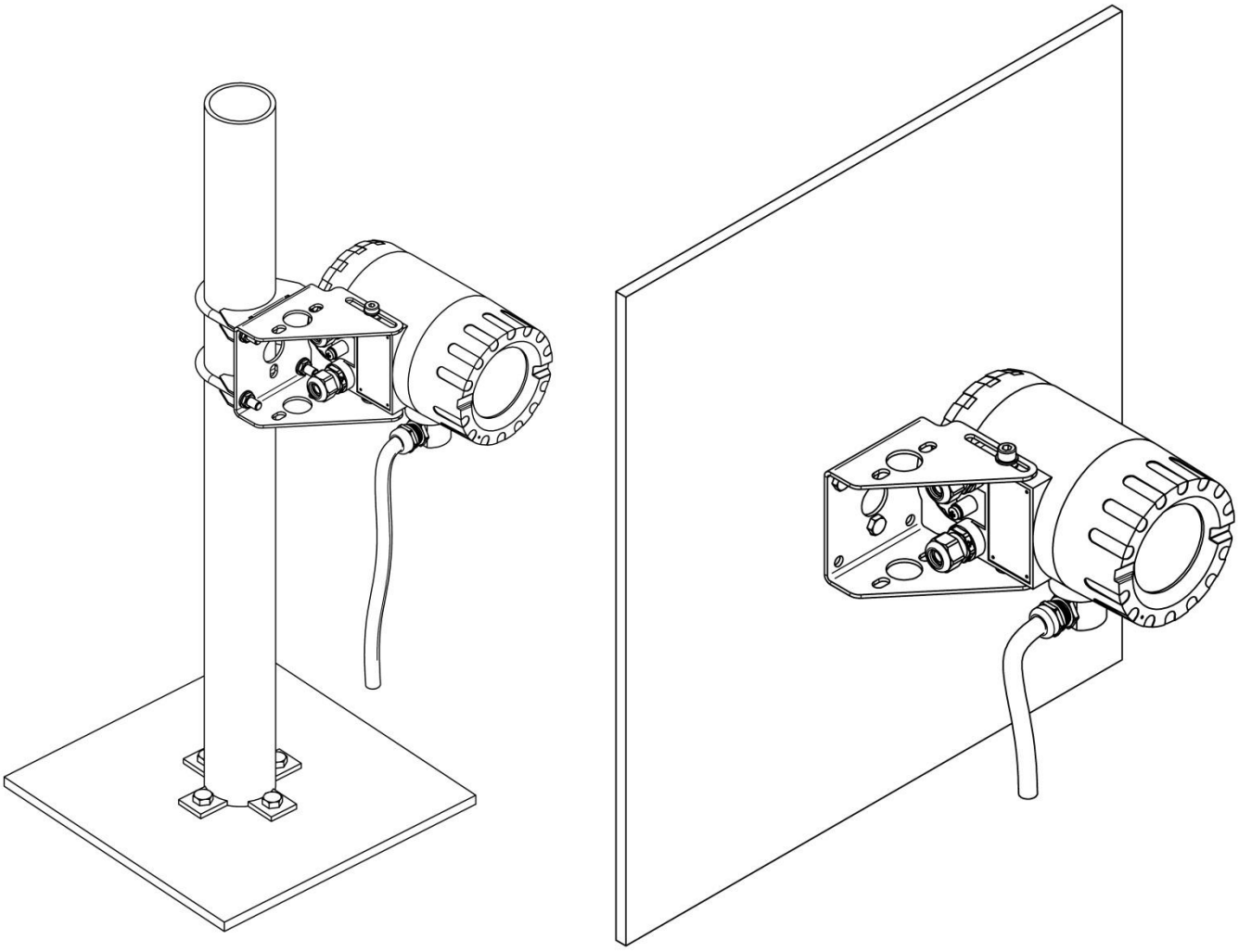


Figure8. Assembly of the flow meter PEM-1000NW – examples

8. CONNECTION

- All connection and installation activities must be performed with the disconnected power supply as well as other external voltages, if such are applied.
- Within close proximity to the converter of the flow meter (in the same room) the protected power switch must be mounted on the power supply line of the flow meter. It should be easily accessible and marked in a way which is distinct and in accordance with symbols complying with local electrical device safety regulations.

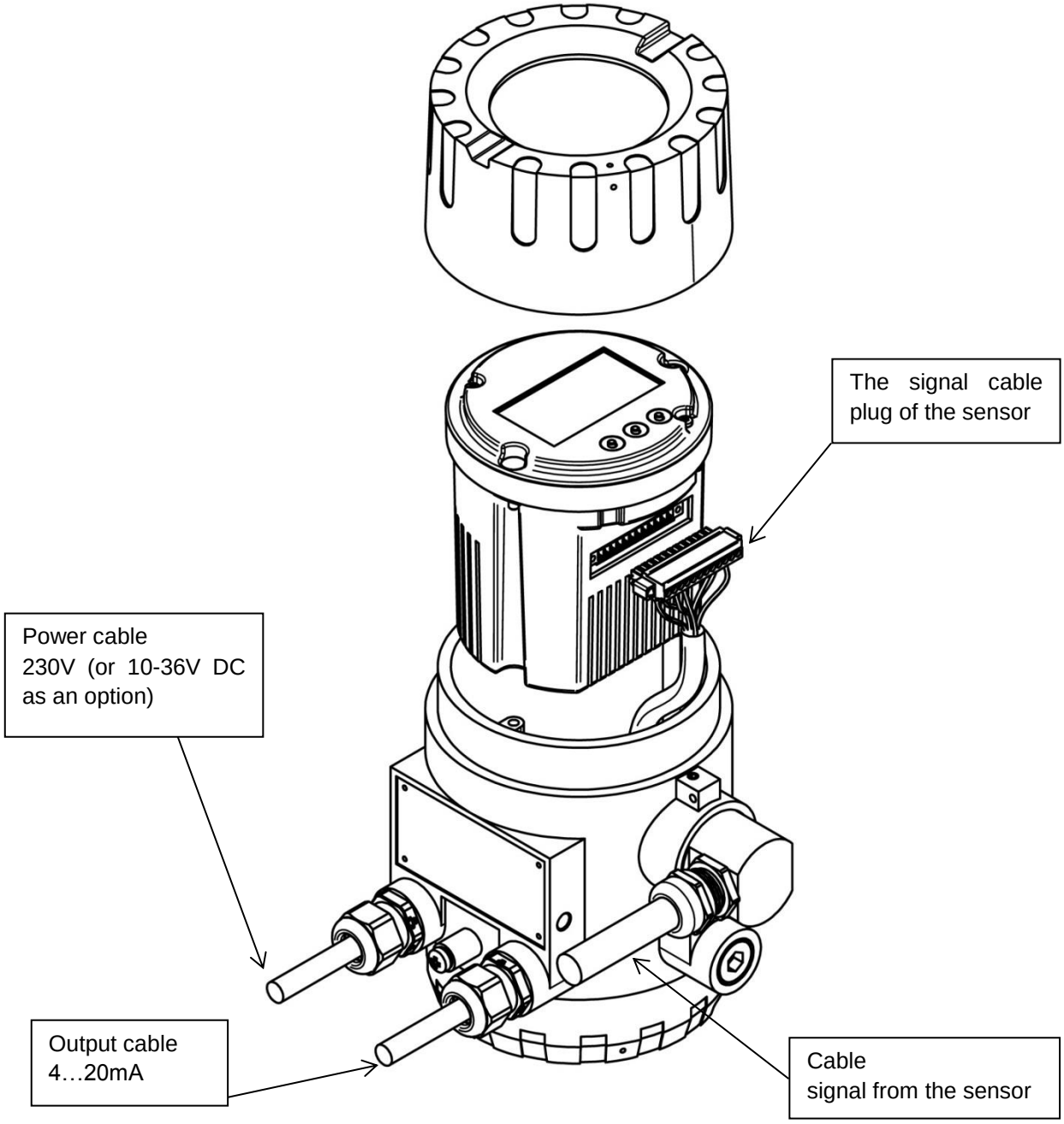
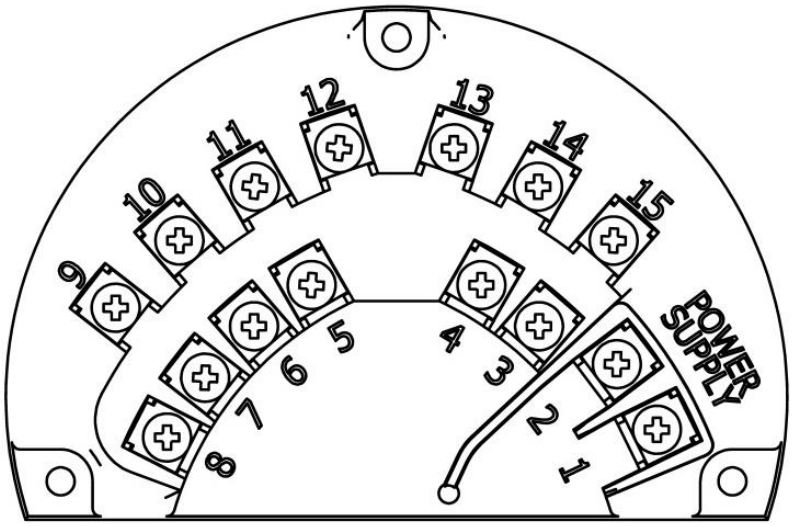


Figure .9 Stub-ups of electrical cables from the converter of the flow meter PEM-1000.

8.1. Electrical connection of the flow meter

Access to electrical terminals of the flow meter is obtained when the side cover of the housing of the converter gets unscrewed.
The following figure and the table show the distribution and purpose of individual terminals.



	Terminal no.	Description		
Power supply	1	mains power	(-)	low-voltage DC power supply (optional)
	2		(+)	
Binary output 1	3	any polarity galvanically isolated passive		
	4			
Pulse/frequency output	5	passive any polarity, galvanically isolated		
	6			
Analog current output 4 ÷ 20 Ma	7	(+)	active / passive (default active)	
	8	(-)		
Communication	9	RS 485 A	galvanically isolated ground should be connected	
	10	RS 485 B		
	11	RS 485 ground/screen		
Passive binary input	12	any polarity galvanically isolated		
	13			
Binary output 2	14	any polarity galvanically isolated passive		
	15			

Figure10. Marking and descriptions of connecting PINs of the flowmeter PEM-1000.

For security reasons the power supply and output cables must be carried to the inside of the housing through separate cable glands.

Cords (links) attached to screw terminals must be ended with sleeve tips of 0,75 mm ^{2}.

When connecting the flow meter to the power supply the following rules must be observed:

- Connections of electrical devices;
- Electrical safety;
- Rules on safe use of electrical installations by staff

Electrical protection of the device enables to operate in a variety of environments, and in consultation with the manufacturer it is possible to perform additional modifications to use the device in specific environmental conditions of a user. The signal cables of the sensor and the output cables of the converter should not be conducted alongside the energy cables or any other ones, which may generate interruptions.
Devices interoperating with the flow meter should be resistant to electromagnetic disturbances generated in the environment and according to the requirements of compatibility existing in the place of application.

Feeding the converter with the low-voltage power supply unit (optional) is connected to the same POWER SUPPLY terminals as the main power supply itself. It is not possible to connect the main power supply to the POWER SUPPLY terminals of the flow meter with the low-voltage feeder.

8.1.1. Power cable

The power cable must be adjusted to the cable gland in accordance with p. 11.3.2. with certified cables of operating voltage 300/500V.

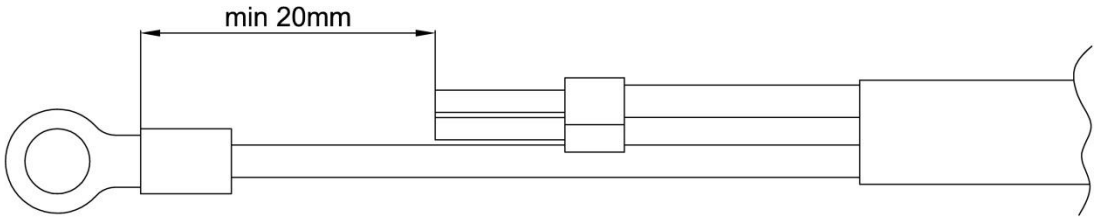


Figure11. Preparation of the power cable

For safety reason the power cable should be prepared in a way enabling the earthing cable (yellow-green) to be longer than the remaining cables to the minimum of 20 mm (fig. 11). The end of the earthing cable must be extended with the tip of M5 bolt loop. The crimp must be tightened on the earthing conductor with the sleeve press tool of properly adjusted size.

8.2. Connection of the signal cable to the sensor

- The values of the signals transmitted from the electrode system of the sensor to the flow meter are at the level of millivolts. These signals are extremely sensitive to magnetic and electrostatic disturbances which are generated by the adjacent high-voltage cables, energy cables or power supply lines feeding the high power electrical devices. The disturbances are compensated by the internal noise filter of the flow meter, however, if it is possible to eliminate the unwanted sources of signals it should be applied. For the PEM-1000NW flow meters it is recommended to place the signal cable from the sensor in separate cable channels.
- The signal cable extending from the sensor is of special design and constitutes the part of the order, hence its length should not be altered (in case of a certified device it must not be changed).
- The outer sheath (insulation) of the cable should remain intact along its entire length.

The cable conductors of the sensor must be connected to the plug in accordance with the table and the figures.

The incorrect connection of the cable conductors to the plug of the converter will cause a lot of measurement irregularities.

Socket/PIN in plug	Type of conductor of a cable	Colour of conductor of a cable
1	External screen of the cable	-
2	Internal screen of pair of the electrodes	-
3	-	-
4	A pair of electrodes	White
5	A pair of electrodes	Brown
6	-	-
7	-	-
8	-	-
9	-	-
10	Internal screen of pair of the coils	-
11	A pair of coils	Green
12	A pair of coils	Yellow

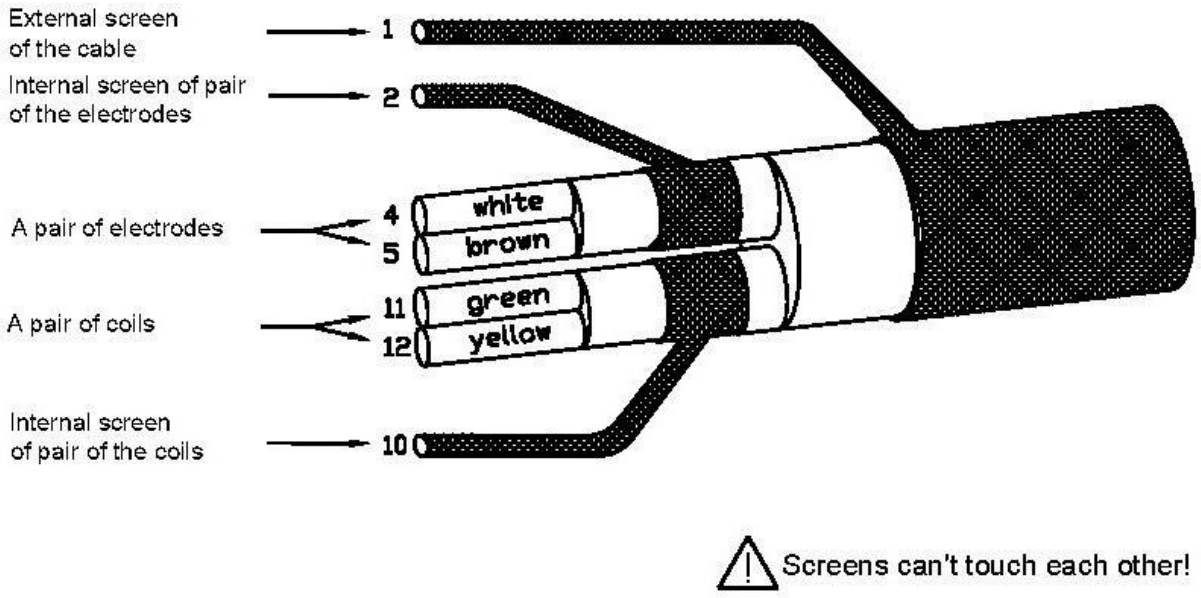


Figure .12 Marking of the stub-ups of the sensor cable conductors

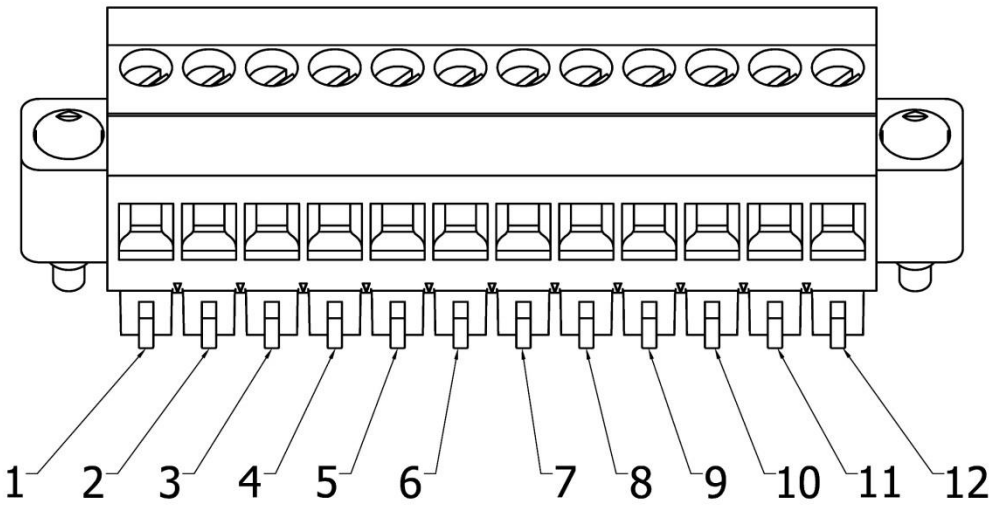


Figure .13 Connecting PINs of the sensor cable plug

8.3. Earthing

The device must be earthed in accordance with the rules existing at the place of installation. The relevant earthing terminals are placed on the housings of the sensor and the converter.

8.3.1. Protective earth

The protective terminal is located in the switching chamber of the converter housing. Cable connection is shown in the figure 14.

Marking of the protective earth connection point in the housing of the converter.

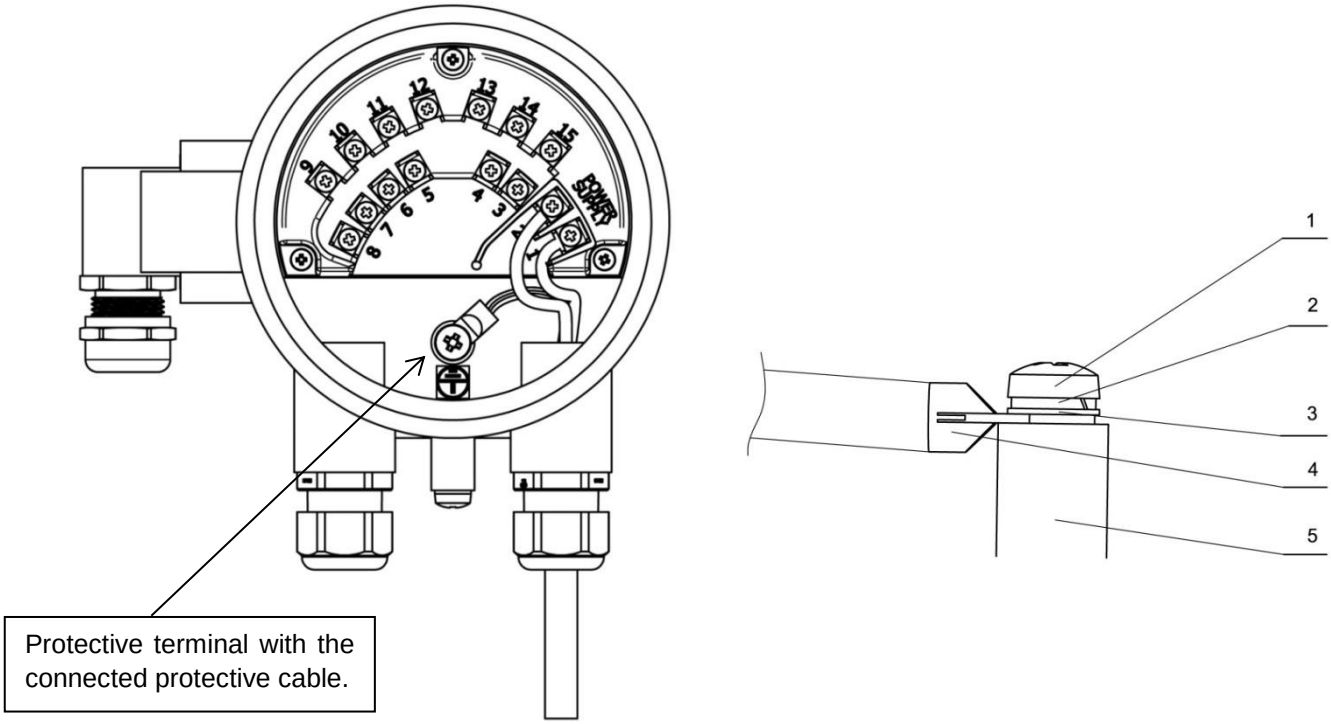


Figure .14 Manner of connection of the protective earth for the flow meter.

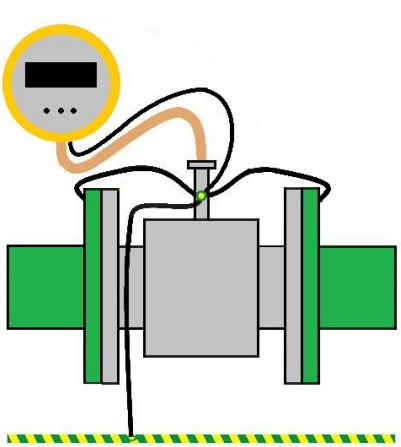
The sequence of elements in the properly provided connection of the protective earth (order of elements illustrated in the figure from the top):

1. M5 screw
2. Spring washer M5
3. Tooth washer
   acc. to DIN 6797 J-M5
4. Wire terminated with a tip clamped with M5 loop
5. Enclosure

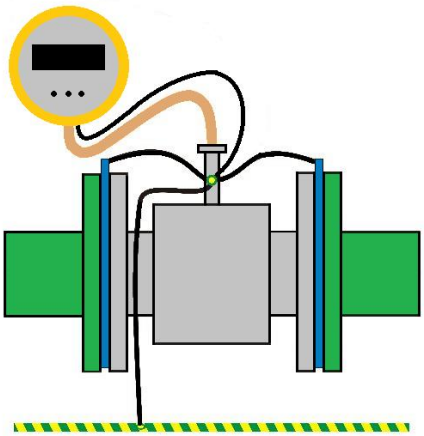
8.3.2. Functional earthing

When installing the flow meter in the separate version the proper connection of the earth housings of both the converter and the sensor must be ensured. The housing of the converter should always be connected to the housing of the sensor and attached to the earth point of the sensor as illustrated in the figures below, and the earth point of the sensor should be connected to a metal pipeline or to earthing rings in the case of non-conductive pipelines.

