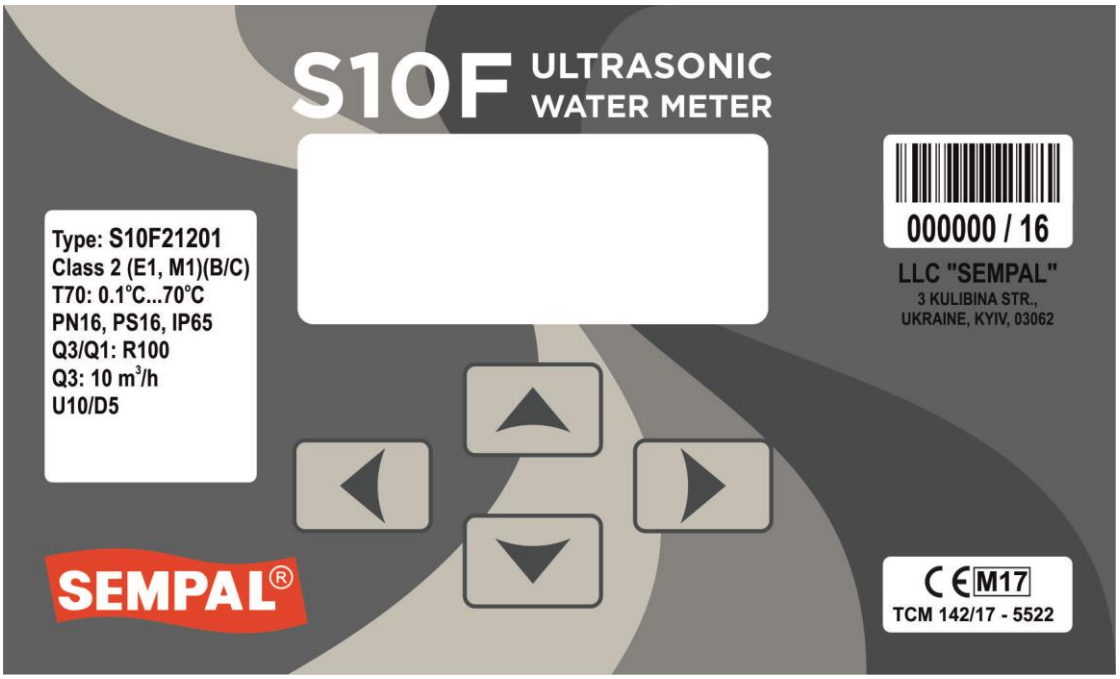


SEMPAL S10F
Ultrasonic Water Meter
Mains powered

Operating Instructions
Part 2

Contents

1 General description

S10F water meters (hereinafter, meters) are applied for fiscal metering, control of supply and consumption of water by industrial facilities and municipal services.

S10F meters are complex measuring devices, for which all starting-up and adjustment procedures should be accomplished by qualified personnel.

While meters are in operation, it is necessary to strictly comply with the requirements of these Operating Instructions.

The Manufacturer's guarantee is 48 months from the date of shipment for meters which were put into operation by specialized enterprises authorized by the company-manufacturer.

Recalibration interval is up to 4 years.

The quality system of "SEMPAL Co LTD" has been certified according to **ISO 9001:2008, ISO 14001:2004, BS OHSAS 18001:2007**.