Marking of the earth connection points functional on the housings of the converter and the sensor.



Earthing of the sensor mounted on the pipeline; earthing cables have been marked in black



The use of the earthing rings for the sizes of DN 10÷DN 40 sensor mounted on plastic pipelines.

Figure .15 Manner of driving the line of the earthing functional in the PEM-1000 flow meter.

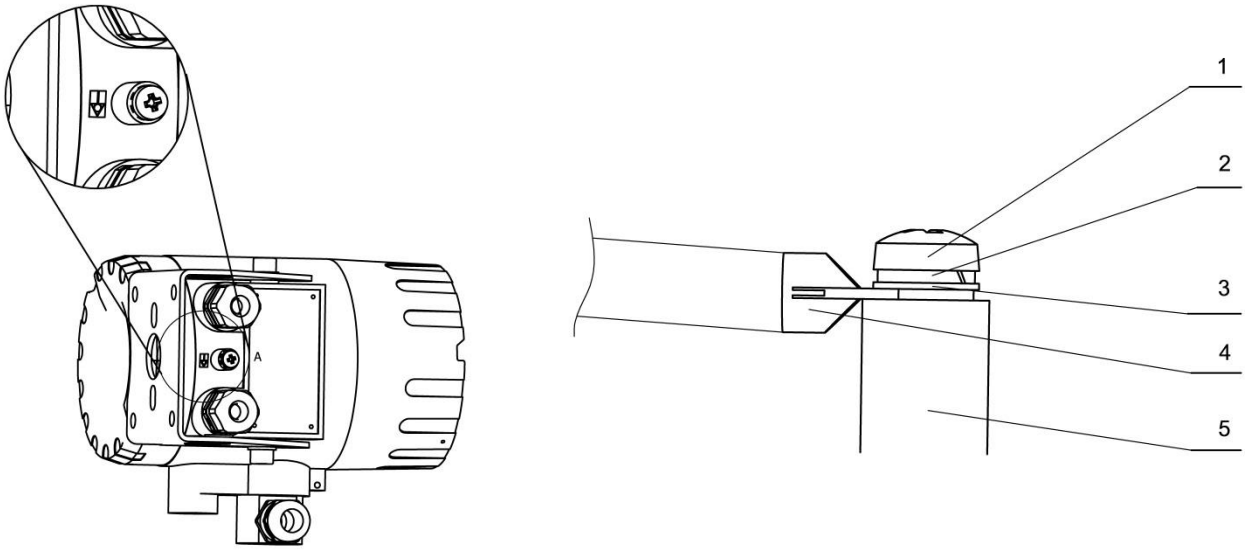


Figure .16 Manner of connection of the earthing functional for the converter housing.

The sequence of elements in the properly provided connection of the converter earthing (on fig. from the top):

1. M5 screw
2. Spring washer M5
3. Tooth washer acc. to DIN 6797 J-M5
4. Wire terminated with a tip with M5 loop
5. Enclosure

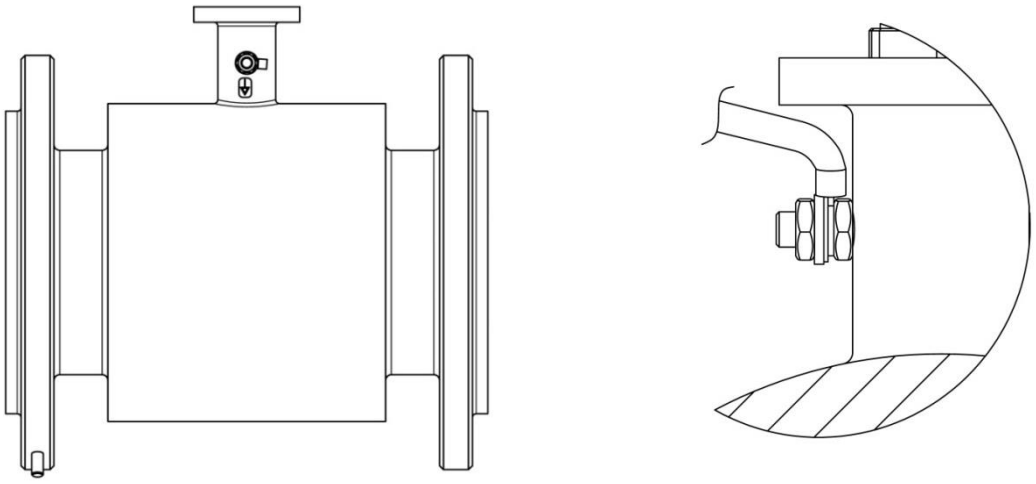


Figure .17 Manner of connection of the earthing functional for the sensor housing.

Connection components in assembly order:

1. Nut M6
2. Wire terminated with a tip with M6 loop
3. Tooth washer acc. to DIN 6797 J-M6
4. Spring washer M6
5. Nut M6

9. START-UP

After assembly and electrical connection of the flowmeter you should check the system and connections as follows:

- Check correctness of sensor and grounding selection.
- Tighten all cable connections, terminals and plugs in all connectors.
- Check completeness of the set, conformity with the serial number of sensor and converter.
- Check correctness of electric supply; pay attention to the label on the converter.
- Verify shock protections of the system.
- If no damages and defects are discovered in the system you should fill the pipeline with liquid and check its tightness. After short flushing switch the system - switch on - switch off - switch on and start measurement.

10. CONFIGURATION

10.1. User interface.

Operation of the flow meter is performed locally using three buttons and a display located under the screwed-off cover of the display.

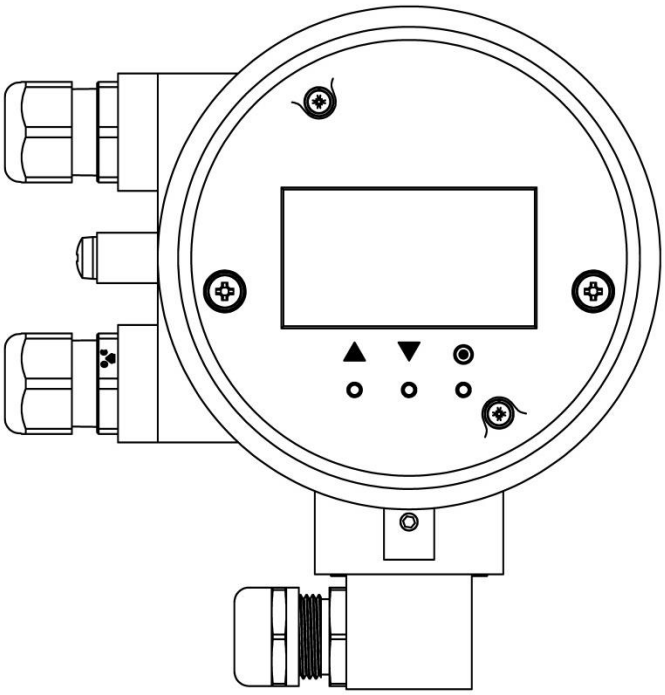


Figure .18 View of local user interface after unscrewing cover with a glass.

Buttons (marked with symbols) have the following actions assigned:

Left button [↑] usually is used to move level up, to the left or decrease value.
Central button [↓] usually is used to move level down, to the right or increase value.
Right button [◙] usually is used to select/confirm (*Enter*) possible changes of value.

10.2. Structure of local menu.

Abbreviations applying to the buttons and display used in the description:

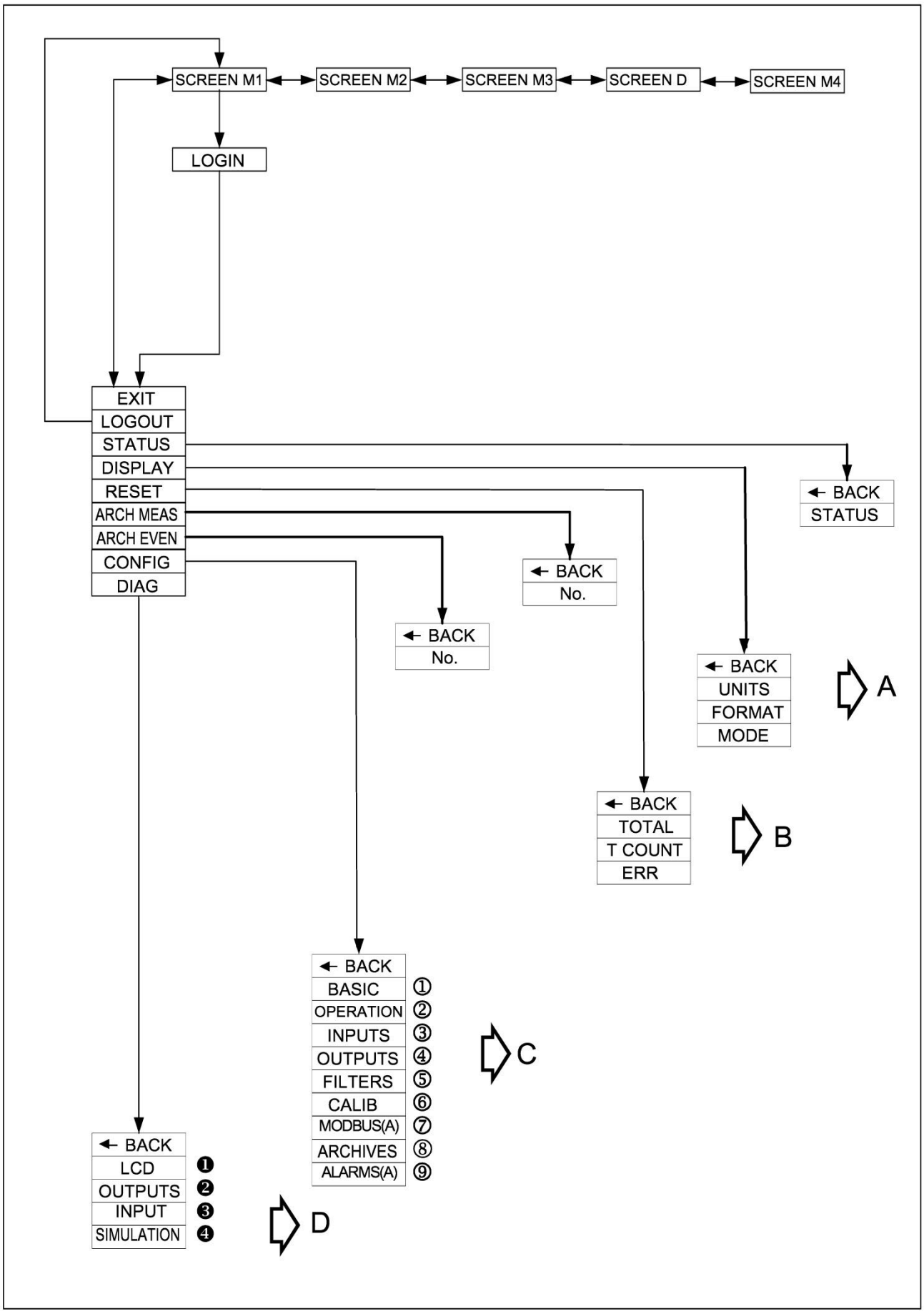
- PL – left button
- PS - central button
- PP – right button
- L1 - first line of LCD display
- L2 - the second line of the LCD display
- L3 - the third line of the LCD display
- L4 - the fourth line of the LCD display

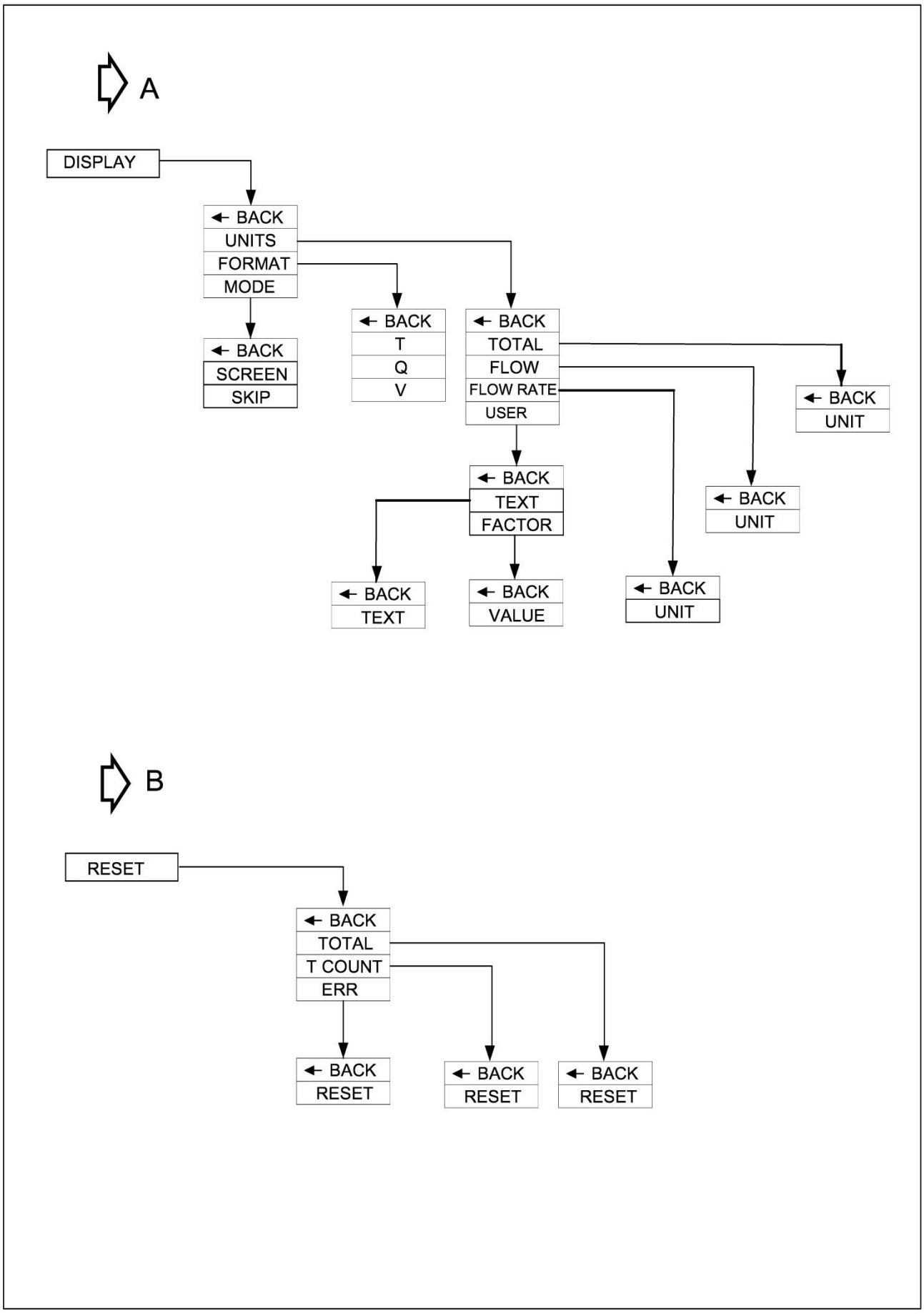
Login to flowmeter menu with various authorization level for functions takes place after entering four digit PIN:

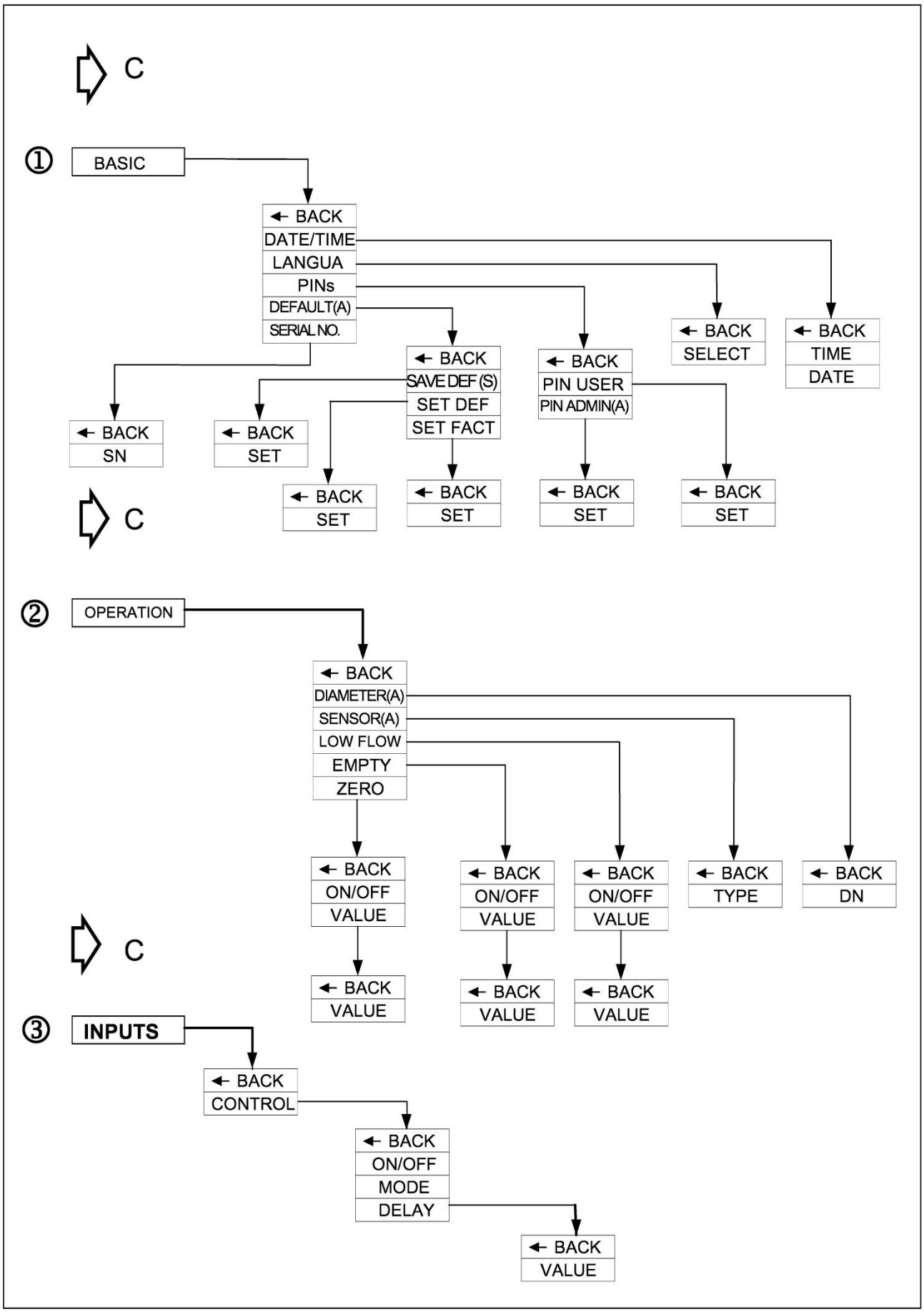
- USER - user with limited functionality, without access to selected menu items, PIN factory set to "1000".
- ADMIN - administrator with full functionality, without restriction in access to menu items, PIN factory set to "1020".

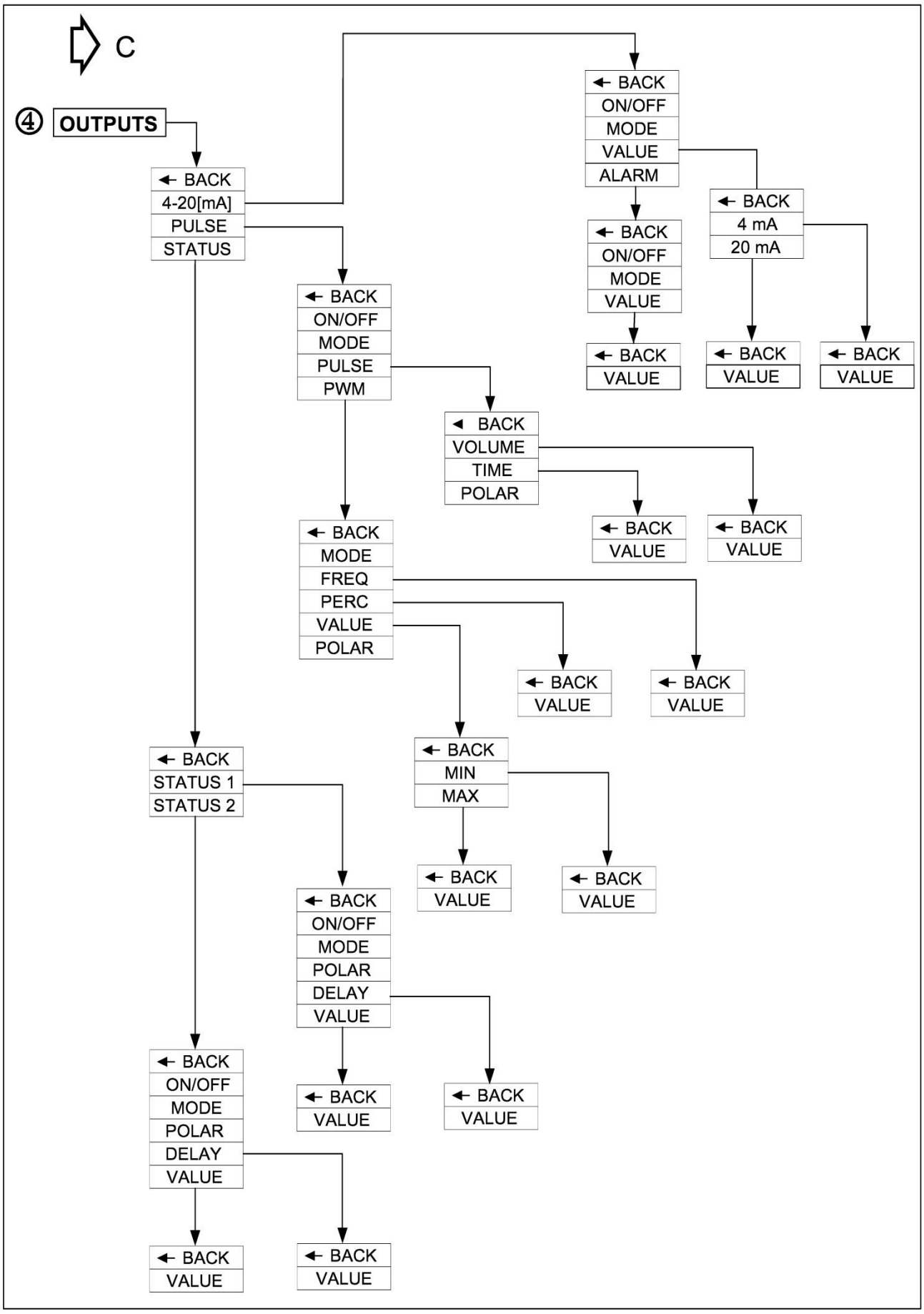
After logging in to flowmeter menu as USER and attempt to select function, to which access is restricted, the following message will be displayed on the screen: *"LACK OF ACCESS TO THIS OPTION."*

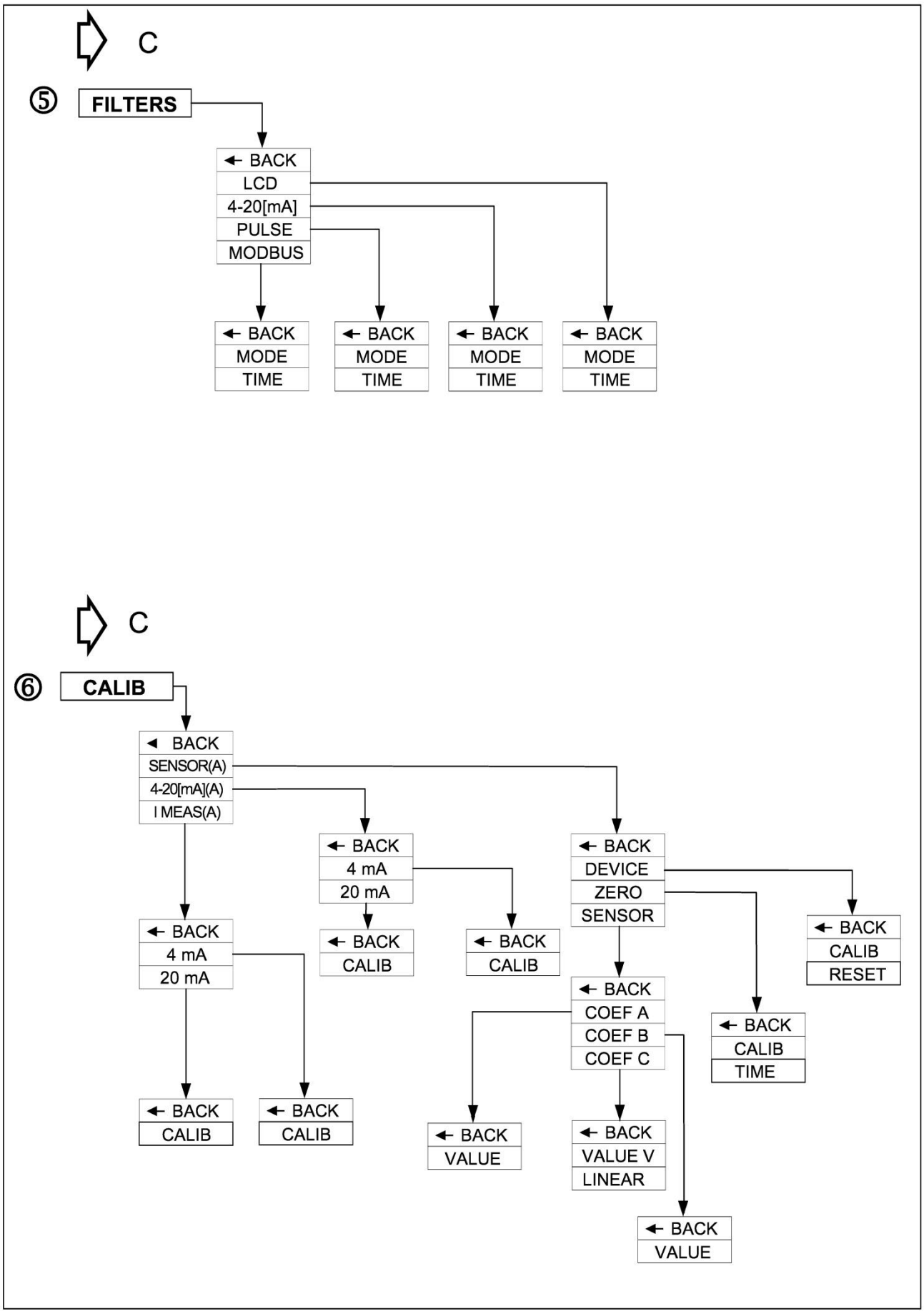
Navigation through the menu of local flowmeter PEM-1000 is presented on the diagrams.

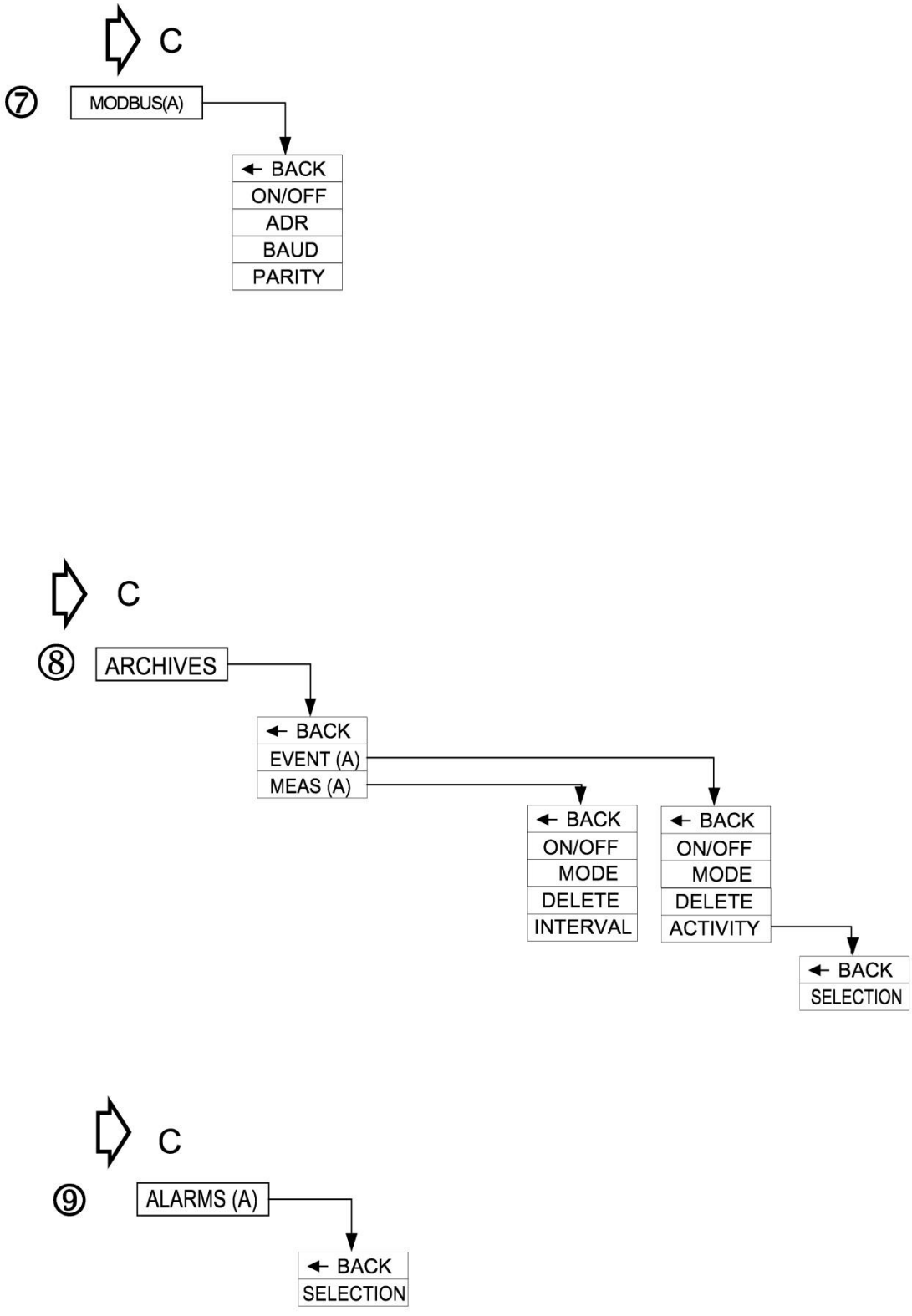

SCREEN M1
SCREEN M2
SCREEN M3
SCREEN D
SCREEN M4
LOGIN
EXIT
LOGOUT
STATUS
DISPLAY
RESET
ARCH MEAS
ARCH EVEN
CONFIG
DIAG
← BACK
STATUS
← BACK
No.
← BACK
No.
← BACK
UNITS
FORMAT
MODE
A
← BACK
TOTAL
T COUNT
ERR
B
← BACK
BASIC ①
OPERATION ②
INPUTS ③
OUTPUTS ④
FILTERS ⑤
CALIB ⑥
MODBUS(A) ⑦
ARCHIVES ⑧
ALARMS(A) ⑨
C
← BACK
LCD ❶
OUTPUTS ❷
INPUT ❸
SIMULATION ❹
D

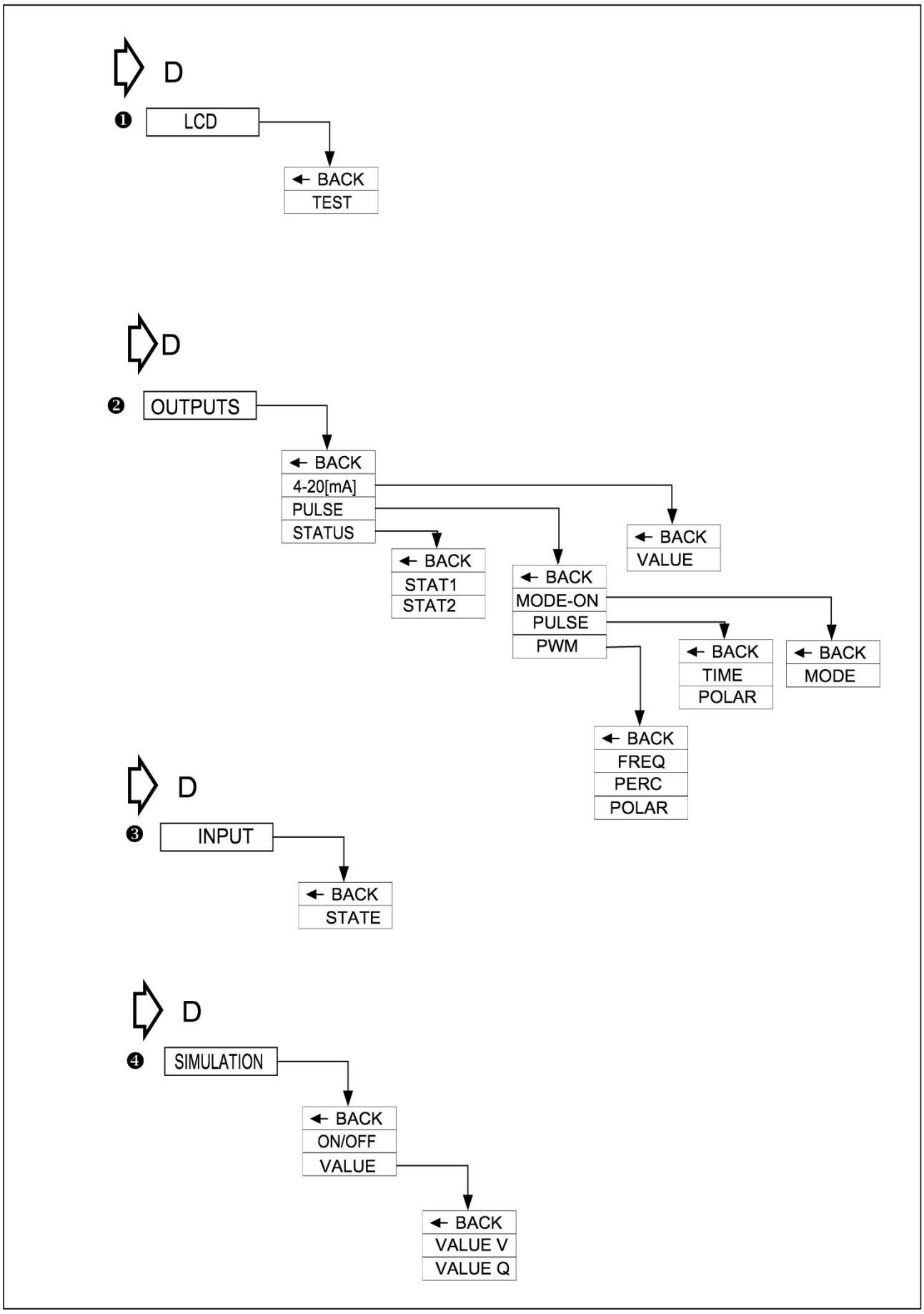

A
DISPLAY
BACK
UNITS
FORMAT
MODE
BACK
SCREEN
SKIP
BACK
T
Q
V
BACK
TOTAL
FLOW
FLOW RATE
USER
BACK
UNIT
BACK
TEXT
FACTOR
BACK
UNIT
BACK
TEXT
BACK
VALUE
BACK
UNIT
B
RESET
BACK
TOTAL
T COUNT
ERR
BACK
RESET
BACK
RESET
BACK
RESET


C
①
BASIC
← BACK
DATE/TIME
LANGUA
PINs
DEFAULT(A)
SERIAL NO.
← BACK
SELECT
← BACK
TIME
DATE
← BACK
SAVE DEF (S)
SET DEF
SET FACT
← BACK
PIN USER
PIN ADMIN(A)
← BACK
SN
← BACK
SET
← BACK
SET
← BACK
SET
← BACK
SET
← BACK
SET
C
②
OPERATION
← BACK
DIAMETER(A)
SENSOR(A)
LOW FLOW
EMPTY
ZERO
← BACK
ON/OFF
VALUE
← BACK
VALUE
← BACK
ON/OFF
VALUE
← BACK
VALUE
← BACK
ON/OFF
VALUE
← BACK
VALUE
← BACK
TYPE
← BACK
DN
C
③
INPUTS
← BACK
CONTROL
← BACK
ON/OFF
MODE
DELAY
← BACK
VALUE


C
④ OUTPUTS
BACK
4-20[mA]
PULSE
STATUS
BACK
ON/OFF
MODE
VALUE
ALARM
BACK
ON/OFF
MODE
VALUE
BACK
VALUE
BACK
4 mA
20 mA
BACK
VALUE
BACK
VALUE
BACK
ON/OFF
MODE
PULSE
PWM
BACK
VOLUME
TIME
POLAR
BACK
VALUE
BACK
VALUE
BACK
MODE
FREQ
PERC
VALUE
POLAR
BACK
VALUE
BACK
VALUE
BACK
STATUS 1
STATUS 2
BACK
MIN
MAX
BACK
VALUE
BACK
VALUE
BACK
ON/OFF
MODE
POLAR
DELAY
VALUE
BACK
VALUE
BACK
VALUE
BACK
ON/OFF
MODE
POLAR
DELAY
VALUE
BACK
VALUE
BACK
VALUE


C
⑤ FILTERS
BACK
LCD
4-20[mA]
PULSE
MODBUS
BACK
MODE
TIME
BACK
MODE
TIME
BACK
MODE
TIME
BACK
MODE
TIME
C
⑥ CALIB
BACK
SENSOR(A)
4-20[mA](A)
I MEAS(A)
BACK
4 mA
20 mA
BACK
CALIB
BACK
CALIB
BACK
CALIB
BACK
4 mA
20 mA
BACK
CALIB
BACK
CALIB
BACK
DEVICE
ZERO
SENSOR
BACK
CALIB
RESET
BACK
COEF A
COEF B
COEF C
BACK
CALIB
TIME
BACK
VALUE
BACK
VALUE V
LINEAR
BACK
VALUE


C
⑦
MODBUS(A)
← BACK
ON/OFF
ADR
BAUD
PARITY
C
⑧
ARCHIVES
← BACK
EVENT (A)
MEAS (A)
← BACK
ON/OFF
MODE
DELETE
INTERVAL
← BACK
ON/OFF
MODE
DELETE
ACTIVITY
← BACK
SELECTION
C
⑨
ALARMS (A)
← BACK
SELECTION


D
❶ LCD
← BACK
TEST
D
❷ OUTPUTS
← BACK
4-20[mA]
PULSE
STATUS
← BACK
STAT1
STAT2
← BACK
MODE-ON
PULSE
PWM
← BACK
FREQ
PERC
POLAR
← BACK
TIME
POLAR
← BACK
MODE
← BACK
VALUE
D
❸ INPUT
← BACK
STATE
D
❹ SIMULATION
← BACK
ON/OFF
VALUE
← BACK
VALUE V
VALUE Q

10.2.1. Description of the individual items in the local menu

Basic screens not requiring user logon

SCREEN M1
It consists of: **L1** – Q flow value with a sign expressed in the given units (*m3/h by default*) and displayed in set format. For floating type format, in case of number not containing on the screen the symbol "--------" is displayed In the case of "issue" by the frontend (exceeded differential voltage electrodes) or a lack of communication with the frontend then the symbol *"* * * * * *"* is shown. **L2** – value of main totalizer T with a sign expressed in the given units (*m3 by default*) and displayed in format set. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed. **L3** - current device status (OK / E_FE_XX – frontend error with code XX / E_SENS_XX - sensor error with code XX / E_MEM_XX – memory error with code XX /EMPTY – empty pipe / UNFILLED – unfilled pipe) and conditions (NO CALIBR – equipment with non-calibrated electronics / SIMUL – device operating in measurements simulation mode / LOCK – menu access blocked / UNLOCK – user logged in / E_COIL – error of sensor's coil resistance / Q_LOW – low flow level / I_SATL – bottom limit of saturation of current loop / I_SATH – upper limit of statuation of current loop / I_AL_L – alarm current, upper limit / I_AL_H – alarm current, upper alarm / I_AL_C – alarm current, user limit_. **L4** – current system date and time. Buttons: **PS** – switch to the second main screen. **PP** - login screen (when user is not logged in) or menu screen (when user is logged in) is displayed after pressing for 2 seconds.
SCREEN M2
It consists of: **L1** – value of positive totalizer TP expressed in the given units (*m3* by default) and displayed in set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed. **L2** – value of negative totalizer TM expressed in the given units (*m3/h* by default) and displayed in set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed. **L3** – value of linear flow V with a sign expressed in the given units (*m3 by default*) and displayed in format set. For *floating* type format, in case of number not containing on the screen the symbol "--------" *is displayed* In the case of "issue" by the frontend (exceeded differential voltage electrodes) or a lack of communication with the frontend then the symbol *"* * * * * *"* is shown. **L4** - device operation time meter CT (time display format: *days:hours:minutes:seconds*). Buttons: **PL** - switch to the first main screen. **PS** - switch to the third main screen.

SCREEN M3

It consists of:
L1 – *USER SCREEN:* message.
L2 – value of positive totalizer (resettable) TP expressed in the given units (*m3 by default*) and displayed in set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed.
L3 – value of negative totalizer (resettable) TM expressed in the given units (*m3/h by default*) and displayed in set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed.
L4 - device operation time meter (resettable) CT (time display format: days:hours:minutes:seconds).

Buttons:
PL - switch to the second main screen.
PS - switch to fourth main screen (optionally to screen with information concerning dosing for enabled functionality).

SCREEN D

Optional screen with information concerning dosing on primary screens level not requiring logging of the user displayed only when dosing function for any or status binary outputs is enabled.

It consists of:
L1 - for enabled dosing functions for first status output the current value of meter *D1*= metering dosed amount of substance expressed in the given units (*m3 by default*) and displayed in format set. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed. Message *OFF* for disabled dosing function of first output.
L2 – for enabled dosing function for second status output the current value of meter *D2*= metering dosed amount of substance expressed in the given units (*m3 by default*) and displayed in format set. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed. *OFF* message for disabled dosing function for second output.
L3 – the entered value *V1*=, which overloads the *D1* counter measuring the dosed amount of the liquid for the first status output, is expressed in appropriate units (*default m3*) and is displayed in the set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed.
L4 – the entered value *V2*=, which overloads the *D2* counter measuring the dosed amount of the liquid for the second status output, is expressed in appropriate units (*default m3*) and is displayed in the set format. For *floating* type format, in case of number not containing on the screen the symbol "--------" is displayed.

Buttons:
PL – switch to the third main screen.
PS – switch to the fourth main screen.

SCREEN M4
The fourth basic screen not requiring user to logon. It consists of: **L1** – device hardware version in X.Y.ZZZZ format where ZZZZ are four youngest figures of the device serial number. **L2** – software version. **L3** – device sensor version. **L4** – checksum (32-bit CRC displayed in format XX-XX-XX- XX) counted from memory space containing functions responsible for metrology of the flowmeter. Current value *CRC: 9E-C9-5E-9D*. Buttons: **PL** – switch to the third main screen.

EXEMPLARY SCREEN FOR DN50

SCREEN M1

```
Q=+20.0000  m3/h
T=+4575998.00 m3
 OK         LOCK
 14:07:34  08-12
```

SCREEN M2

```
TP=4575998.00 m3
TM=2.1524     m3
V=2.8213     m/s
CT=0007:09:35:09
```

SCREEN M3

```
  USER SCREEN:
TP=4575998.0  m3
TM=2.1647     m3
CT=0007:09:18:57
```

SCREEN M4

```
   Hard.: 0.1
 Soft.: 0.3.0520
FEv: B2/000101FD
CRC: 9E-C9-5E-9D
```

Explanations of menu items available from SCREEN M1

1

LOGIN – a screen which lets the user log into the device menu; depending on the entered correct PIN, it is possible to login with different privilege levels allowing access to functions of the flow meter, i.e. as a regular user (USER with limited privileges) or as an administrator (ADMIN with full privileges).

It consists of:
L1 – *LOGIN:* message.
L2 – the four-digit PIN which is being entered (digits which are not being currently edited are masked with a "*" symbol).
L3 – a "^" marker indicating the edited digit or the *Enter* message indicating where to confirm the entered PIN.
L4 – symbols indicating the function of PL and PS buttons.

Buttons:
PL – shift to editing PIN digit to the left of the currently edited digit.
PS – shift to editing PIN digit to the right of the currently edited digit.
PP – change the edited digit or confirm the entered PIN.

1 ***LOGIN***

MENU – main menu screen of the device.

It consists of:
L1 – message depending on the privilege level: *MENU (USER):* for a regular user and *MENU (ADMIN):* for an administrator.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select the indicated menu item (to select *Exit* the button must be pressed for 1 second, while to select *Logout* it must be pressed for 2 seconds).

1 ***LOGIN-MENU***

EXIT – exit the main menu of the device and return to the basic screen level.

2 ***LOGIN-MENU***

LOGOUT – log off the user from the main menu of the device and exit to the basic screen level.

3 ***LOGIN-MENU***

STATUS – extended description of the status of the device.

It consists of:
L1 – *STATUS = XX* message, where *XX* is the error number in case of an error and *00* if the status is *OK*.
L2 – *Back* menu item, indicated by a ">" marker.
L3 – description of the status, i.e. *Device is OK* message if there are no errors or *Device ERROR* message in case of errors.
L4 – *Description -->* message in case of errors.

Buttons:
PS – in case of errors, move to screens describing each error.
PP – select indicated menu item.