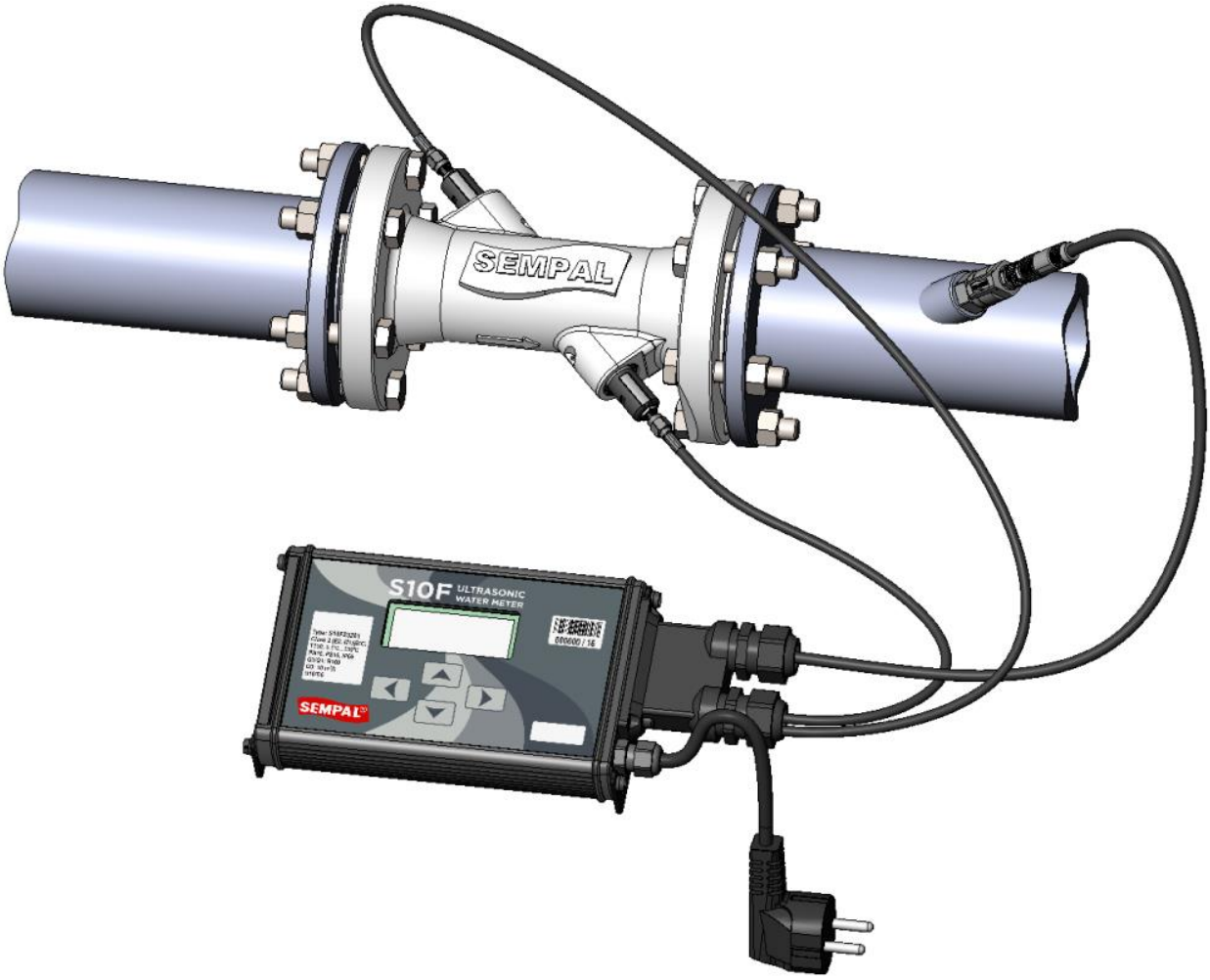
If you have any questions regarding procurement, maintenance, operation and servicing of meters, contact us or our authorized regional representatives.

"SEMPAL Co LTD" contact details:
info@sempal.com
Phone/fax: (+38044) 239-2197, (+38044) 239-2198.
www.sempal.com

2 Mechanical construction

Meters consist of the following **functional units**:

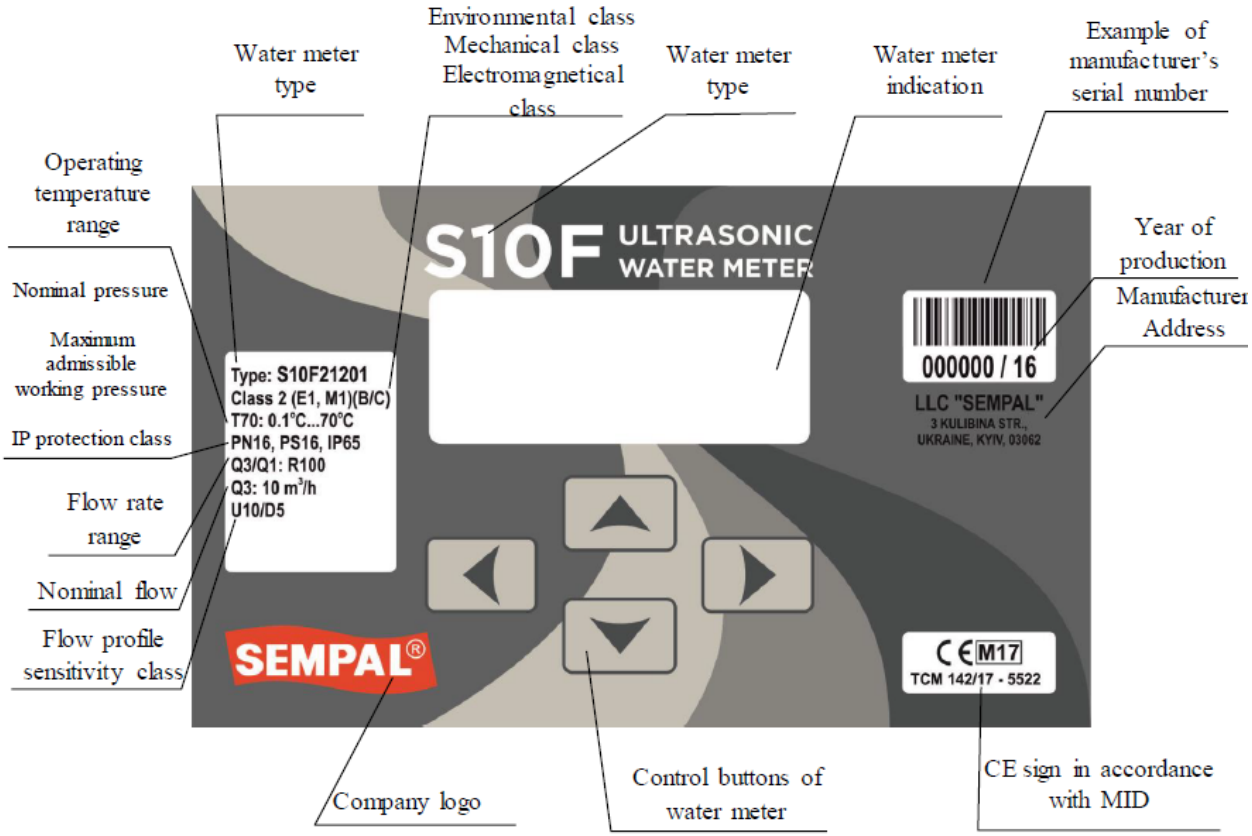
- Flow metering sections (FS) with ultrasonic flow sensors. They may be represented by 1-path or 2-path configurations on demand;
- Resistive temperature detectors (RTD) or temperature sensors on demand;
- S10F electronic unit (calculator).



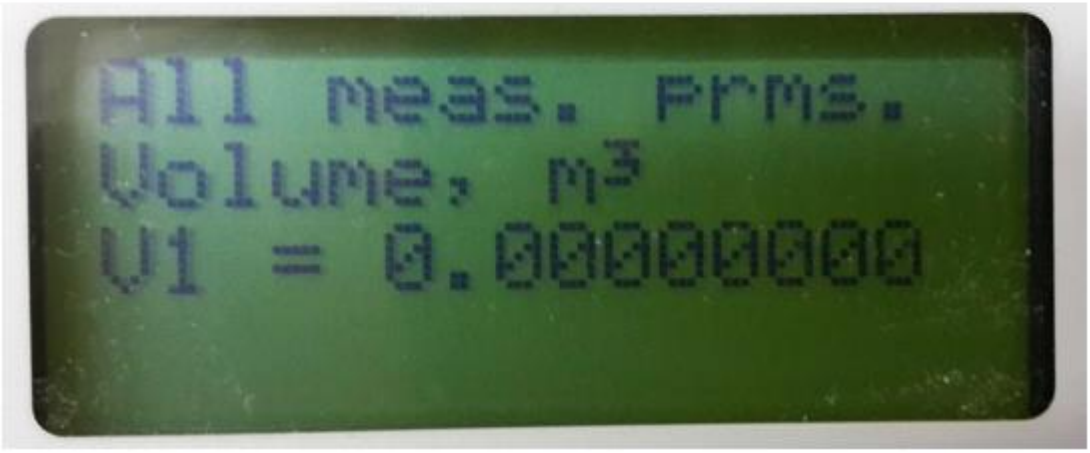
Accessories:

- On customer's demand meters may incorporate one or two pressure transducers converting overpressure to proportional current signal from 4 to 20 mA.
- Two supplementary flow meters with pulse outputs can be connected to the meter to calculate volume in water supply systems.
- Meters with outputs of "open collector" type or with active outputs can be used. Maximum output voltage for active outputs is 10 V. Maximum input pulse frequency is 1000 Hz.

Calculator



Mains Power supply type screen
Graphical display



3 Technical specification

3.1 General information

S10F meters are intended for measurement of cold and hot water consumption, notably the volume, mass, flow rate, temperature and overpressure of water or fluids with solid particles under 200 μm and solid residue mass of no more than 500 milligram/liter .

Climatic Environment class (OIML R49) is B-C (indoors and outdoors).

Calculator enclosure protection class is IP 65
Flow sensors protection class is IP68

Meters may be operated under the following conditions:

- Atmospheric pressure from 84.0 to 106.7 kPa;
- Ambient temperature from 0.1 to +50 ^{0} C (for calculator);
- Ambient temperature from 0.1 to +70 ^{0} C (for flow meter body);
- Relative humidity not exceeding 95 %;
- Supplied network voltage:

  220 V (187… 242) V, frequency (50 ± 1) Hz;
  or (36 ± 5.4) V, frequency (50 ± 1) Hz;
  or (24 ± 3.6) V, frequency (50 ± 1) Hz.

Pressure stage is PN 16 (for DN 20 – DN 600) and PN 25 (for DN 700 – DN 1200).

Accuracy class (OIML R49) 1 and 2

Limits of permissible absolute error of temperature measurements are ± 0.2 ^{0}C.

Limits of absolute error of time measurement is ± 1 min in 24 h.

Average error-free operation of
meters is not less than 50 000 h,
calculators is not less than 100 000 h.

Total average life of meters is not less than 12 years.

3.2 Calculator functions

The calculator displays and transmits the following physical quantities:

- Volume (mass) of the water, m^3 (ton);
- Volumetric flow rate of the water, m^3/h (ton/h);
- Temperature of the water, ^0C;
- Overpressure of the liquid or water MPa (kgf/cm^2);
- Work time and non-work time, h;
- Current time (hour, minute, second) and date.

3.2.1 Data logger

The Calculator stores information on the measured values of flow rate and volume (or mass) of the water, work time and non-work time, as well as measured temperature average values:

Data logging interval	Data logging depth
Hourly logger	100 days
Daily logger	3 years

The entire stored information and measured parameters may be transmitted via communication interfaces (RS232, RS485, M-Bus).
Measurement information about volume of the liquid or water, as well as work time and non-work time is stored in the meter nonvolatile memory for not less than 12 years after meter power supply cut.

3.2.2 Display

Number of digits displayed by the calculator:

Parameter	Number of digits
Volume (mass) of the water	8
Volumetric flow rate of the water	5
Temperature of the water	5
Overpressure of the water	3
Work time or non-work time, current time	7
Date	8

Display resolution:

Parameter	Resolution
Volume (mass) of the water	from 10^{-7} to 1 m^3 (from 10^{-7} to 1 ton)
Volumetric (mass) flow rate of the water	from 0.001 to 0.1 m^3/h (from 0.001 to 0.1 ton/h)
Temperature of the water	0.01 ^0C
Overpressure of the water	0.1 kgf/cm^2 (0.01 MPa or 10.0 bar)
Operation time or out-of-service time	from 10^{-5} to 1 h
Current time	1 min