1 ***LOGIN-MENU-STATUS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-STATUS***

STATUS ERROR – description of current errors.

It consists of:
L1 – message with a description of the error *(Error FrontEnd / Error Sensor / Error Memory / Empty pipe / Unfilled pipe).*
L2 – message with code of the error (*Error code = XX*).
L3 – in case of SRAM errors, *SRAM error* message.
L4 – in case of EEPROM errors, *EEPROM error* message.

Buttons:
PL – return to the first status screen.
PS – move to next screen with error description.

4 ***LOGIN-MENU***

DISPLAY – setting display options for the device.

It consists of:
L1 – *DISPLAY:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY***

UNITS – setting units for measured values.

It consists of:
L1 – *UNITS DIS.:* message
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS***

TOTALIZERS – setting units for totalizers.

It consists of:
L1 – *TOTALIZERS UNIT:* message.
L2 – selectable *Back* menu item.
L3 – selectable *Unit*= menu item, along with currently set unit.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-TOTALIZERS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-TOTALIZERS***

UNIT – unit selection.

Buttons:
PL – scroll the list of units up.
PS – scroll the list of units down.
PP – select unit change mode (marker changes from ">" to "*") and confirm selected unit (marker changes from "*" to ">").

List of units:
- metric:
m3 – cubic meters
dm3 – cubic decimeters
cm3 – cubic centimeters
Ml – megaliters
hl – hectoliters
l – liters
ml – milliliters
- non-metric:
in3 – cubic inches
ft3 – cubic feet
af – acre-foot (1 acre of surface area to a depth of 1 foot)
ozf – fluid ounce
gUS (galUS) – US gallon equal to 231 in3
MgS (MgalUS) – mega US gallon
bbs (bblUS) – US standard fluid barrel equal to 31.5 US gallons
gUK (galUK) – imperial gallon equal to 4.54609 liters
MgK (MgalUK) – mega imperial gallon
bbk (bblUK) – imperial standard fluid barrel equal to 36 imperial gallons.
- user-defined:
--- (User) – unit which can be defined by the user whose value and description are set in a separate menu item.

3 ***LOGIN-MENU-DISPLAY-UNITS***

FLOW – setting flow units.

It consists of:
L1 – *FLOW UNIT:* message.
L2 – selectable *Back* menu item.
L3 – selectable *Unit*= menu item, along with currently set unit.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-FLOW***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-FLOW***

UNIT – unit selection.

Buttons:
PL – scroll the list of units up.
PS – scroll the list of units down.
PP – select unit change mode (marker changes from ">" to "*") and confirm selected unit (marker changes from "*" to ">").

List of units:
- metric:
m3/h – cubic meters per hour
m3/sec – cubic meters per second
m3/min – cubic meters per minute
m3/day – cubic meters per day
dm3/h
dm3/sec
dm3/min
dm3/day
cm3/h
cm3/sec
cm3/min
cm3/day
Ml/h
Ml/sec
Ml/min
Ml/day
hl/h
hl/sec
hl/min
hl/day
l/h
l/sec
l/min
l/day
ml/h
ml/sec
ml/min
ml/day
- non-metric:
in3/h
in3/sec
in3/min
in3/day
ft3/h
ft3/sec
ft3/min

ft3/day
af/h
af/sec
af/min
af/day
ozf/h
ozf/sec
ozf/min
ozf/day
gUS/h
gUS/sec
gUS/min
gUS/day
MgS/h
MgS/sec
MgS/min
MgS/day
bbS/h
bbS/sec
bbS/min
bbS/day
gUK/h
gUK/sec
gUK/min
gUK/day
MgK/h
MgK/sec
MgK/min
MgK/day
bbK/h
bbK/sec
bbK/min
bbK/day
- user-defined:
--- /h – unit per hour which can be defined by the user whose value and description are set in a separate menu item.
--- /sec – unit per second which can be defined by the user whose value and description are set in a separate menu item.
--- /min – unit per minute which can be defined by the user whose value and description are set in a separate menu item.
--- /day – unit per day which can be defined by the user whose value and description are set in a separate menu item.

4 ***LOGIN-MENU-DISPLAY-UNITS***

FLOW RATE – setting linear flow rate units.

It consists of:
L1 – *FLOW RATE UNIT:* message.
L2 – selectable *Back* menu item.
L3 – selectable *Unit*= menu item, along with currently set unit.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-FLOW RATE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-FLOW RATE***

UNIT – unit selection.

Buttons:
PL – scroll the list of units up.
PS – scroll the list of units down.
PP – select unit change mode (marker changes from ">" to "*") and confirm selected unit (marker changes from "*" to ">").

List of units:
m/s – meters per second
m/min – meters per minute
m/h – meters per hour
m/day – meters per day
cm/s
cm/min
cm/h
cm/day

5 ***LOGIN-MENU-DISPLAY-UNITS***

USER DEFINIT. – setting user-defined unit.

It consists of:
L1 – *USER UNIT:* message.
L2 – *Back* menu item.
L3 – *Text unit* menu item (setting displayed text description of the user-defined unit).
L4 – *Factor unit* menu item (setting the factor used to convert measurements to the user-defined unit).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT.***

TEXT UNIT – setting displayed text description of the user-defined unit.

It consists of:
L1 – *TEXT UNIT:* message.
L2 – *Back* menu item.
L3 – *Text*= menu item and currently set three-character description of the user-defined unit.
L4 – in edit mode, indicator of the character which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT.-TEXT UNIT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT.-TEXT UNIT***

TEXT= – entered three-character unit description.

Buttons:
PL – move the indicator of the character which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the character which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered unit description).
PP – select (marker changes from ">" to "*") and exit the description setting function (marker changes from "*" to ">") and change the character indicated by the marker (in ascending order).

3 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT***

FACTOR UNIT – setting the factor of the user-defined unit used to convert measurements.

It consists of:
L1 – *FACTOR UNIT:* message.
L2 – *Back* menu item.
L3 – *Val*= menu item and currently set factor expressed in cubic meters (a floating-point number).
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT-FACTOR UNIT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-UNITS-USER DEFINIT-FACTOR UNIT***

VAL= – entered user-defined unit factor defining how many cubic meters correspond to the defined unit (entered floating-point number is limited to values between 0.00001 – 9999999; it is not possible to set a value of 0 - a value of 0 is replaced with a factor of 1).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered factor).
PP – select (marker changes from ">" to "*") and exit the factor setting function (marker changes from "*" to ">") and change the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-DISPLAY***

FORMAT – setting the display format of measured values.

It consists of:
L1 – *FORMAT DIS.:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-FORMAT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-FORMAT***

T – selecting display format for totalizers, indicates currently set format.

Buttons:
PL – change the format to *floating* (normal floating-point notation displayed using a maximum of 8 characters).
PS – change the format to *scientific* (scientific notation X.XXXXEYY).
PP – select format change mode (marker changes from ">" to "*") and confirm selected format (marker changes from "*" to ">").

3 ***LOGIN-MENU-DISPLAY-FORMAT***

Q – selecting display format for flow, indicates currently set format.

Buttons:
PL – change the format to *floating* (normal floating-point notation displayed using a maximum of 8 characters).
PS – change the format to *scientific* (scientific notation X.XXXXEYY).
PP – select format change mode (marker changes from ">" to "*") and confirm selected format (marker changes from "*" to ">").

4 ***LOGIN-MENU-DISPLAY-FORMAT***

V – selecting display format for linear flow rate, indicates currently set format.

Buttons:
PL – change the format to *floating* (normal floating-point notation displayed using a maximum of 8 characters).
PS – change the format to *scientific* (scientific notation X.XXXXEYY).
PP – select format change mode (marker changes from ">" to "*") and confirm selected format (marker changes from "*" to ">").

4 ***LOGIN-MENU-DISPLAY***

MODE – setting the display mode for main screen (which of the basic screens M1, M2, M3 is to be displayed as the main screen and automatic screen change mode).

It consists of:
L1 – *MODE DIS.:* message.
L2 – *Back* menu item.
L3 – *Screen No* menu item (setting as main screen).
L4 – *Skip* menu item (setting mode for automatic "cycling" of main screens).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DISPLAY-MODE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DISPLAY-MODE***

SCREEN No.= – selecting main screen (*MAIN / COUN / USER*).

Buttons:
PL – decrease screen number.
PS – increase screen number.
PP – select screen change mode (marker changes from ">" to "*") and confirm selected screen (marker changes from "*" to ">").

3 ***LOGIN-MENU-DISPLAY -MODE***

SKIP= – setting automatic "cycling" of main screens (time between screen changes expressed in seconds, 0 means the function is turned off, adjustable between 0 – 120 seconds).

Buttons:
PL – decrease time between screen changes.
PS – increase time between screen changes.
PP – select time change mode (marker changes from ">" to "*") and confirm selected time (marker changes from "*" to ">").

5 ***LOGIN-MENU***

RESET – resetting the values of user's counters.

It consists of:
L1 – *RESET:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-RESET***

BACK – return to previous menu level.

2 ***LOGIN-MENU-RESET***

TOTALIZERS U – resetting user's totalizers.

It consists of:
L1 – *USER TOTALIZERS:* message.
L2 – *Back* menu item.
L3 – *Reset* menu item.
L4 – value of positive user's totalizer.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-RESET-TOTALIZERS U***

BACK – return to previous menu level.

2 ***LOGIN-MENU-RESET-TOTALIZERS U***

RESET= – resetting values set by default to *OFF*.

Buttons:

PL – set assigned function to *OFF*.
PS – set assigned function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function (marker changes from "*" to ">"), successful reset is indicated by an *OK* message.

3 ***LOGIN-MENU-RESET***

COUNTER TIME U – resetting (user's) operating time counter.

It consists of:
L1 – *USER COUNTER TI:* message.
L2 – *Back* menu item.
L3 – *Reset* menu item.
L4 – value of (user's) operating time counter.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-RESET-COUNTER TIME U***

BACK – return to previous menu level.

2 ***LOGIN-MENU-RESET-COUNTER TIME U***

RESET= – resetting values set by default to *OFF*.

Buttons:
PL – set assigned function to *OFF*.
PS – set assigned function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function (marker changes from "*" to ">"), successful reset is indicated by an *OK* message.

4 ***LOGIN-MENU-RESET***

ERRORS-resetting device status errors

It consists of:
L1 – *RESET ERRORS:* message.
L2 – *Back* menu item.
L3 – *Reset* menu item.
L4 – *STATUS = XX* message, where *XX* is the error number in case of an error and *00* if the status is *OK*.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-RESET-ERRORS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-RESET-ERRORS***

RESET= – resetting values set by default to *OFF*.

Buttons:
PL – set assigned function to *OFF*.
PS – set assigned function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function (marker changes from "*" to ">"), successful reset is indicated by an *OK* message.

6 ***LOGIN-MENU***

ARCHIVE MEAS.-browsing measurement archive.

It consists of:
L1 – *Back* menu item and *MEAS.:* message.
L2 – *No.:* menu item and number of measurements stored in memory *XXXX* and number of full memory records *YY* (if circular recording function is on) displayed as *XXXX/YY* (maximum number of records in memory is 8128).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-ARCHIVE MEAS.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-ARCHIVE MEAS.***

NO.: – displaying selected archive item (average value of measurements of flow Q).
It consists of:
L2 – In edit mode (archive browsing), number of currently displayed archive item *ZZZZ* and total number of all stored items *XXXX* are shown, displayed as *ZZZZ/XXXX*. If there are no records in the archive, message *Lack of records Memory Empty* is displayed. If an error occurs while reading a record from memory, message *Incorrect record Memory Error* is displayed.
L3 – in edit mode (archive browsing), stored average flow *Q* (for a period set in archive configuration menu) is displayed, expressed in units of flow configured in the menu (a floating-point number).
L4 – in edit mode (archive browsing), time and date when a given archive item was recorded is displayed (as month-day hour:minute).

Buttons:
PL – select previous archive item for display (after reaching the first item, move to last stored item).
PS – select next archive item for display (after reaching the final item, move to first stored item).
PP – select (marker changes from ">" to "*") and exit the measurement archive records browsing function (marker changes from "*" to ">").

7 ***LOGIN-MENU***

ARCHIVE EVENTS – browsing event archive.

It consists of:
L1 – *Back* menu item and *EVENTS:* message.
L2 – *No.:* menu item and number of events stored in memory *XXXX* and number of full memory records *YY* (if circular recording function is on) displayed as *XXXX/YY* (maximum number of records in memory is 8128).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-ARCHIVE EVENTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-ARCHIVE EVENTS***

NO.: – display selected archive item (name of event and possibly a parameter).

It consists of:
L2 – In edit mode (archive browsing), number of currently displayed archive item *ZZZZ* and total number of all stored items *XXXX* are shown, displayed as *ZZZZ/XXXX*. If there are no records in the archive, message *Lack of records Memory Empty* is displayed. If an error occurs while reading a record from memory, message *Incorrect record Memory Error* is displayed.
L3 – in edit mode (archive browsing), name of recorded event is displayed; a parameter may also be displayed following a "/".
L4 – in edit mode (archive browsing), time and date when a given archive item was recorded is displayed (as month-day hour:minute:second).

Buttons:
PL – select previous archive item for display (after reaching the first item, move to last stored item).
PS – select next archive item for display (after reaching the final item, move to first stored item).
PP – select (marker changes from ">" to "*") and exit the measurement archive records browsing function (marker changes from "*" to ">").

List of events recorded in the archive:
Start – device start-up
Event parameters:
– no parameter
Login – logged into the device menu
Event parameters:
User – operator with user privileges logged in
Admin – operator with administrator privileges logged in
Off – operator logged off
Status OK – device status changed to the correct value
Event parameters:
– no parameter
Error FE – FrontEnd error
Event parameters:
=XX – error code (a one-byte number store in hexadecimal format)
Error Sen – measuring sensor error
Event parameters:
=XX – error code (a one-byte number store in hexadecimal format)
Error Mem – device memory error
Event parameters:
EEPROM – EEPROM error
SRAM – SRAM error
Empty – empty pipe detected
Event parameters:
– no parameter
Unfilled – unfilled pipe detected

Event parameters:
– no parameter
Reset – user's counters reset
Event parameters:
Total. – user's totalizers reset
Count. – user's counter reset
Error. – errors reset
Tot.in – user's totalizers reset via binary input
Default – device parameters set to default values
Event parameters:
– no parameter
Factory – device parameters set to factory values
Event parameters:
– no parameter
Calibrat. – device calibration parameters saved
Event parameters:
Device – calibration of electronics (using artificial head sensor)
Zero – sensor zero point calibration
Sensor – sensor calibration (coefficients A, B i C).
Coil Err – flow meter coil error
Event parameters:
– no parameter
Low Flow – low flow rate detected.
Event parameters:
– no parameter

8 ***LOGIN-MENU***

CONFIGURATION – device configuration.

It consists of:
L1 – *CONFIGURATION:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION***

BASIC – configuring basic device functions.

It consists of:
L1 – *BASIC CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC***

SET DATE/TIME – setting time and date of the internal clock of the device.

It consists of:
L1 – *Back* menu item.
L2 – *T:* menu item (setting time).
L3 – *D:* menu item (setting date).
L4 – indicator of item which is being set.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DATE/TIME***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DATE/TIME***

T: – setting the time of the internal clock of the device.

Buttons:
PL – move the indicator of the time digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the time digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered values).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value indicated by the marker (in ascending order within a limited range appropriate to the digit being changed).

3 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DATE/TIME***

D: – setting the date of the internal clock of the device.

Buttons:
PL – move the indicator of the time digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the time digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered values).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value indicated by the marker (in ascending order within a limited range appropriate to the digit being changed).

3 ***LOGIN-MENU-CONFIGURATION-BASIC***

SET LANGUAGE – selecting the language of the flow meter menu.

It consists of:
L1 –*LANG.SELECTION:* message.
L2 – *Back* menu item.
L3 – *Select*= menu item (selecting the menu language from a defined list).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET LANGUAGE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET LANGUAGE***

SELECT – selecting the language of operation.

Buttons:
PL – scroll the list of defined languages up.
PS – scroll the list of defined languages down.
PP – select language change mode (marker changes from ">" to "*") and confirm selected language (marker changes from "*" to ">").

List of defined languages:
English

4 ***LOGIN-MENU-CONFIGURATION-BASIC***

SET PINS – setting PINs securing access do the device menu.

It consists of:
L1 – *SETTING PINS:* message.
L2 – *Back* menu item.
L3 – *Pin User* menu item (setting PIN for a regular user).
L4 – *Pin Admin* menu item (setting PIN for an administrator).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS***

PIN USER – setting PIN securing access to the device menu for a regular user.

It consists of:
L1 – *USER PIN:* message.
L2 – *Back* menu item.
L3 – *PIN:* menu item (setting PIN).
L4 – indicator of PIN digit currently being set.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS-PIN USER***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS-PIN USER***

PIN: – setting PIN for a regular user (digits not being currently edited are masked with a *"*"*).

Buttons:
PL – move the indicator of the PIN digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the PIN digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered PIN).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS***

PIN ADMIN – setting PIN securing access to the device menu for an administrator. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *ADMIN PIN:* message.
L2 – *Back* menu item.
L3 – *PIN:* menu item (setting PIN).
L4 – indicator of PIN digit currently being set.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS-PIN ADMIN***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET PINS-PIN ADMIN***

PIN: – setting PIN for an administrator (digits not being currently edited are masked with a "*").

Buttons:
PL – move the indicator of the PIN digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the PIN digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered PIN).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

5 ***LOGIN-MENU-CONFIGURATION-BASIC***

SET DEFAULT – default and factory settings of the device. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *DEFAULT CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT***

SAVE DEFAULT – store current device configuration as default configuration. Menu item available only to service personnel.

It consists of:
L1 – *DEFAULT PARAM.:* message.
L2 – *Back* menu item.
L3 – *Save*= menu item (allows to save current configuration as default).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SAVE DEFAULT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SAVE DEFAULT***

SAVE= – saving configuration.

Buttons:
PL – switch default configuration saving function to *OFF*.
PS – switch default configuration saving function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function, i.e. save configuration or cancel saving (marker changes from "*" to ">"), successful save is indicated by an *OK* message.

3 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SET DEFAULT***

SET DEFAULT – setting default device parameters (device restarts automatically after parameter setting is complete).

It consists of:

L1 – *DEFAULT PARAM.:* message.
L2 – *Back* menu item, and after default configuration has been "loaded", message *"WAIT FOR RESTART"* is displayed.
L3 – *Set*= menu item (enables setting default parameters).

Buttons:

PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SET DEFAULT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SET DEFAULT***

SET= – setting default configuration.

Buttons:
PL – switch default configuration setting function to *OFF*.
PS – switch default configuration setting function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function, i.e. "load" default configuration and restart the device or cancel loading (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT***

SET FACTORY – setting factory device parameters (non-modifiable parameters permanently stored in memory; device restarts automatically after parameter setting is complete).

It consists of:
L1 – *FACTORY PARAM.:* message.
L2 – *Back* menu item, and after factory configuration has been "loaded", message *"WAIT FOR RESTART"* is displayed.
L3 – *Set*= menu item (enables setting factory parameters).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SET FACTORY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC-SET DEFAULT-SET FACTORY***

SET= – setting factory configuration.

Buttons:
PL – switch factory configuration setting function to *OFF*.
PS – switch factory configuration setting function to *ENTER*.
PP – select (marker changes from ">" to "*") and execute set function, i.e. "load" factory configuration and restart the device or cancel loading (marker changes from "*" to ">").

6 ***LOGIN-MENU-CONFIGURATION-BASIC***

SERIAL NUMBER – reading serial number of the device.

It consists of:
L1 – *SERIAL NUMBER:* message.
L2 – *Back* menu item.
L3 – *SN*= menu item containing serial number of the device.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-BASIC- SERIAL NUMBER***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-BASIC- SERIAL NUMBER***

SN= – eight-digit serial number of the device.

3 ***LOGIN-MENU-CONFIGURATION***

OPERATION – setting operating parameters of the device.

It consists of:
L1 – *OPERAT. message CONFIG:*.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION***

PIPE DIAMETER – setting diameter of the pipe on which the device is installed. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *PIPE DIAMETER:* message.
L2 – *Back* menu item.
L3 – *DN*= menu item (selecting pipe diameter in mm from a defined list).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-PIPE DIAMETER***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-PIPE DIAMETER***

DN= – selecting the diameter of the pipe.

Buttons:
PL – scroll the list of defined diameters up.
PS – scroll the list of defined diameters down.
PP – select diameter change mode (marker changes from ">" to "*") and confirm selected diameter (marker changes from "*" to ">").

List of defined diameters:
2.5 [mm]
4 [mm]
6 [mm]
10 [mm]
15 [mm]
20 [mm]
25 [mm]
32 [mm]
40 [mm]
50 [mm]
65 [mm]
80 [mm]
100 [mm]
125 [mm]
150 [mm]
200 [mm]
250 [mm]
300 [mm]
350 [mm]
400 [mm]
450 [mm]
500 [mm]
600 [mm]
700 [mm]
800 [mm]
900 [mm]
1000 [mm]

3 ***LOGIN-MENU-CONFIGURATION-OPERATION***

SENSOR TYPE – setting type of sensor used. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *SENSOR TYPE:* message.
L2 – *Back* menu item.
L3 – *TYPE=* menu item (selecting sensor type – with two or three active electrodes).

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-SENSOR TYPE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-SENSOR TYPE***

TYPE= – sensor type selection.

Buttons:
PL – switch to type with two active electrodes.
PL – switch to type with three active electrodes.
PP – select (marker changes from ">" to "*") and confirm set type (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-OPERATION***

LOW FLOW RATE – setting low flow rate.

It consists of:
L1 – *LOW FLOW RATE:* message.
L2 – *Back* menu item.
L3 – *On/Off=* menu item (turning the low flow rate function on and off).
L4 – *Value* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-LOW FLOW RATE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-LOW FLOW RATE***

ON/OFF= – on and off the function.

Buttons:
PL – turn the low flow rate function *OFF*.
PS – turn the low flow rate function *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OPERATION-LOW FLOW RATE***

VALUE – setting threshold value for low flow rate function.

It consists of:
L1 – *Back* menu item and *FLOW VALUE* message.
L2 – set low flow rate threshold value expressed in units of flow configured in the menu (a floating-point number).
L3 – in edit mode, entering the low flow rate threshold value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-LOW FLOW RATE-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-LOW FLOW RATE-VALUE***

> – entered low flow rate threshold value expressed in units of flow (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered low flow rate threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

5 ***LOGIN-MENU-CONFIGURATION-OPERATION***

EMPTY PIPE – setting empty pipe detection.

It consists of:
L1 – *EMPTY PIPE:* message.
L2 – *Back* menu item.
L3 – *On/Off*= menu item (turning the detection function on and off).
L4 – *Value* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-EMPTY PIPE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-EMPTY PIPE***

ON/OFF= – on and off the function.

Buttons:
PL – turn empty pipe detection *OFF*.
PS – turn empty pipe detection *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OPERATION-EMPTY PIPE***

VALUE – setting empty pipe detection threshold value.

It consists of:
L1 – *Back* menu item and *R ELEC ohm:* message (electrode resistance in ohms).
L2 – set resistance threshold value (a fixed-point number).
L3 – in edit mode, entering the resistance value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-EMPTY PIPE-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-EMPTY PIPE-VALUE***

> – entered resistance value (entered fixed-point number is limited to values between 0 – 999999999).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered resistance value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

6 ***LOGIN-MENU-CONFIGURATION-OPERATION***

ZERO DISCRIM. – setting zero discrimination.

It consists of:
L1 – *ZERO DISCRIM.:* message.
L2 – *Back* menu item.
L3 – *On/Off*= menu item (turning the discrimination function on and off).
L4 – *Value* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-ZERO DISCRIM.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-ZERO DISCRIM.***

ON/OFF= – on and off the function.

Buttons:
PL – turn zero discrimination *OFF*.
PS – turn zero discrimination *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OPERATION-ZERO DISCRIM.***

VALUE – setting zero discrimination threshold value.

It consists of:
L1 – *Back* menu item and *ZERO THRE* message.
L2 – set zero discrimination threshold value expressed in units of flow configured in the menu (a floating-point number).
L3 – in edit mode, entering the zero discrimination threshold value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OPERATION-ZERO DISCRIM.-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OPERATION-ZERO DISCRIM.-VALUE***

> – entered zero discrimination threshold value expressed in units of flow (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered discrimination threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

4 ***LOGIN-MENU-CONFIGURATION***

INPUTS – setting of inputs parameters.

It consists of:
L1 – *INPUTS CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-INPUTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-INPUTS***

CONTROL INPUT – setting operating mode of binary input.

It consists of:
L1 – *CONTROL INPUT:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT***

ON/OFF= – on and off the input.

Buttons:
PL – turn the input *OFF*.
PL – turn the input *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT***

MODE= – selecting operating mode of input.

Buttons:
PL – scroll the list of defined functions up.
PS – scroll the list of defined functions down.
PP – select function change mode (marker changes from ">" to "*") and confirm selected function (marker changes from "*" to ">").

List of defined operating modes:
Reset – function to delete values of user's totalizers and user's operating time counter through the input.
Dosing – Dosing function for "reloading" flow values measured for status outputs set to dosing mode through the input.

4 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT***

DELAY – setting delay of the input.

It consists of:
L1 – *Back* menu item and *DELAY [sec]* message.
L2 – set delay time value (a fixed-point number).
L3 – in edit mode, entering delay time value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT-DELAY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-INPUTS-CONTROL INPUT-DELAY***

> - entered value of delay time within the range from 0 to 3600 seconds.

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered delay time value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

5 ***LOGIN-MENU-CONFIGURATION***

OUTPUTS – setting of output parameters.

It consists of:
L1 – *OUTPUTS CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS***

4-20[mA] LOOP – setting operating parameters of current loop output (minimum current loop saturation threshold is 3.9[mA], while maximum current loop saturation threshold is 20.8[mA]).

It consists of:
L1 – *LOOP CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP***

ON/OFF= – on and off the output.

Buttons:
PL – turn the output *OFF*.
PS – turn the output *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP***

MODE= – output operation mode selection.

Buttons:
PL – scroll the list of defined modes up.
PS – scroll the list of defined modes down.
PP – select operating mode change mode (marker changes from ">" to "*") and confirm selected operating mode (marker changes from "*" to ">").

List of defined operating modes of 4-20[mA] output:
NORMAL – normal current output operating mode (currents proportional to set flow values).
INVERTED – inverted current output operating mode (currents proportional to flow multiplied by -1).
MODULO –absolute value current output operating mode (currents proportional to absolute value of the flow).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP***

VALUE – setting flow value corresponding to 4mA and 20mA currents.

It consists of:
L1 – *LOOP VALUE:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE***

4[mA] – setting flow value for 4mA current.

It consists of:
L1 – *Back* menu item and *LOOP4*mA message.
L2 – set flow value expressed in units configured in the menu corresponding to 4mA current (a floating-point number).
L3 – in edit mode, entering flow value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE-4[mA]***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE-4[mA]***

> – entered flow value (entered floating-point number is limited to values between 0.0000001 – 9999999 and -0.0000001 – -9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered flow value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE***

20[mA] – setting flow value for 20mA current.

It consists of:
L1 – *Back* menu item and *LOOP20mA* message.
L2 – set flow value expressed in units configured in the menu corresponding to 20mA current (a floating-point number).
L3 – in edit mode, entering flow value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE-20[mA]***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-VALUE-20[mA]***

> – entered flow value (entered floating-point number is limited to values between 0.0000001 – 9999999 and -0.0000001 – -9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered flow value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

5 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP***

ALARM – setting mode for alarm signaled by the current loop (alarm is signaled if device reports an error – status other than OK).

It consists of:
L1 – *ALARM CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM***

ON/OFF= – on and off alarm current function.

Buttons:
PL – turn alarm function *OFF*.
PS – turn alarm function *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM***

MODE= – selecting alarm current type.

Buttons:
PL – scroll the list of defined current types up.
PS – scroll the list of defined current types down.
PP – select current type change mode (marker changes from ">" to "*") and confirm selected alarm current type (marker changes from "*" to ">").

List of defined alarm current types:
LOW – low alarm current (3.75[mA]).
HIGH – high alarm current (21.6[mA]).
CUSTOM – user-defined alarm current (defined in menu by the user within the range of 3.6[mA] to 23.0[mA]).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM***

VALUE (CUSTOM) – setting alarm current for user-defined type.

It consists of:
L1 – *Back* menu item and *ALARM [mA]* message.
L2 – set user-defined alarm current (a floating-point number).
L3 – in edit mode, entering the current.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-4-20[mA] LOOP-ALARM-VALUE***

> – entered user-defined alarm current within the range of 3.6[mA] – 23.0 [mA].

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered alarm current).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS***

PULSE OUTPUT – setting operating parameters of pulse output.

It consists of:
L1 – *PULSE CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT***

ON/OFF= – enable or disable the output.

Buttons:
PL – turn the output *OFF*.
PS – turn the output *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT***

MODE= – output operation mode selection.

Buttons:
PL – set the output to *PULSE* operating mode.
PL – set the output to *PWM* operating mode.
PP – select operating mode change mode (marker changes from ">" to "*") and confirm selected operating mode (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT***

PULSE – setting operating parameters of the output in pulse operating mode.

It consists of:
L1 – *PULSE:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE***

VOLUME / IMP. – setting fluid volume for which a pulse is generated.

It consists of:
L1 – *Back* menu item and *VALUE* message.
L2 – set fluid volume expressed in units configured in the menu (a floating-point number).
L3 – in edit mode, entering the fluid volume.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE-VOLUME / IMP.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE-VOLUME / IMP.***

> – entered fluid volume (entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered fluid volume).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE***

PULSE TIME – setting pulse time in ms (within the permissible range of 1 – 10000 ms).

It consists of:
L1 – *Back* menu item and *TIME [ms]* message.
L2 – set pulse time (a fixed-point number).
L3 – in edit mode, entering pulse time.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE-PULSE TIME***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE-PULSE TIME***

> – entered pulse time (entered fixed-point number is limited to values between 1 – 10000; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered pulse duration).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PULSE***

POLAR= – selection of pulse output polarity.

Buttons:
PL – set the output in *NEGATIVE* polarity.
PS – set the output in *POSITIVE* polarity.
PP – select polarity change mode (marker changes from ">" to "*") and confirm selected polarity (marker changes from "*" to ">").

5 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT***

PWM – setting operating parameters of the output in PWM operating mode.

It consists of:
L1 – *PWM:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PWM***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PWM***

MODE= – selecting operating mode of PWM output, i.e. with variable frequency and constant duty cycle or variable duty cycle at constant frequency.

Buttons:
PL – set output operating mode to *FREQUENCY* (PWM with variable frequency).
PL – set output operating mode to *PERCENT* (PWM with variable duty cycle).
PP – select operating mode change mode (marker changes from ">" to "*") and confirm selected operating mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSE OUTPUT-PWM***

FREQUENCY – setting constant frequency value for operating mode with variable duty cycle (between 0.1Hz – 1000Hz).

For *FREQUENCY* operating mode, it consists of:
L1 – *Back* menu item and *FREQ [Hz]* message.
L3 – *Variable freq.* message.
L4 – *Depend on flow* message.

Buttons: PP – select indicated menu item.

For *PERCENT* operating mode, in consists of:
L1 – *Back* menu item and *FREQ [Hz]* message.
L2 – set constant frequency of operation for PWM output (a floating-point number).
L3 – in edit mode, entering the frequency value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-FREQUENCY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-FREQUENCY***

> – entered frequency value for PWM (entered floating-point number is limited to values between 0.1 – 1000; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered frequency value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-PERCENT***

PERCENT – setting constant duty cycle value for operating mode with variable frequency (between 0% – 100%).

For *PERCENT* operating mode, in consists of:
L1 – *Back* menu item and *PERC message. [%]*
L3 – *Variable perc.* message.
L4 – *Depend on flow* message.

Buttons:
PP – select indicated menu item.

For *FREQUENCY* operating mode, it consists of:
L1 – *Back* menu item and *PERC message. [%]*
L2 – set constant duty cycle value for PWM output (a fixed-point number).
L3 – in edit mode, entering the duty cycle value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-PERCENT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-PERCENT***

> – entered duty cycle value for PWM (entered fixed-point number is limited to values between 0 – 100).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered duty cycle value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

5 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM***

VALUE – setting the range of flow values (minimum and maximum) for PWM output operation.

It consists of:
L1 – *PWM VALUE:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE***

Value min. – setting minimum flow value.

It consists of:
L1 – *Back* menu item and *MIN* message.
L2 – set minimum flow value expressed in units configured in the menu (a floating-point number).
L3 – in edit mode, entering flow value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE-VALUE MIN***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE-VALUE MIN***

> – entered flow value (entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered flow value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE***

Value max. – setting maximum flow value.

It consists of:
L1 – *Back* menu item and *MAX* message.
L2 – set maximum flow value expressed in units configured in the menu (a floating-point number).
L3 – in edit mode, entering flow value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE-VALUE MAX***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM-VALUE-VALUE MAX***

> – entered flow value (entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered flow value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

6 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-PULSEOUTPUT-PWM***

POLAR= – selection of pulse output polarity.

Buttons:
PL – set the output in *NEGATIVE* polarity.
PS – set the output in *POSITIVE* polarity.
PP – select polarity change mode (marker changes from ">" to "*") and confirm selected polarity (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS***

STATUS OUTPUTS – setting the operating parameters of the status outputs.

It consists of:
L1 – *STATUS CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS***

STATUS 1 – setting the parameters of the first status output.

It consists of:
L1 – *STATUS 1 CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

ON/OFF= – on and off the output.

Buttons:
PL – turn the output *OFF*.
PS – turn the output *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

MODE= – output operation mode selection.

Buttons:
PL – scroll the list of defined modes up.
PS – scroll the list of defined modes down.
PP – select operating mode change mode (marker changes from ">" to "*") and confirm selected operating mode (marker changes from "*" to ">").

List of defined operating modes of status output 1:
– **Empty pipe** – empty pipe signalling
– **Low flow** – low flow signalling
– **Unfil. Pipe** – not filled pipe signalling
– **Errors all** – errors signalling (FrontEnd, sensor, memory)
– **Coil error** – coil error signalling
– **I saturat.** - current loop saturation signalling
– Direction – signaling of liquid flow direction (output setpoint for positive flow)
– Q > value – signalling of flow bigger than assumed value
– **Q < value** – signaling of flow lower than assumed value
– **TP > value** – signaling that the user's positive totalizer exceeded assumed flow volume (in units of flow configured in the menu)
– **TM > value** – signaling that the user's negative totalizer exceeded assumed flow volume (in units of flow configured in the menu)
– **Dosing** – dosing function, controlling the output for the time necessary to measure given flow volume (measured flow given in units of flow configured in the menu).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

POLAR= – selection of status output polarity.

Buttons:
PL – set the output in *NEGATIVE* polarity.
PS – set the output in *POSITIVE* polarity.
PP – select polarity change mode (marker changes from ">" to "*") and confirm selected polarity (marker changes from "*" to ">").

5 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

DELAY – setting the delay of status output.

It consists of:
L1 – *Back* menu item and *DELAY [s]* message.
L2 – set delay time value (a fixed-point number).
L3 – in edit mode, entering delay time value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1-DELAY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1-DELAY***

> - entered value of delay time within the range from 0 to 3600 seconds.

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered delay time value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

6 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1***

VALUE – setting of value for status output.

It consists of:
L1 – *Back* menu item and *VALUE* message.
L2 – set value (floating point number).
L3 – in edit mode, entering value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS1-VALUE***

> – entered value for the output expressed in units depending on setting of MODE item (entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS***

STATUS 2 – setting the parameters of the second status output.

It consists of:
L1 – *STATUS 2 CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

ON/OFF= – on and off the output.

Buttons:
PL – turn the output *OFF*.
PS – turn the output *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

MODE= – output operation mode selection.

Buttons:
PL – scroll the list of defined modes up.
PS – scroll the list of defined modes down.
PP – select operating mode change mode (marker changes from ">" to "*") and confirm selected operating mode (marker changes from "*" to ">").

List of defined operating modes of status output 2:
– **Empty pipe** – empty pipe signalling
– **Low flow** – low flow signalling
– **Unfil. Pipe** – not filled pipe signalling
– **Errors all** – errors signalling (FrontEnd, sensor, memory)
– **Coil error** – coil error signalling
– **I saturat.** - current loop saturation signalling
– Direction – signaling of liquid flow direction (output setpoint for positive flow)
– Q > value – signalling of flow bigger than assumed value
– **Q < value** – signaling of flow lower than assumed value
– **TP > value** – signaling that the user's positive totalizer exceeded assumed flow volume (in units of flow configured in the menu)
– **TM > value** – signaling that the user's negative totalizer exceeded assumed flow volume (in units of flow configured in the menu)
– **Dosing** – dosing function, controlling the output for the time necessary to measure given flow volume (measured flow given in units of flow configured in the menu).

4 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

POLAR= – selection of status output polarity.

Buttons:
PL – set the output in *NEGATIVE* polarity.
PS – set the output in *POSITIVE* polarity.
PP – select polarity change mode (marker changes from ">" to "*") and confirm selected polarity (marker changes from "*" to ">").

5 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

DELAY – setting the delay of status output.

It consists of:
L1 – *Back* menu item and *DELAY [s]* message.
L2 – set delay time value (a fixed-point number).
L3 – in edit mode, entering delay time value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2-DELAY***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2-DELAY***

> - entered delay time value within the range of 0 to 3600 seconds.

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered delay time value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

6 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2***

VALUE – setting of value for status output.

It consists of:
L1 – *Back* menu item and *VALUE* message.
L2 – set value (floating point number).
L3 – in edit mode, entering value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2-VALUE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-OUTPUTS-STATUS OUTPUTS-STATUS 2-VALUE***

> – entered value for the output expressed in units depending on setting of MODE item (entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

6 ***LOGIN-MENU-CONFIGURATION***

FILTERING – set the parameters for filtering.

It consists of:
L1 – *FILTERS CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-FILTERING***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-FILTERING***

FOR LCD – setting filtering for data displayed on the LCD.

It consists of:
L1 – *FILTER LCD:* message.
L2 – *Back* menu item.
L3 – *Mode* menu item.
L4 – *Time* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LCD***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LCD***

Mode= – selecting used filter type (*AVERAGE* – average for time period or *DAMPING* – filter taking into account previous values).

Buttons:
PL – select *AVERAGE* type.
PS – select *DAMPING* type.
PP – select (marker changes from ">" to "*") and confirm set type (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LCD***

Time= – setting filter time in seconds (range 0 – 60 sec. where 0 means filter disabled).

Buttons:
PL – decrease time.
PS – increase time.
PP – select (marker changes from ">" to "*") and confirm set time (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-FILTERING***

FOR LOOP 4-20 – setting filtering for data used by the current loop.

It consists of:
L1 – *FILTER 4-20:* message.
L2 – *Back* menu item.
L3 – *Mode* menu item.
L4 – *Time* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LOOP 4-20***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LOOP 4-20***

Mode= – selecting used filter type (*AVERAGE* – average for time period or *DAMPING* – filter taking into account previous values).

Buttons:
PL – select *AVERAGE* type.
PS – select *DAMPING* type.
PP – select (marker changes from ">" to "*") and confirm set type (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR LOOP 4-20***

Time= – setting filter time in seconds (range 0 – 60 sec. where 0 means filter disabled).

Buttons:
PL – decrease time.
PS – increase time.
PP – select (marker changes from ">" to "*") and confirm set time (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-FILTERING***

FOR PULSE OUT – setting filtering for data used by the pulse output (in PWM operating mode).

It consists of:
L1 – *FILTER PULSE:* message.
L2 – *Back* menu item.
L3 – *Mode* menu item.
L4 – *Time* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR PULSE OUT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR PULSE OUT***

Mode= – selecting used filter type (*AVERAGE* – average for time period or *DAMPING* – filter taking into account previous values).

Buttons:
PL – select *AVERAGE* type.
PS – select *DAMPING* type.
PP – select (marker changes from ">" to "*") and confirm set type (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR PULSE OUT***

Time= – setting filter time in seconds (range 0 – 60 sec. where 0 means filter disabled).

Buttons:
PL – decrease time.
PS – increase time.
PP – select (marker changes from ">" to "*") and confirm set time (marker changes from "*" to ">").

5 ***LOGIN-MENU-CONFIGURATION-FILTERING***

FOR MODBUS – setting of filtering for data used by Modbus output.

It consists of:
L1 – *FILTER MODBUS:* message.
L2 – *Back* menu item.
L3 – *Mode* menu item.
L4 – *Time* menu item.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR MODBUS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR MODBUS***

Mode= – selecting used filter type (*AVERAGE* – average for time period or *DAMPING* – filter taking into account previous values).

Buttons:
PL – select *AVERAGE* type.
PS – select *DAMPING* type.
PP – select (marker changes from ">" to "*") and confirm set type (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-FILTERING-FOR MODBUS***

Time= – setting filter time in seconds (range 0 – 60 sec. where 0 means filter disabled).

Buttons:
PL – decrease time.
PS – increase time.
PP – select (marker changes from ">" to "*") and confirm set time (marker changes from "*" to ">").

7 ***LOGIN-MENU-CONFIGURATION***

CALIBRATION – performing calibration of the device.

It consists of:
L1 – *CALIBRATION:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION***

SENSOR – calibration of device sensor. Menu item available only with administrator privileges.

It consists of:
L1 – *SENSOR CALIBR.:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR***

DEVICE COEF. – calibration of the electronics using "artifical" sensor.

It consists of:
L1 – *Back* menu item and *COEF message. [--].*
L2 – = value of coefficient saved in the device memory (a floating-point number).
L3 – *Calibration* menu item, and during calibration current status of the procedure *Calib.*=, i.e. *Stop/Start* before the procedure starts, *Wait* while calibration data is being collected, *Error* if an error occurs during the procedure,
Finish after the data collection procedure has been completed and a new coefficient has been calculated and *Save* for saving the newly obtained coefficient in memory.
L4 – *Reset* menu item, and during calibration counter *No.*= counting down collected data samples, and the newly calculated coefficient after all data has been collected.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-DEVICE COEF.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-DEVICE COEF.***

CALIB.= – operating calibration procedure.

Buttons:
PL – select *Stop* option before calibration begins and *Finish* after data collection has been completed.
PS – select *Start* option before calibration begins and *Save* after data collection has been completed.
PP – for *Stop* or *Error* –
exit calibration mode without performing calibration, for *Start* – begin calibration data collection procedure, for *Finish* – leave calibration procedure without saving the newly calculated coefficient and for *Save* – save the new coefficient.

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-DEVICE COEF.***

RESET= – option for resetting (setting to 1) the calibration coefficient stored in device memory.

Buttons:
PL – set resetting option to *OFF*.
PL – set resetting option to *ENTER*.
PP – for *OFF* – exit reset mode without resetting, and for *ENTER* – set a new coefficient of 1.

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR***

ZERO COEF. – calibrating sensor zero point.

It consists of:
L1 – *Back* menu item and *COEF message. ZERO.*
L2 – = value of coefficient stored in device memory (a floating-point number) expressed in m/s.
L3 – *Calibration* menu item, and during calibration current status of the procedure *Calib.*=, i.e. *Stop/Start* before the procedure starts, *Wait* while calibration data is being collected, *Error* if an error occurs during the procedure, *Finish / Overflow* after the data collection procedure has been completed (overflow error message for values exceeding 0.3 m/s) and a new coefficient has been calculated and *Save* for saving the newly obtained coefficient in memory if it is below 0.3 m/s (threshold protecting against zeroing during flow).
L4 – *Time* menu item containing zeroing duration in minutes, and during calibration a counter counting down time in seconds until completion of the data collection procedure *for xxxx [sec]*, and after all data has been collected, newly calculated coefficient in m/s.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR ZERO COEF.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR ZERO COEF.***

CALIB.= – operating zero point calibration procedure.

Buttons:
PL – select *Stop* option before calibration begins and *Finish* after data collection has been completed.
PS – select *Start* option before calibration begins and *Save* after data collection has been completed.
PP – for *Stop, Error* or *Overflow* – exit calibration mode without performing calibration, for *Start* – begin calibration data collection procedure, for *Finish* – leave calibration procedure without saving the newly calculated coefficient and for *Save* – save the new coefficient.

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR ZERO COEF.***

TIME= – setting duration of zeroing procedure between 1 – 60 minutes.

Buttons:
PL – decrease time at one-minute steps.
PS – increase time at one-minute steps.
PP – enter or exit the zeroing time setting mode.

4 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR***

SENSOR COEF. – entering sensor calibration coefficients (A, B and C calibration line and "deflection").

It consists of:
L1 – *SENSOR COEF.:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.***

COEFFICIENT A – entering calibration coefficient A.

It consists of:
L1 – *Back* menu item and *COEF A[--]* message.
L2 – set coefficient value (a floating-point number).
L3 – in edit mode, entering value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT A***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT A***

= – entered value of calibration coefficient A (modulus of entered floating-point number is limited to values between 0.0000001 – 9999999; it is not possible to set a value of 0 - a value of 0 is replaced with a coefficient of 1).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.***

COEFFICIENT B – entering calibration coefficient B.

It consists of:
L1 – menu item *Back* and message *COEF B*
L2 – set coefficient value (a floating-point number) in m/s.
L3 – in edit mode, entering value.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT B***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT B***

= – entered value of calibration coefficient B (modulus of entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0) in m/s.

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

4 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.***

COEFFICIENT C – entering calibration coefficient V in m/s and percent characteristics deflection coefficient.

It consists of:
L1 – *Back* menu item and *COEF C* message.
L2 – set value of coefficient V
in [m/s]
(a floating-point number).
L3 – *Linear.*= menu item, containing percentage of characteristics deflection for V point, while in edit mode, entering value of coefficient V.
L4 –in V coefficient edit mode,
indicator of digit being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT C***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT C***

V= – entered value of calibration coefficient V (modulus of entered floating-point number is limited to values between 0.0000001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-SENSOR-SENSOR COEF.-COEFFICIENT C***

Linear.= – setting percent characteristics "deflection" coefficient within +/- 10% for the point defined by coefficient V.

Buttons:
PL – decrease the value of "deflection" with 0.1% increment.
PS – increase the value of "deflection" with 0.1% increment.
PP – enter or exit the "deflection" coefficient setting mode.

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION***

LOOP 4-20 – calibraiton of current loop output 4-20[mA]. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *LOOP CALIBR.:* message.
L2 – *Back* menu item.
L3 – *Coef menu item. 4[mA]* - calibration of current loop for value 4mA.
L4 – menu item *Coef. 20[mA]* - calibration of current loop for value 20mA.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20***

COEF. 4mA – calibration of current loop to value 4mA with requirement to use external reference current measurement.

It consists of:
L1 – menu item *Back* and message *COEF4mA.*
L2 – value of coefficient saved in the device memory (a fixed-point number).
L3 – in current value measurement mode *I*= for current loop measured by internal system in [mA] (during calibration may be used as auxiliary value indicator and not as reference measurement due to limited accuracy).
L4 – in calibration mode *DAC Value*= value set for analog-digital converter as a hexadecimal number.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20-COEF.4[mA]***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20-COEF.4[mA]***

> - calibration of current loop value to 4mA.

Buttons:
PL – decrease of value set for DAC converter.
PS – increase of value set for DAC converter.
PP – selection (change of *">"* tag to *"*"*) and exit and saving calibration coefficient (change of *"*"* tag to ">").

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20***

COEF. 20mA – calibration of current loop to value 20mA with requirement to use external reference current measurement.

It consists of:
L1 – menu item *Back* and message *COEF20.*
L2 – value of coefficient saved in the device memory (a fixed-point number).
L3 – in current value measurement mode *I*= for current loop measured by internal system in [mA] (during calibration may be used as auxiliary value indicator and not as reference measurement due to limited accuracy).
L4 – in calibration mode *DAC Value*= value set for analog-digital converter as a hexadecimal number.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20-COEF.20[mA]***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-LOOP 4-20-COEF.20[mA]***

> - calibration of value of current for loop to 20mA.

Buttons:
PL – decrease of value set for DAC converter.
PS – increase of value set for DAC converter.
PP – selection (change of *">"* tag to *"*"*) and exit and saving calibration coefficient (change of *"*"* tag to ">").

4 ***LOGIN-MENU-CONFIGURATION-CALIBRATION***

CURRENT MEASUR – calibration of internal measurement of loop current 4-20[mA]. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *MEAS.I CALIBR.:* message.
L2 – *Back* menu item.
L3 – menu item *Coef.meas. 4mA* - calibration of value of current for 4mA.
L4 – menu item *Coef.meas.20mA* - calibration of value of current for 20mA.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR***

COEF.meas. 4mA – calibration of current measurement for value 4mA with requirement to use external reference current measurement.

It consists of:
L1 – menu item *Back* and message *COEF4.mA.*
L2 - calibration value of current saved in device memory in [mA] (floating point number).
L3 – in current value measurement mode *I*= for current loop measured by internal system in [mA] (during calibration may be used as auxiliary value indicator and not as reference measurement due to limited accuracy).
L4 – in calibration mode *DAC Value*= value set for analog-digital converter as a hexadecimal number.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR-COEF.MEAS.4mA***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR-COEF.MEAS.4mA***

> - calibration of value of current for loop to 4mA.

Buttons:
PL – decrease of value set for DAC converter.
PS – increase of value set for DAC converter.
PP – selection (change of ">" tag to "*") and exit and saving calibration current (change of "*" tag to ">").

3 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR***

COEF.meas.20mA – calibration of current measurement for 20 mA with requirement to use external reference current measurement.

It consists of:
L1 – menu item *Back* and message *COEF20mA.*
L2 - calibration value of current saved in device memory in [mA] (floating point number).
L3 – in current value measurement mode *I*= for current loop measured by internal system in [mA] (during calibration may be used as auxiliary value indicator and not as reference measurement due to limited accuracy).
L4 – in calibration mode *DAC Value*= value set for analog-digital converter as a hexadecimal number.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR-COEF.MEAS.20mA***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-CALIBRATION-CURRENT MEASUR-COEF.MEAS.20mA***

> - calibration of value of current for loop to 20mA.

Buttons:
PL – decrease of value set for DAC converter.
PS – increase of value set for DAC converter.
PP – selection (change of ">" tag to "*") and exit and saving calibration current (change of "*" tag to ">").

8 ***LOGIN-MENU-CONFIGURATION***

MODBUS – setting of configuration parameters for MODBUS. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *MODBUS CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-MODBUS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-MODBUS***

ON/OFF= – to on and off the bus.

Buttons:
PL – to disable the bus *OFF*.
PS – to enable the bus *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-MODBUS***

ADDRESS= – setting of device address in defined range 1 – 247.

Buttons:
PL – decrease address.
PS – increase address.
PP – selection (change of ">" tag to *"*"*) and exit and saving address set (change of *"*"* tag to ">").

4 ***LOGIN-MENU-CONFIGURATION-MODBUS***

BAUD= – selection of bus baud rate.

Buttons:
PL – scroll the list of defined rates down.
PS – scroll the list of defined diameters up.
PP – selection (change of ″>″ tag to ″*″) and exit and saving rate set (change of ″*″ tag to ">").

List of defined baud rates for MODBUS:
– 4800
– 9600
– 19200
– 38400
– 57600
– 115200.

5 ***LOGIN-MENU-CONFIGURATION-MODBUS***

PARITY= - selection of bus parameters.

Buttons:
PL – scroll the list of defined parameters down.
PS – scroll the list of defined parameters up.
PP – selection (change of ″>″ tag to ″*″) and exit and saving parameters set (change of ″*″ tag to ">").

List of defined parameters for MODBUS:
– EVEN_1S (EVEN 1 STOP) – with parity, one stop bit
– ODD_1S (ODD 1 STOP) – with parity, one stop bit
– NOPA_2S (NOPAR 2 STOP) – without parity, two stop bits.

9 ***LOGIN-MENU-CONFIGURATION***

ARCHIVES – setting the parameters for flowmeter archive.

It consists of:
L1 – *ARCHIVES CONFIG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ARCHIVES***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ARCHIVES***

EVENT ARCHIVES – setting of parameters for events archiving. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *ARCHIVES EVENTS:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES***

ON/OFF= – on and off option to save events occurring during operation of the device in the memory.

Buttons:
PL – events saving disabled *OFF*.
PS – events saving enabled *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES***

MODE CONT.= – enable or disable the function of circular recording to event memory (after saving all the memory, i.e. 8128 items, the oldest entries are overwritten with new entries).

Buttons:
PL – turn circular recording *OFF*.
PS – turn circular recording *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES***

DELETE= – deleting events saved in the device memory.

Buttons:
PL – disable deleting event archive (*OFF*).
PS – enable deleting event archive (*ENTER*).
PP – select (marker changes from ">" to "*") and confirm set mode, i.e. leave the function without erasing events for *OFF* or erase event memory for ENTER (marker changes from "*" to ">"), successful erasing is indicated by an *OK* message.

5 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES***

ACTIVITY EVENT – setting activity (saving option) for the individual events registered in the device. Saving of all events is active after restoring the device to the factory settings.

It consists of:
L1 – *ACTIVITY EVENTS:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES-ACTIVITY EVENT***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-EVENT ARCHIVES-ACTIVITY EVENT***

SELECTION:

START= – enabling and disabling activity of the event giving information about start-up of the device.

Buttons:
PL – turn event activity *OFF*.
PS – turn event activity *ON*.
PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

LOGIN= – enabling and disabling activity of the event giving information about user logon to the menu of the device.

Buttons:
PL – turn event activity *OFF*.
PS – turn event activity *ON*.
PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

STATUS OK= – enabling and disabling activity of the event giving information about change of status from incorrect to correct.

Buttons:
PL – turn event activity *OFF*.
PS – turn event activity *ON*.
PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

ERROR FE= – enabling and disabling activity of the event giving information about errors notified by FrontEnd. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERROR SENS.= – enabling and disabling activity of the event giving information about occurrence of fault of the sensor. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERROR MEM.= – enabling and disabling activity of the event giving information about occurrence of error of internal memory of the device. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
EMPTY= – enabling and disabling activity of the event giving information about detection of empty pipe by the flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
UNFILLED= – enabling and disabling activity of the event giving information about detection of non-filled pipe by the flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

	RESET= – enabling and disabling activity of the event giving information about erasing the totalizers or counter user timer and errors of the device. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
	DEFAULT= – enabling and disabling activity of the event giving information about restoring of default settings in the flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
	FACTORY= – enabling and disabling activity of the event giving information about restoring factory settgings in the flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
	CALIBRAT.= – enabling and disabling activity of the event giving information about saving of new calibration coefficient of the flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
	COIL ERROR= – enabling and disabling activity of the event giving information about error of measuring coil. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
	LOW FLOW= – enabling and disabling activity of the event giving information about detection of low flow in flowmeter. Buttons: PL – turn event activity *OFF*. PS – turn event activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-ARCHIVES***

MEAS. ARCHIVES – setting of parameters for measurement archiving. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *ARCHIVES MEAS.:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-MEAS. ACHIVES***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-MEAS. ACHIVES***

ON/OFF= – on and off of saving of measurements of average flow values in the memory.

Buttons:
PL – events saving disabled *OFF*.
PS – events saving enabled *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

3 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-MEAS. ACHIVES***

MODE CONT.= – enable or disable the function of circular recording to measurement memory (after saving all the memory, i.e. 8128 items, the oldest entries are overwritten with new entries).

Buttons:
PL – turn circular recording *OFF*.
PS – turn circular recording *ON*.
PP – select (marker changes from ">" to "*") and confirm set mode (marker changes from "*" to ">").

4 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-MEAS. ACHIVES***

DELETE= – deleting measurements saved in the device memory.

Buttons:
PL – disable deleting measurement archives (*OFF*).
PS – enable deleting measurement archives (*ENTER*).
PP – select (marker changes from ">" to "*") and confirm set mode, i.e. leave the function without erasing measurements for *OFF* or erase measurement memory for ENTER (marker changes from "*" to ">"), successful erasing is indicated by an *OK* message.

5 ***LOGIN-MENU-CONFIGURATION-ARCHIVES-MEAS. ACHIVES***

INTERVAL=– setting time period expressed in minutes to saving average flow value in the memory. Time period for saving expressed in minutes can be set from 10 minutes to 24 hours with 10-minute increments.

Buttons:
PL - decreasing value of time period for measurements saving in 10-minute increments.
PS - increasing value of time period for measurements saving in 10-minute increments.
PP – select (marker changes from ">" to "*") and confirm set time value (marker changes from "*" to ">").

10 ***LOGIN-MENU-CONFIGURATION***

ALARMS – setting activity of alarms for the flowmeter. ***Menu item available only with administrator privileges.***

It consists of:
L1 – *ACTIVITY ALARMS:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS***

SELECTION:

EMPTY PIPE= – enabling and disabling activity of alarm for empty pipe detection.

Buttons:
PL – turn alarm activity *OFF*.
PS – turn alarm activity *ON*.
PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

UNFIL. PIPE= – enabling and disabling activity of alarm for non-filled pipe detection.

Buttons:
PL – turn alarm activity *OFF*.
PS – turn alarm activity *ON*.
PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

LOW FLOW= – enabling and disabling activity of alarm for detection of low flow. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERR FRONTE= – enabling and disabling activity of alarm for FrontEnd error. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERR SENSOR= – enabling and disabling activity of alarm for error of sensor. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERR MEMORY= – enabling and disabling activity of alarm for internal memory of the flowmeter. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
ERR COIL= – enabling and disabling activity of alarm for coil error. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
Q > VALUE= – enabling and disabling activity of alarm for flow greater than value set as a parameters. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

Q < VALUE= – enabling and disabling activity of alarm for flow smaller than value set as a parameter. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
V > VALUE= – enabling and disabling activity of alarm for linear velocity of flow greater than value set as a parameter. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
V < VALUE= – enabling and disabling activity of alarm for linear velocity of flow smaller than value set as a parameter. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
TPU > VALUE= – enabling and disabling activity of alarm for exceeding value set as a parameter by absolute value of user's positive totalizer. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").
TMU > VALUE= – enabling and disabling activity of alarm for exceeding value set as a parameter by absolute value of user's negative totalizer. Buttons: PL – turn alarm activity *OFF*. PS – turn alarm activity *ON*. PP – select (marker changes from ">" to "*") and confirm set activity (marker changes from "*" to ">").

VALUE QMAX – setting of value of maximum flow as a parameter for exceeding the set limit.

It consists of:
L1 – menu item *Back* and message *VALUE QMAX.*
L2 – maximum flow threshold value set, expressed in units of flow configured in the menu (a floating-point number).
L3 – in edit mode, entering the value of maximum flow threshold.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE QMAX***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE QMAX***

> – entered maximum flow threshold value expressed in units of flow (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered maximum flow threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

VALUE QMIN – setting of value of minimum flow as a parameter for exceeding the set limit.

It consists of:
L1 – menu item *Back* and message *VALUE QMIN.*
L2 – minimum flow threshold value set, expressed in units of flow configured in the menu (a floating-point number).
L3 – in edit mode, entering the value of minimum flow threshold.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE QMIN***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE QMIN***

> – entered minimum flow threshold value expressed in units of flow (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered minimum flow threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

VALUE VMAX – setting of value of maximum linear velocity as a parameter for exceeding the set limit.

It consists of:
L1 – menu item *Back* and message *VALUE VMAX.*
L2 – minimum value of maximum linear velocity of flow set, expressed in units of configured in the menu (a floating-point number).
L3 – in edit mode, entering value of maximum linear velocity of flow.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE VMAX***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE VMAX***

> – entered value of maximum linear velocity of flow expressed in units set (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered maximum linear velocity of flow threshold value).
PP – select (marker changes from *">"* to *"*"*) and exit the value setting function (marker changes from *"*"* to ">") and change the value of the digit indicated by the marker (in ascending order).

VALUE VMIN – setting minimum value of flow linear velocity as a parameter for alarm indicating exceeding threshold set.

It consists of:
L1 – menu item *Back* and message *VALUE VMIN.*
L2 – minimum value of minimum linear velocity of flow set, expressed in units of configured in the menu (a floating-point number).
L3 – in edit mode, entering value of minimum linear velocity of flow.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE VMIN***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE VMIN***

> – entered value of minimum linear velocity of flow expressed in units set (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value of threshold for minimum linear velocity of flow set).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

VALUE TP USER – setting of threshold value for user's positive totalizer as a parameter for alarm indicating exceeding threshold set.

It consists of:
L1 – menu item *Back* and message *VALUE TP:.*
L2 – value set in totalizer limit in volume unit configured in the menu (floating point number).
L3 - entering value of totalizer limit in edit mode.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE TP USER***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE TP USER***

> – entered totalizer limit value expressed in volume units (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered totalizer threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

VALUE TM USER – setting of threshold value for user's negative totalizer as a parameter for alarm indicating exceeding threshold.

It consists of:
L1 – menu item *Back* and message *VALUE TM:.*
L2 – value set in totalizer limit in volume unit configured in the menu (floating point number).
L3 - entering value of totalizer limit in edit mode.
L4 – in edit mode, indicator of the digit which is being entered.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE TM USER***

BACK – return to previous menu level.

2 ***LOGIN-MENU-CONFIGURATION-ALARMS-VALUE TM USER***

> – entered totalizer limit value expressed in volume units (entered floating-point number is limited to values between 0.00001 – 9999999; it is possible to set a value of 0).

Buttons:
PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving).
PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered totalizer threshold value).
PP – select (marker changes from ">" to "*") and exit the value setting function (marker changes from "*" to ">") and change the value of the digit indicated by the marker (in ascending order).

9 ***LOGIN-MENU***

DIAGNOSTICS – device diagnostics.

It consists of:
L1 – *DIAGNOSTICS:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DIAGNOSTICS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS***

LCD TEST – LCD display test - systematic filling of all display items with figures.

It consists of:
L1 – menu item *Back.*
L2 – message about test status *Test LCD = OFF / ON*.
L4 – test service message <- *OFF ON* ->.

Buttons:
PL – test disable.
PS – test enable.
PP – exit from test (equivalent to disable).

1 ***LOGIN-MENU-DIAGNOSTICS-LCD TEST***

BACK – return to previous menu level.

3 ***LOGIN-MENU-DIAGNOSTICS***

OUTPUTS TEST – test of device outputs.

It consists of:
L1 – *OUTPUTS DIAG:* message.
L2 – menu item which can be selected, indicated by a ">" marker.
L3 – subsequent menu items.
L4 – subsequent menu items.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST***

4-20[mA] LOOP – test of current loop output.

It consists of:
L1 – menu item *Back* and value of current loop 4-20 measured internally *I= value* (in [mA]).
L2 – message *DAC Value*= value set for analog-digital converter ias a hexadecimal number.
L3 – test service message for PL <--*: DAC -0x1*.
L4 – test service message for PS -->*: DAC +0x1*.

Buttons:
PL – decrease of value set for DAC converter.
PS – increase of value set for DAC converter.
PP – exit from the test.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-4-20[mA] LOOP***

BACK – return to previous menu level.

3 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST***

PULSE OUTPUT – pulse output test.

It consists of:
L1 – menu item *Back and PULSE* message.
L2 – menu item *Mode*.
L3 – menu item *Pulse*.
L4 – menu item *PWM*.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS***

Mode – enabling output into appropriate operation mode - as pulse or PWM output.

It consists of:
L1 – menu item *Back.*
L2 – *Pulse Output:* message.
L3 – test mode message = *ON PWM / PULSE*.
L4 – test service message <- *PWM PULSE ->*.

Buttons:
PL – enabling output to *PWM* mode.
PS – enabling output to *PULSE mode.*
PP – exti from test item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-MODE***

BACK – return to previous menu level.

3 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS***

Pulse – output servicing in pulse operation mode.

It consists of:
L1 – menu item *Back,* and *PULSE message.*
L2 – menu item *Time= xxxx[ms]* – setting of time for pulse generated systematically (tripping every 0.5s).
L3 – menu item *Polar= POSITIVE/NEGATIVE* – setting polarity of generated pulses.
L4 – test service message <-- -->.

Buttons:
PL – in *Time* item decrease of pulse time and in *Polar* item setting polarity to *NEGATIVE*.
PS – in *Time* item increase of pulse time and in *Polar* item setting of polarity to *POSITIVE*.
PP – selection (change of ">" tag to "*") and exiting from test item (change of "*" tag to ">") and exit from test in *Back* item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PULSE***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PULSE***

TIME= – setting of time of generated pulse with 1[ms] resolution.

3 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PULSE***

POLAR= – setting of polarity of generated pulses.

4 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS***

PWM – servicing of output in PWM operation mode.

It consists of:
L1 – menu item *Back,* and message *PWM.*
L2 – menu item *Freq= xxx.x[Hz]* – setting frequency of generated signal.
L3 – menu item *PerPWM= xxx[%]* – setting filling of generated signal.
L4 – menu item *Polar= POSITIVE/NEGATIVE* – setting polarity of generated signal.

Buttons:
PL – in *Freq* item decreasing frequency, in *PerPWM* item decreasing of filling and in *Polar* item setting polarity to *NEGATIVE*.
PS – in *Freq* item increasing polarity, in *PerPWM* item increasing filling and in *Polar* item setting polarity to *POSITIVE*.
PP – selection (change of ">" tag to "*") and exiting from test item (change of "*" tag to ">") and exit from test in *Back* item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PMW***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PMW***

FREQ= – setting of frequency of generated signal in the range to 1[kHz] with 0.1[Hz] resolution.

3 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PMW***

PERPWM= – setting of filling of generated signal in the range to 100% with 1% resolution.

4 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-PULSE OUTPUTS-PMW***

POLAR= – setting polarity of generated signal.

4 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST***

STATUS OUTPUTS – test of binary status outputs.

It consists of:
L1 – *Back* menu item. And STATUS message
L2 – menu item *Stat1= POSITIVE/NEGATIVE* – setting of required output polarity.
L3 – menu item *Stat2= POSITIVE/NEGATIVE* – setting of required output polarity.

Buttons:
PL – scrolling up of menu items and in *Stat1 and Stat2* item and setting polarity of output to *NEGATIVE*.
PS – scrolling down of menu items and in *Stat1 i Stat2* items setting of output polarity *POSITIVE*.
PP – selection (change of ">" tag to "*") and exiting from test item (change of "*" tag to ">") and exit from test in *Back* item.

1 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-STATUS OUTPUTS***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-STATUS OUTPUTS***

STAT1= – setting of status output condition 1.

3 ***LOGIN-MENU-DIAGNOSTICS-OUTPUTS TEST-STATUS OUTPUTS***

STAT2= – setting of status output condition 2.

4 ***LOGIN-MENU-DIAGNOSTICS***

INPUT TEST – test of isolated inputs - indicates current status of signal applied to input.

It consists of:
L1 – menu item *Back. And message INPUT*
L2 – message *Status input:*.
L3 – current input status – *OFF* (no voltage applied to input or open terminals) or *ON* (voltage applied to input or closing of terminals).

Buttons:
PP – exit from test (equivalent to disable).

1 ***LOGIN-MENU-DIAGNOSTICS-INPUT TEST***

BACK – return to previous menu level.

5 ***LOGIN-MENU-DIAGNOSTICS***

SIMULATION – measurements simulation, test based on operation of the flowmeter with set value of flow or linear velocity.
of flow I. The only difference in device operation is that the totalizers are not saved during the test.

It consists of:
L1 – message *SIMULATION MEAS.*.
L2 – *Back* menu item.
L3 – menu item *On/Off*.
L4 – menu item *Simulation Val.*.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

1 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION***

BACK – return to previous menu level.

2 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION***

ON/OFF= – on and off simulation of measurements test.

Buttons:
PL – disabling test *OFF*.
PS – enabling test *ON*.
PP – select (marker changes from *">"* to *"*"*) and confirm set mode (marker changes from *"*"* to *">"*).

3 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION***

SIMULATION VAL. - entering simulated value of flow or linear velocity of flow (option to enter values "interchangeably" that is after entering V value the Q value is calculated automatically, while after entering Q value the V value is automatically calculated.

It consists of:
L1 – message *VALUE SIMULATION.*
L2 – *Back* menu item.
L3 - menu item *V*= and currently set value of simulated linear velocity of flow expressed in the given units (floating point number).
L4 – menu item *Q*= and currently set value of simulated flow expressed in the given units (floating point number) and indicator of entered digit in edit mode.

Buttons:
PL – move to menu item above the current item.
PS – move to menu item below the current item.
PP – select indicated menu item.

					1 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION-SIMULATION VAL.*** **BACK** – return to previous menu level.
					2 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION-SIMULATION VAL.*** **-** entered value of simulated linear velocity of flow expressed in units of linear velocity (entered floating point number is limited to absolute value in the range 0.0001 – 999999 with option to set 0 value). Buttons: PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving). PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value). PP – selecting (change of tag from „>" to „*") and exiting from setting of value of simulated linear velocity. of flow (change of "*" tag to ">") and change of digit indicated by the tag (increasing).
					3 ***LOGIN-MENU-DIAGNOSTICS-SIMULATION-SIMULATION VAL.*** **Q=**– entered value of simulated flow expressed in units of flow (entered floating point number is limited to absolute value in the range 0.0001 – 999999 with option to set 0 value). Buttons: PL – move the indicator of the digit which is currently being entered to the left (moving the indicator to the leftmost end *("Exit"* message in L4) allows to exit the function without saving). PS – move the indicator of the digit which is currently being entered to the right (moving the indicator to the rightmost end *("Set"* message in L4) allows to save the entered value). PP – select (marker changes from *">"* to *"*"*) and exit from the function intended for setting of simulated flow (marker changes from "*" to ">") and change the digit indicated by the marker (in ascending order).

11. TECHNICAL PARAMETERS

11.1. Electrical connections

11.1.1. Output signals

Analog output	Active or passive (depending on the order) 4 … 20mA / 500Ω
Pulse/frequency output	Passive Max. 24V/10mA DC, any polarity 0.1 …500Hz
Binary outputs OC	Quantity: two, open collector Max. 35V DC / 100mA for each output Galvanic isolation Any polarity
Communication output	Modbus RTU/RS 485 Galvanic isolation

11.1.2. Power supply

Standard version:	Mains power	90-260V AC 50Hz 15VA
Optional version:	Low-voltage power supply:	10-36V DC 15W Supply inlet protected against reverse polarity of the voltage.

11.2. Protection class

The device has class I protection; it is equipped with protective terminal to which you should connect protective conductor. Measuring circuits (to sensor) are separated from hazardous voltages with reinforced insulation according to the requirements of PN-EN 61010-1.

11.3. Technical parameters

11.3.1. Technical specification of the sensor

Nominal diameters	DN 10÷1000
Connecting cables to the converter	Double shielded conductor e.g. Paar Tronic CY-CY 2x2x0.25mm2 lub 2x2x0.34mm2 (Helukabel) Unitronic CY PIDY 2x2x0.25mm2 or 2x2x0.34mm2 (Lapp Kabel) or equivalent. Length of cable: 0.5m - ALW execution 8m or 12m,24m,32m,40m,48m - NW execution
Measuring principle	Electromagnetic
Supply ofexciting coil of the sensor	From converter
Insulation class of exciting coil	Class E
Field connections	Flanges DIN (ANSI, BS) / hygienic acc. to DIN 11851
Maximum pressure	Standard 1.6 MPa (option 2.5/4.0 MPa) operation with negative pressure is forbidden
Ingress protection	Standard IP 67, option IP 68 acc. to EN 60529, NEMA 5 (NEMA 6)
Insulation lining	Hard, soft rubber DN20÷DN1000 Teflon (PTFE) DN10÷DN500
Range of temperatures for insulating liners	Rubber (soft), hard -5÷90°C, Execution PEM-1000NW Rubber (soft), hard ÷60°C, Execution PEM-1000ALW Teflon -25÷130°C, Execution PEM-1000NW Teflon 0÷60°C, Execution PEM-1000ALW
Ambient temperature ranges	-20÷60°C
Electrodes	Steel 1.4571 (316Ti) 1.4404(316L), Hastelloy, Tantalum, Titanium, Platinum
Outer enclosure and flanges	Carbon steel, steel 1.4301 (304), steel 1.4541 (321)
Sensor pipe	Steel 1.4541 (321)
Protection coating	Multi-compound Acrymetal varnish
Accessories	Stainless steel earthing rings for plastic pipes for executions DN10..40
Optional executions of the sensor	Stainless steel, executions with hygienic grade connectors
Dimensions and weight	According to the table 1, 2, 3.

11.3.2. Technical specifications of the converter

Minimum conductance of the medium	≥ 5μS/cm, ≥ 20 μS/cm for demineralized water
Precision of the measurement	±0.5% value indications in the range from 20% Qmax (inclusive) to 100% Qmax ±1% value indications in the range from 10% Qmax (inclusive) to 20% Qmax (for given reference conditions *)
Cut-off level for small flows	Settable value, arbitrary
Instantaneous flow	2-way (l/s, m^3/h, m^3/s)
Balance of flows	bi-directional m^3, I stored in separate counters S+, S-
Balance of directional flows	Difference of flows (S+)-(S-) in separate meter S
Flow direction	Automatically recognized
Flowmeter zero	Automatic zeroing
Empty pipe detection	Cyclic, programmed
Astronomical time	The calendar to the year 2099 battery-backed
Display	4 x 16 characters, illuminated
Keyboard	3 buttons
Operating mode of relay	Programmed by the user
Cable glands	Gland M20x1.5 Circular supply cable 6-12 mm, with multi-conductor wires (line), with approved cables with operation voltage 300/500V, 3x 0.75 mm^2 Cu (or 3x0.5mm^2 Cu if the design allows such case) intended for "soft" industrial applications and, if required, for humid environment*.
Fuse	250 mA T/ 250 V non-replaceable 2,5 A T/ 250V non-replaceable
Ingress protection	IP 66 or IP 67 (special execution) acc. to EN 60529
Range of working environment temperatures	-20÷60°C
Dimensions	In accordance with the fig. 2.
Weight	approx. 3 kg
Enclosure material	Aluminum alloy ZL 102
Finishing of surface of converter enclosure	paint coat

* Cross-section and type of cable should be selected by the designer of the electrical installation.

11.4. Reference conditions

Flow	0.3 - 12m/s
Measured medium	Water 10-30ºC
Conductivity	> 300µS/cm
Supply variability	Un ± 2% (Un – supply voltage)
Ambient temperature	18 - 25 ºC, constant humidity
Stabilization time after switching on the power supply	Minimum 20 min.
Straight sections of flow	10 diameters upstream the sensor, 3 diameters downstream the sensor
Measuring sensor	Centrally located, earthed in accordance with the fig. 15.

11.5. Metrological parameters

11.5.1. Standard measuring ranges

- **PEM-1000** flowmeters are available in the size ranges of flange connections specified by the DIN standard within the range DN10 ÷ DN1000 or optionally can be executed in the size range of flange connections in accordance to the ANSI, BS standard.
- Standard flow values **Qmax** for the individual executions of the flowmeters with flange connections in accordance with DIN in the range DN10 ÷ DN1000 are presented in the table below. It is possible to set the other **Qmax** flow values for the individual executions of the flowmeters greater than twice the standard value of measuring range.

DN according to DIN	Volumetric flow	Volumetric flow	Linear velocity
	Qmax [m3/h]	Qmax [l/sec.]	Vmax [m/s]
10	1	0.278	3.54
15	2	0.556	3.14
20	4	1.111	3.54
25	5	1.389	2.83
32	10	2.778	3.45
40	15	4.167	3.32
50	20	5.556	2.83
65	30	8.333	2.51
80	50	13.889	2.76
100	100	27.778	3.54
125	150	41.667	3.40
150	200	55.556	3.14
200	360	100.000	3.18
250	500	138.889	2.83
300	760	211.111	2.99
350	1000	277.778	2.89
400	1300	361.111	2.87
500	2000	555.556	2.83
600	3000	833.333	2.95
800	5000	1388.889	2.76
1000	8000	2222.222	2.83

Table 4. Standard measuring ranges for the PEM-1000 flowmeter.

11.5.2. Table of volumetric flows calculated for the characteristic flow velocities of the medium for the executions with flanges according to DIN.

Volumetric flow is calculated based on measured linear velocity of the flow and geometry of cross-section of the flowmeter. The table presents values of the volumetric flows for the given DN for characteristic linear velocities of the flow.

DN	Flow velocity V [m/s]							
	0.300	1.000	2.000	3.000	4.000	5.000	6.000	
10	0.085	0.283	0.565	0.848	1.131	1.414	1.696	
15	0.191	0.636	1.272	1.909	2.545	3.181	3.817	
20	0.339	1.131	2.262	3.393	4.524	5.655	6.786	
25	0.530	1.767	3.534	5.301	7.069	8.836	10.603	
32	0.869	2.895	5.791	8.686	11.581	14.476	17.372	
40	1.357	4.524	9.048	13.572	18.096	22.619	27.143	
50	2.121	7.069	14.137	21.206	28.274	35.343	42.411	
65	3.584	11.946	23.892	35.838	47.784	59.729	71.675	
80	5.429	18.096	36.191	54.287	72.382	90.478	108.573	Flow
100	8.482	28.274	56.549	84.823	113.097	141.372	169.646	
125	13.254	44.179	88.357	132.536	176.714	220.893	265.072	[m3/h]
150	19.085	63.617	127.234	190.852	254.469	318.086	381.703	
200	33.929	113.097	226.194	339.292	452.389	565.486	678.583	
250	53.014	176.714	353.429	530.143	706.858	883.572	1060.287	
300	76.341	254.469	508.938	763.406	1017.875	1272.344	1526.813	
350	103.908	346.360	692.721	1039.081	1385.441	1731.801	2078.162	
400	135.717	452.389	904.778	1357.167	1809.556	2261.945	2714.334	
500	212.057	706.858	1413.716	2120.573	2827.431	3534.289	4241.147	
600	305.363	1017.875	2035.750	3053.625	4071.501	5089.376	6107.251	
800	542.867	1809.556	3619.112	5428.668	7238.223	9047.779	10857.335	
1000	848.229	2827.431	5654.862	8482.293	11309.724	14137.155	16964.586	

Table 5. Volumetric flow as a function of linear velocity of the medium

Values of flows corresponding to the velocity 1 m/s			
DN	m^3 / h	l / min.	l / s
10	0.283	4.712	0.079
15	0.637	10.62	0.177
20	1.131	18.85	0.314
25	1.767	29.452	0.491
32	2.895	48.255	0.804
40	4.524	75.398	1.257
50	7.069	117.81	1.964
65	11.946	199.1	3.318
80	18.096	301.59	5.027
100	28.274	471.23	7.854
125	44.179	736.31	12.272
150	63.617	1060.3	17.671
200	113.10	1885	31.42
250	176.71	2945.2	49.087
300	254.47	4241.2	70.686
350	346.36	5772.7	96.211
400	452.39	7539.8	125.66
450	572.26	9537.5	158.96
500	706.86	11781	196.35
600	1017.9	16965	282.74
700	1384.7	23079	384.65
800	1809.6	30159	502.65
900	2289.1	38151	635.85
1000	2827.4	47124	785.4

Table 6. Values of flows corresponding to the velocity 1 m/s

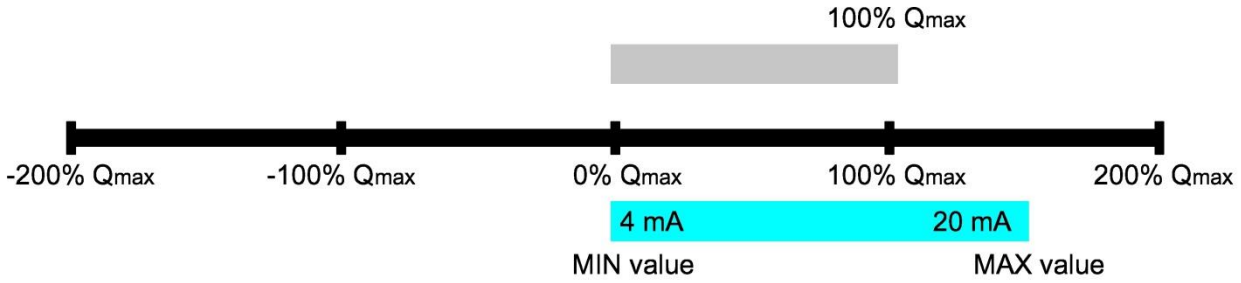
11.5.3. Available pressure ranges acc. to DIN, ANSI for operation of the flowmeters for the individual executions for DN flanged connections

DIN PN16	DIN PN25	DIN PN40	ANSI150lb	ANSI 300lb
DN10	DN10	DN10	DN10	DN10
DN15	DN15	DN15	DN15	DN15
DN20	DN20	DN20	DN20	DN20
DN25	DN25	DN25	DN25	DN25
DN32	DN32	DN32	DN32	DN32
DN40	DN40	DN40	DN40	DN40
DN50	DN50	DN50	DN50	DN50
DN65	DN65	DN65	DN65	DN65
DN80	DN80	DN80	DN80	DN80
DN100	DN100	DN100	DN100	DN100
DN125	DN125	DN125	DN125	DN125
DN150	DN150	DN150	DN150	DN150
DN200	DN200	DN200	DN200	DN200
DN250	DN250	DN250	DN250	DN250
DN300	DN300	DN300	DN300	DN300
DN350	DN350	DN350	DN350	DN350
DN400	DN400	DN400	DN400	DN400
DN500	DN500	DN500	DN500	DN500
DN600	DN600	DN600	DN600	DN600
DN800	DN800		DN800	
DN1000	DN1000		DN1000	

11.5.4. Basic principles for selection of the DN size (acc. to DIN) of the flowmeter for the nominal flow Qn

- Electromagnetic flowmeters have the declared measurement class for linear velocity in the range 0.3 ÷ 10 m/s and simultaneous complete filling of the sensor with liquid and meeting the requirements for the physical and chemical parameters of the medium and the environment in the specification of the sensor.
- The basic parameter necessary for selection of the **DN** size of the flowmeter is knowledge of expected nominal flow **Qn** [m3/h, l/s]. **DN** value of the flowmeter should be selected so that for nominal flow **Qn** [m3/h, l/s] the linear velocity of the flow **Vn** [m/s] is as close as possible to 3 m/s. Selecting **DN** size for the flowmeter user should use the standard values of the flow resulting from the parameter **Qmax**[m3/h]. Values of **Qmax** flow for the individual **DN** values of the flowmeters are selected for the linear value of the flow **V** [m/s] equal to approx. 3 m/s.
- Design of the flowmeter ensures measurement (balancing) in the range of the flows up to 200% **Qmax**.

Representation of instantaneous flow value with a current signal 4-20 is limited to range of flows determined by the MIN value and MAX value parameters (the same unit as set in Flow unit option) included in the Outputs config subgroup.



Measuring range of the flowmeter determined by Qmax parameter

The manufacturer ensures maintaining of declared accuracy class in the range from 10% to 100% Qmax.

If it is necessary to adapt the flowmeter to linear velocity Vn>3m/s you should contact with the manufacturer of the flowmeter.

11.6. Allowable ambient and operation parameters

Ambient temperature	-20…60 ºC
Relative humidity	to 80%
Ambient atmosphere	no aggressive components
Altitude above sea level	to 2000m

Do not exceed allowable ambient and device operation parameters. Exceeding can cause more measurement errors, occurrence of irregularities in operation of display and whole equipment.

11.6.1. Electromagnetic compatibility, immunity

Assessment acc. to PN-EN 61326-1, 2 for industrial applications:

Electrostatic discharges (ESD):
PN-EN 61000-4-2
Level S3; Contact ±6kV; Air ±8kV; Criterion B;

Conducted interferences induced by fields with radio frequency:
PN-EN 61000-4-6
0,15…80MHz, 10V; Criterion A;

Electromagnetic fields (radiated interferences):
PN-EN 61000-4-3
80…2000MHz - 10V/m; …2700MHz - 1V/m; Criterion A;

Fast electrical transient conditions (Burst):
PN-EN 61000-4-4
± 2kV supply lines - enclosure; ± 1kV signal lines - enclosure; Criterion B (A);

Surges:
PN-EN 61000-4-5
± 0,5kV (±1kV) signal lines - enclosure ± 1kV (±2kV) supply lines - enclosure; Criterion B;

11.6.2. Electromagnetic compatibility, emissions

Measurements acc. to CISPR 16-1, CISPR 16-2, class B;
Distance of antenna 3m, quasi-peak measurements:

Radiation:
0,15…30MHz; 80-52dBµV/m;
30…2000MHz; <54dBµV/m;

Induction:
0.01…0.15MHz; 96-50dBµV/m;
0.15…0.35MHz; 60-50dBµV/m;
0.35…30MHz; <50dBµV/m;

11.6.3. Mechanical resistance

Impacts:
PN-EN 60068-2-27, 31
50g/11ms

Sinusoidal vibrations:
PN-EN 60068-2-6, test Fc;
To 1.6mm; 2…25Hz;
To 4g for 25…100Hz;

11.6.4. Insulation resistance

>100MΩ @110V DC

11.6.5. Insulation resistance

1330 V AC (1880 V DC), 5 s – rising, 5s - test

11.6.6. Ingress protection of the enclosure

acc. to PN-EN 60529:2003
Sensor - IP 67
Converter – IP 66 or IP 67.

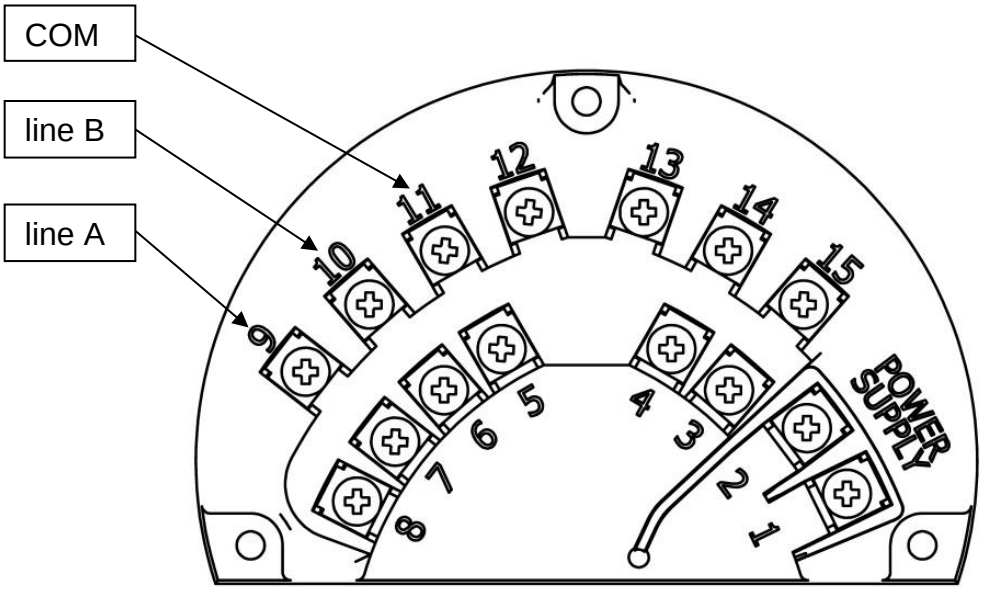
12. MODBUS COMMUNICATION

12.1. Data of the MODBUS interface in the device.

Physical layer	RS485 half-duplex
Terminating resistor	built-in, 130Ω, activated by switch on rear wall of electronics unit, item "2"
Specification of RS485 transceiver	Interface galvanically isolated from ground of the flow meter. Allowable voltage between the common wire and lines A, B:-7/+ 12V. "Fail-safe" receiver. Reduction of rate of rise ("slew-rate") during sending. Transceiver does not interfere operation of the bus without power supply to the flowmeter.
Transmission mode	MODBUS RTU, compatible with MODBUS over serial line specification and implementation guide V1.02
Time relationships for transmission	Compatible with the requirements of MODBUS over serial line specification and implementation guide V1.02
MODBUS electrical connection	Three screw terminals in terminal chamber at the back of the device. Interface with galvanic isolation, connection of the common wire is required. Terminal 9 - line A RS485 (non-reversing) Terminal 10 - line B RS485 (reversing) Terminal 11 - common wire RS485.
Range of digital transmission	1200 mm (shielded twisted pair)
Address space	1...247 device addresses
Maximum number of devices on the bus	256
Transmission rate	4800, 9600, 19200, 38400, 57600, 115200 bps
Transmission parity check	no parity, odd, even
number of bits of sign of transmission frame	11 bits (8N2, 8E1, 8O1). Number of stop bits connected with parity check. For *no parity* there are 2 stop bits, 1 bit for the other cases.
Response time for the query	max. 20ms, typical 10ms, measured from the end of query frame to start of response frame. It does not depend on transmission rate
Setting of transmission parameters	From the keyboard, from configuration menu

Physical layer:
MODBUS interface of the flowmeter is intended for connecting to two-wire RS485 bus. Because the interface is galvanically isolated it is also required to connect a common wire RS485. Method of its connection depends on system configuration and expected differences in potentials between the devices.

Connection diagram is presented on the below figure:



The most popular terminology of terminals markings acc. to RS485 is given; that is line A is non-reversing line of the interface while the line B is reversing line. This standard is used by the world's largest manufacturers of the RS-485 transceivers. It is important to bear in mind that there is also contrary method of marking of these lines compatible with the TIA/EIA standard.

The flowmeter is equipped with galvanically isolated MODBUS interface.

Non-isolated RS485 interface allows difference of ground potentials for the individual interfaces not exceeding -7 to +12V, while each difference of potentials of the grounds causes flow of equalizing currents. Exceeding of the potentials difference may even cause damage of the interface. In case of an isolated interface the common wire is connected only to ground of the Master device (usually using cable screen) and is not connected with the other grounds therefore the potential difference is small and equalizing currents does not flow. Ground (enclosure) potential of the Slave device may considerably differ from the ground potential of the Master device without negative consequences.

Typical connection diagram of two-wire RS485 bus is indicated on the below figure:

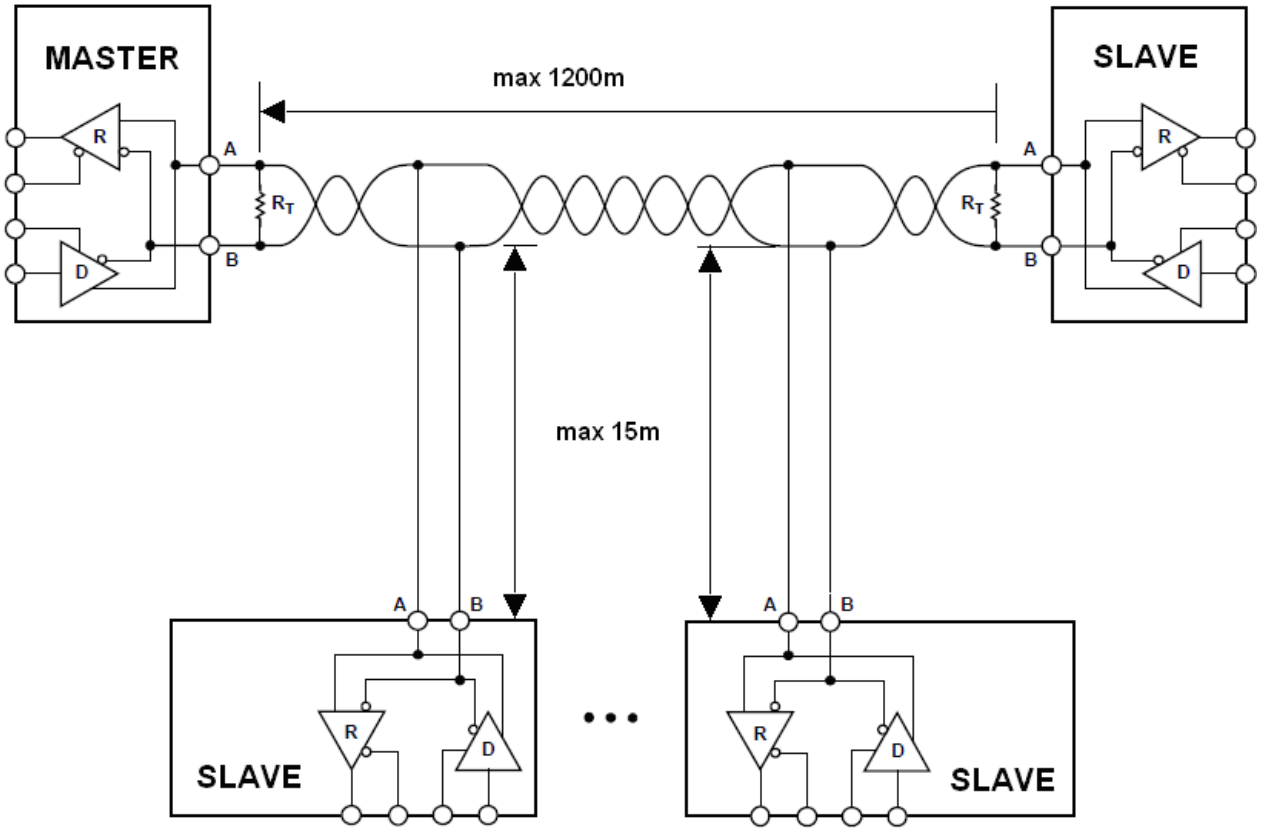


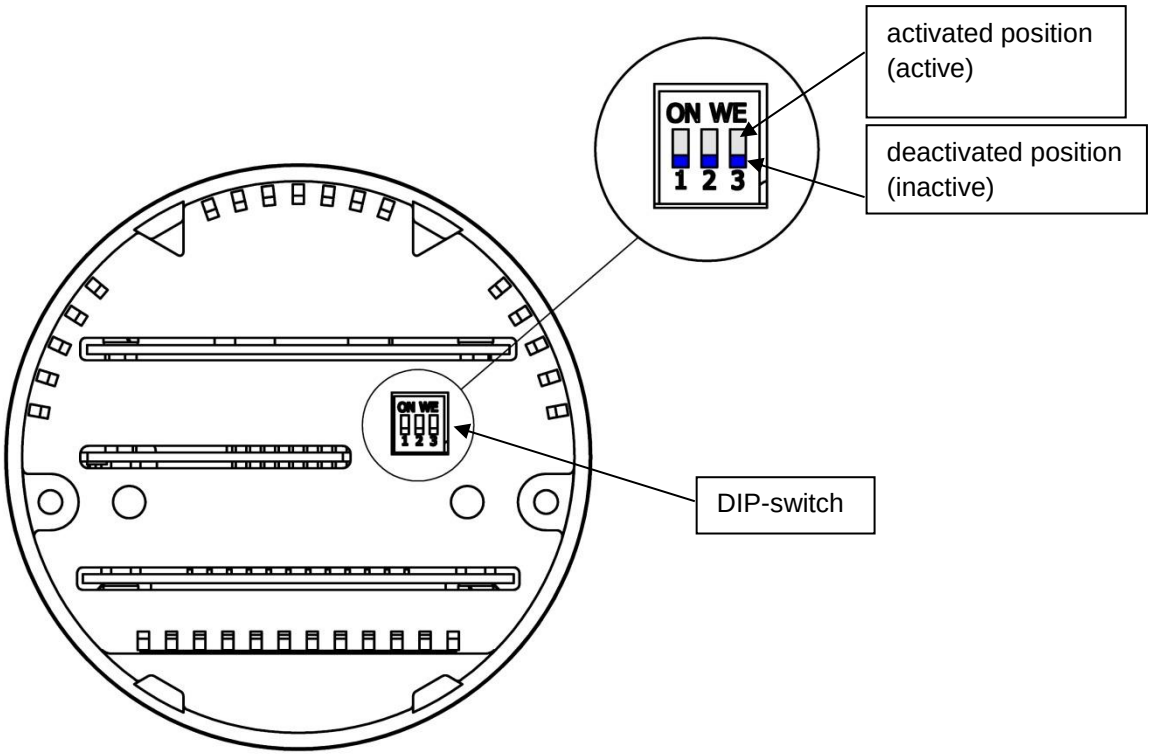
Figure .19 Connection diagram of two-wire RS485 bus.

To ensure correct operation of many devices on one serial communication bus you should connect to it in series appropriate leads from the devices. Each device connected to the bus should have unique address assigned.

It is possible to configure network with max. length 1200metres and maximum 247 Modbus devices. The bus should be led from the Master device, through successive devices (connected directly or through cable junction boxes) up to the last Slave device. Each stub of the conductor from the bus may be max. 15 meters long, while as far as it is possible you should avoid such long stubs. Do not led cables in "star" configuration. Use cables suitable for the RS485 bus, that is screened twisted pair with suitable characteristic impedance compatible with EIA-485. Bus should be terminated with a terminating resistor R_T at least from the side of the last Slave device or from both ends as presented on the figure. Flowmeter is equipped with a terminating resistor activated by a configuration switch located on the back wall of the electronics unit.

If the bus consists of at least one device without fail-safe type interface, that is it does not interpret differential voltages A-B smaller than ±200mV as an inactive condition then it is required to connect a set of pull-up resistors to the line A, B, which are forcing voltages on lines when no transmitter is active. Flowmeter interface is equipped with such resistors, which may be activated using configuration switch located on the rear wall of the electronics unit.

Marking and operation of the switches is presented on the following figure:



Pos. 1, 3: "fail-safe" resistors, pos. 2: terminating resistors). Switch for the given position is enabled (switched on) when its slider is set in upper position.

Enable items 1 and 3 in case when the "fail-safe" resistors are activated. Flowmeter receiver does not require to enable the "fail-safe" resistors.
Bus terminator may be located also in the junction box and therefore it is not necessary to manipulate configuration switch.

All positions of the switch are disabled in new devices.

12.2. Checking and setting the parameters of the transmission.

Use MODBUS menu for this purpose which is located in: Configuration → Modbus.
In this way you can change the following parameters:

- Enable or disable MODBUS module
- Own address of the device
- Transmission rate
- Configuration of stop bit parity.

You must be logged using the code to have access to the menu.

Change of transmission parameters is possible in any time also during the transmission and it takes place immediately after confirmation of the changes in the menu. It is important to bear in mind that change of configuration during the transmission will stop it (frame coming from the Master device will be ignored).

Modbus interface operates in the unicast mode what means than it responds to correct MODBUS frames, with compatible address, send by the Master device. The Interface supports the following MODBUS functions (frame types):

Function code	Name	Description
0x03	Read holding registers	Registers reading. Basic function used to read the measurement results and current parameters of the equipment. Implemented four address spaces are described in the following part of the manual.
0x08 sub-functions 0x00 00, 0x00 01, 0x00 0A ÷ 0x00 12	Diagnostics	Selected set of diagnostic functions allowing checking transmission correctness through the "echo" frame and deleting and reading diagnostic meters compatible with the MODBUS standard.
0x2B sub-function 0x0E	Encapsulated Interface Transport / Read Device Identification.	Reading of text information identifying the equipment.

If MODBUS frame with compatible address and correct CRC control area but with incorrect data will be send to the device then the exception will be returned. Supported MODBUS exceptions are presented in the table:

Error code	Name	Description
1	Illegal function	This exception is returned when function code is not supported by the device.
2	Illegal data address	This exception is returned in case of query for non-implemented address or address, which is not a beginning of the logically coherent register (in case of data longer than 16-bit). Reading of long registers in batches is forbidden due to lack of guarantees of the accuracy of the data.
3	Illegal data value	This exception is returned in case of query for incorrect number of registers that is the end of read area is outside the implemented area or the end of read area divides the logically coherent register (longer than 16-bit). Reading of long registers in batches is forbidden due to lack of guarantees of the accuracy of the data.
4	Slave device failure	This exception is returned when the device is damaged.

Currently all data made available by the MODBUS interfaces are read-only. It is only possible to erase diagnostic meters.

Frame 0x03 allows reading device registers. Only unicast mode is allowed. Four address spaces, as presented in the table (MODBUS addresses are given) are available:

Address range: MODBUS*	Name	Description
106-106	Quick identification of the device - "reversed" order	This register is presented due to a backward compatibility with a previous version of the device. Size of area is one (1) 32-bit word.
2000-2010	Measurement data - "reversed" order	This area contains basic measurement data in form of 32-bit words and it is compatible with the previous version of the device. Size of area is six (6) 32-bit words.
4000-4030	Extended measurement data - "reversed" order	This area contains extended measurement data in form of 32-bit words arranged in "reversed" order that is the youngest 16-bit words first and then the older 16-bit word. Because 16-bit MODBUS words are always "big-endian" coded then the whole 32-bit word does not have "big endian" and "low endian" order. Except difference in arrangement of 16-bit words all data contained in the 4000-4030 and 5000-5030 fields are the same. Size of area is 16 words with 32 bits.
5000-5030	Extended measurement data - "big endian" order	This area contains extended measurement data in form of 32-bit words arranged in "big-endian" order that is the oldest 16-bit word first and then younger 16-bit word. Because 16-bit MODBUS words are always "big-endian" coded then the 32-bit figure has "big endian" order. Except difference in arrangement of 16-bit words all data contained in the 4000-4030 and 5000-5030 fields are the same. Size of area is 16 words with 32 bits.

Please remember that MODBUS registers addresses are bigger by 1 than the addresses sent in frames.

Detailed explanation of data coding in the MODBUS registers are given in the below table:

Coding:	Description	Example
inv. long int	32-bit integer coded in the "reversed" order. Fits in 2 MODBUS registers that is 4 bytes.	Contents (hexadecimal) of the successive 16-bit registers: 03 EA, 00 00. This corresponds to the number of 0x000003EA that is 1002 decimal.
long int	32-bit integer, "big endian" coded. Fits in 2 MODBUS registers that is 4 bytes.	Contents (hexadecimal) of the successive 16-bit registers: 00 00, 03 EA. This corresponds to the number of 0x000003EA that is 1002 decimal.
inv. float	32-bit floating-point number, IEEE754 compatible, coded in "reversed" order. Fits in 2 MODBUS registers that is 4 bytes.	Contents (hexadecimal) of the successive 16-bit registers: C4 19, 42 E0. This corresponds to the number of 0x42E0C419 that is 112.383 floating-type.
float	32-bit floating-point number, IEEE754 compatible, saved in "big-endian" order. It occupies 2 MODBUS registers that is 4 bytes.	Contents (hexadecimal) of the successive 16-bit registers: 42 E0, C4 19. This corresponds to the number of 0x42E0C419 that is 112.383 floating-type.

Because 32-bit areas contains numbers constituting whole, it is not permissible to read this numbers in batches (single MODBUS registers) and in case of attempt for such reading **of at least one register** the MODBUS exception will be returned. This is because the 32-bit number consisting of two 16-bit readings may be incorrect if value of such number is changed between the readings.

For example: 32-bit register contains increasing number. First value - 0x0000FFFF. Next value - 0x00010000 (bigger by 1). If the number is read in the order "older 16b word - younger 16b word" and the change occurs exactly between the readings then number 0x0000 (first reading) 0x0000 (second reading) will be obtained what will give incorrect number 0x00000000 that is 0.

Below you will find examples of correct and incorrect reading of the registers presented for 2000-2010 space. Colour areas means registers read:

MODBUS registers addresses															
1998	1999	2000-2001		2002-2003		2004-2005		2006-2007		2008-2009		2010-2011		2012	2013
X	X	C494	4189	0000	0000	1CAD	42B9	C419	42E0	BE77	4083	C494	4189	X	X
correct															
correct															
correct															
incorrect															
incorrect															
incorrect															
incorrect															
incorrect															
incorrect															

The contents of registers in 106-106 is as follows:

Register	Address (hex)	Brief description	Extended description	Unit	Format
106	0x0069	Quick identification.	contains decimal value 1002	-	inv. long int

The contents of the registers for 2000-2010 is as follows:

Register	Address (hex)	Brief description	Extended description	Unit	Format
2000	0x07CF	Current flow Q	Filtration can be independently configured for this variable.	l/s	inv. float
2002	0x07D1	Empty pipe error	Error is indicated on bit 0 as value 1. The other bits always have 0 value.	-	inv. long int
2004	0x07D3	Total totalizer S	Volume counter for flowing liquid. The counter increases for positive flow and decreases for negative.	m^3	inv. float
2006	0x07D5	Positive totalizer S+	Volume counter for flowing liquid. The counter increases for positive flow and does not change for negative flow.	m^3	inv. float
2008	0x07D7	Negative totalizer S-	Volume counter for flowing liquid. The counter increases for negative flow and does not change for positive flow.	m^3	inv. float
2010	0x07D9	Copy of the register 2000		l/s	inv. float

The contents of registers in 4000-4030 is as follows:

Register	Address (hex)	Brief description	Extended description	Unit	Format
4000	0x0F9F	Current flow Q	Filtration can be independently configured for this variable.	m^3/h	inv. float
4002	0x0FA1	Information flags	Meaning of bits: bit 7 - measuring board error bit 6 - sensor error bit 5 - sensor coil error bit 4 - memory error bit 3 - empty pipe error bit 2 - not filled pipe error (for sensors with not filled pipe) The other bits: 0	-	inv. long int
4004	0x0FA3	Total totalizer S	Volume counter for flowing liquid. The counter increases for positive flow and decreases for negative.	m^3	inv. float
4006	0x0FA5	Positive totalizer S+	Volume counter for flowing liquid. The counter increases for positive flow and does not change for negative flow.	m^3	inv. float
4008	0x0FA7	Negative totalizer S-	Volume counter for flowing liquid. The counter increases for negative flow and does not change for positive flow.	m^3	inv. float
4010	0x0FA9	Total totalizer US	Volume counter for flowing liquid. The counter increases for positive flow and decreases for negative. Counter deletable by the user.	m^3	inv. float
4012	0x0FAB	Positive totalizer US+	Volume counter for flowing liquid. The counter increases for positive flow and does not change for negative flow. Counter deletable by the user.	m^3	inv. float
4014	0x0FAD	Negative totalizer US-	Volume counter for flowing liquid. The counter increases for negative flow and does not change for positive flow. Counter deletable by the user.	m^3	inv. float
4016	0x0FAF	Flow velocity v	Linear velocity of flow, allowing assessing the flow quickly, regardless of pipe diameter.	m/s	inv. float
4018	0x0FB1	Pipe diameter	Pipe diameter selected in the menu. This value makes the flow Q dependent on the linear velocity of liquid flow. Diameter values are	-	inv. long int

			defined as a list: DN2=0, DN4=1, DN6=2, DN10=3, DN15=4, DN20=5, DN25=6, DN32=7, DN40=8, DN50=9, DN65=10, DN80=11, DN100=12, DN125=13, DN150=14, DN200=15, DN250=16, DN300=17, DN350=18,DN400=19, DN450=20, DN500=21, DN600=22, DN700=23, DN800=24, DN900=25, DN1000=26		
4020	0x0FB3	Filter mode for Q	Filter mode for Q value presented by MODBUS (not applicable to values send by current loop or to screen). Filter averaging 0 value, "dumping" filter value 1	-	inv. long int
4022	0x0FB5	Filtration time constant	Filtration time constant for the filter described above. Value in seconds from 0 to 60. 0 value means no filtration.	s	inv. long int
4024	0x0FB7	Cut-off of small flow	Value 1 means that cut-off of low flow is enable while value 0 means that it is disabled.	-	inv. long int
4026	0x0FB9	Cut-off value for low flow	Cut-off value for low flow. If absolute value of current flow is lower than this value then flow value is substituted with 0.	m^3/h	inv. float
4028	0x0FBB	Device operation time	Device operation time - in 0.5s units	½s	inv. long int
4030	0x0FBD	Device operation time - user	Device operation time - in 0.5s units, can be deleted by the user.	½s	inv. long int

The contents of registers in 5000-5030 is as follows:

Register	Address (hex)	Brief description	Extended description	Unit	Format
5000	0x1387	Copy of the register 4000	Registers arranged in "big endian" order. Detailed descriptions in the table for 4000-4030 registers.	m^3/h	float
5002	0x1389	copy of the register 4002		-	long int
5004	0x138B	copy of the register 4004		m^3	float
5006	0x138D	copy of the register 4006		m^3	float
5008	0x138F	copy of the register 4008		m^3	float
5010	0x1391	copy of the register 4010		m^3	float
5012	0x1393	copy of the register		m^3	float

		4012			
5014	0x1395	copy of the register 4014		m^3	float
5016	0x1397	copy of the register 4016		m/s	float
5018	0x1399	copy of the register 4018		-	long int
5020	0x139B	copy of the register 4020		-	long int
5022	0x139D	copy of the register 4022		s	long int
5024	0x139F	copy of the register 4024		-	long int
5026	0x13A1	copy of the register 4026		m^3/h	float
5028	0x13A3	copy of the register 4028		½s	long int
5030	0x13A5	copy of the register 4030		½s	long int

Frame 0x08 allows you to perform diagnostic operations. This frame defines subfunctions described by 16-bit value. Majority of the diagnostic functions is based on the diagnostic meters defined by MODBUS. Only unicast mode is available. Available subfunctions of 0x08 frame with their description are presented in the following table.

Code sub-function (hex)	**Meter number**	**Name of function or meter acc. to MODBUS**	**Description of function**
00 00	-	Return Query Data	In response to this query a frame is sent which is an accurate echo (copy) of query frame, including the data field. The data field can be of any type.
00 01	1-8	Restart Communications Options	This frame restarts serial port (with currently selected parameters in the menu) and zeroing of diagnostic meters. Data field of query frame can consist both 0x0000 and 0xFF00 values because this device does not run Communications Event Log.
00 0A	1-8	Clear Counters and Diagnostic Register	This frames resets diagnostic meters. Data field of query frame: 0x0000.
00 0B	1	Return Bus Message Count	This frame returns value of diagnostic meter Return Bus Message Count. This meter contains number of correct* frames detected on the bus. The data field of the query frame is always 0x0000.
00 0C	2	Return Bus	This frame returns values of diagnostic meter Return

		Communication Error Count	Bus Communication Error Count. This meter contains number of incorrect frames on bus, with incorrect CRC, with parity error, with lost characters or shorter than 3 bytes. The data field of the query frame is always 0x0000.
00 0D	3	Return Slave Exception Error Count	This frame returns value of diagnostic meter Return Slave Exception Error Count. This meter contains number of exceptions in received, correct frames (incorrect code, address, data in frame). The data field of the query frame is always 0x0000.
00 0E	4	Return Slave Message Count	This frame returns value of diagnostic meter Return Slave Message Count. This meter contains number of correct frames directed to this device, including broadcast frames. The data field of the query frame is always 0x0000.
00 0F	5	Return Slave No Response Count	This frame returns value of diagnostic meter Return Slave No Response Count. This meter contains number of correct frames directed to this device, including frames without response (broadcast). The data field of the query frame is always 0x0000.
00 10	6	Return Slave NAK Count	This frame returns value of diagnostic meter Return Slave NAK Count. This meter contains number of correct frames directed to this device, for which NAK response is returned. The data field of the query frame is always 0x0000.
00 11	7	Return Slave Busy Count	This frame returns value of diagnostic meter Return Slave Busy Count. This meter contains number of correct frames directed to this device, for which Slave Device Busy response is returned. The data field of the query frame is always 0x0000.
00 12	8	Return Bus Character Overrun Count	This frame returns value of diagnostic meter Return Bus Character Overrun Count. This meter contains number of cases, where some characters from received frame have been lost (applies to all frames on bus)

			The data field of the query frame is always 0x0000.

*) correct frame is a frame without parity errors, CRC error and frame length is correct, in other words: this is a frame, which structure (in ADU layer) is correct and therefore the frame can be directed for decoding and execution of the command. It does not mean correctness of data contained in PDU.

Frame 0x2B allows data tunneling in various formats using MODBUS frames. One subfunction of this frame, 0x0E, is supported that is Read Device Identification. Only unicast mode is available. Response to this frame returns information about the device, organized in compact structure of objects with **byte** organization (what differs from the MODBUS data organization, which is usually 16-bit). Each object contains ID, byte informating about data field length and data field. Data field contains a string of text characters coded in ASCII standard, not terminated with zero. Returned objects are presented below:

Object ID	Object length (hex.)	Object length (decimal)	Content of object data field
00	0D	13	`Aplisens S.A.`
01	08	8	`PEM-1000`
02	0A	10	`v0.01.0000`

13. INSPECTIONS. CLEANING. SPARE PARTS

13.1. Periodic inspections

Periodic inspections should be carried out in accordance with the standards valid for the user.
Condition of the electrical connections on terminals (reliability of the connections) and stability of display mounting shall be checked during the inspection.

13.2. Non-periodic inspections

If converter could be endangered to mechanical damages, electric overvoltages or incorrect operation will be stated - then inspections shall be carried out.
If signal in measuring line is missing or its value is incorrect you should check condition of cable, condition of connections on terminals etc. Check whether value of supply voltage and load resistance is correct. If the line is in good working order you should check operation of the flowmeter.

13.3. Cleaning/washing.

To remove dirt from external surfaces of the flowmeter they should be wiped/swept dry or, if necessary, additional rubbed through with cloth moisten with water.

14. SCRAPPING, DISPOSAL

Worn-out or damaged devices should be disposed in accordance with the WEEE directive (2002/96/EC) on waste electrical and electronic equipment or it should returned to the manufacturer.

15. ADDITIONAL INFORMATION

15.1. Additional information

The manufacturer reserves the right to introduce design and process changes in the device not decreasing its performance parameters.

16. REVISION LOG

No. of revision	Document edition	Description of review
1	02.A.0/06.04.17	Changes connected with introduction of software version 2.5: - Addition of screen for dosage function on main screen level - Addition of possibility to preview serial number of the device in the menu Changes connected with introduction of software version 2.6.(xxxx): - Addition of zeroing option in calibration function - Addition of C coefficient in calibration function (coefficient of non-linearity).
2	02.A.1/25.05.17	Editorial changes.
3	02.A.2/07.07.17	Modbus communication: change of address column in table for registers in 5000-5030.