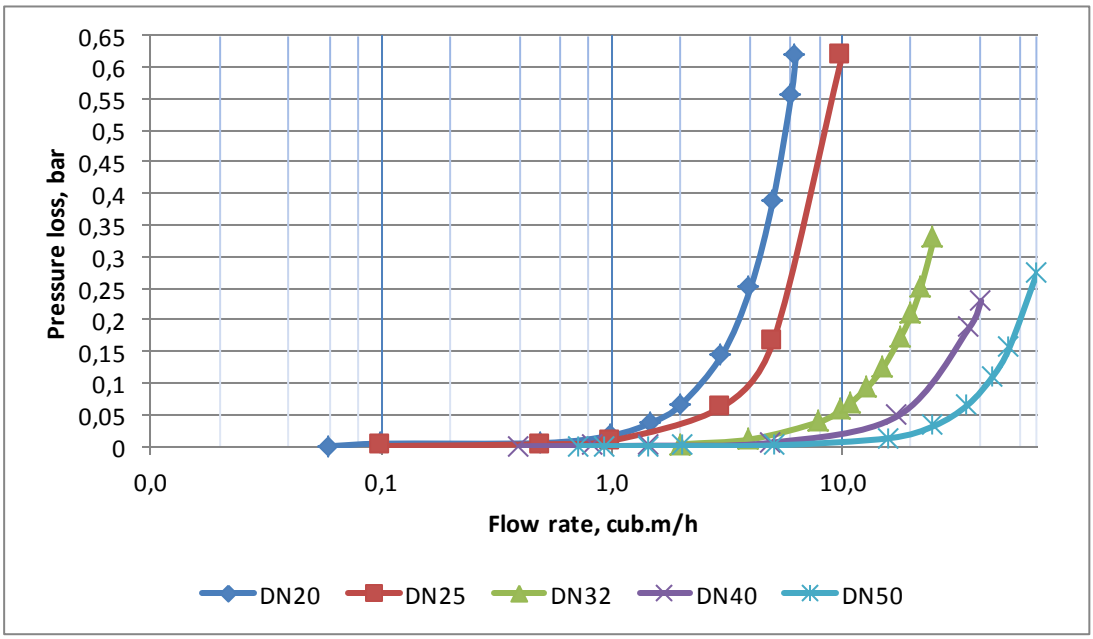
3.2.3 Tariffs

The consumer may set the day/night tariff mode. If done so, the time for the beginning of the night tariff and the time for the beginning of the day tariff can be set. When the tariff mode is on, all stored parameters, such as volume, mass, are stored and archived in separate meters for day and night tariff.

3.3 Approved meter data

DN mm	Min. flow Q_1 m^3/h	Transition flow Q_2 m^3/h	Nom. flow Q_3 m^3/h	Max. flow Q_4 m^3/h	Dynamic range Q_3/Q_1	Pressure loss Δp at Q_3 bar	Overall length mm	Connection on meter
20	0,06	0,10	6,3	7,9	100	0,62	160	G1B
							200	DN20
25	0,10	0,16	10	12,5	100	0,62	160	G1
							200	DN25
32	0,25	0,40	25	31,3	100	0,33	180	M48×2
							200	DN32
40	0,40	0,64	40	50,0	100	0,23	200	G2
							220	DN40
50	0,63	1,01	63	78,8	100	0,22	180	DN50
65	1,00	1,60	100	125,0	100	0,22	200	DN65
80	1,60	2,56	160	200,0	100	0,22	210	DN80
100	2,50	4	250	312,5	100	0,22	230	DN100
125	4,00	6,40	400	500,0	100	-	265	DN125
150	6,30	10,08	630	787,5	100	-	315	DN150
200	10,00	16	1000	1250	100	-	540	DN200
250	20	32	2000	2500	100	-	620	DN250
300	25	40	2500	3125	100	-	680	DN300
400	40	64	4000	5000	100	-	820	DN400
500	63	100,80	6300	7875	100	-	970	DN500
600	100	160	10000	12500	100	-	1110	DN600
800	160	256	16000	20000	100	-	1360	DN800
1000	250	400	25000	31250	100	-	1550	DN1000
1200	400	640	40000	50000	100	-	2000	DN1200

3.4 Pressure loss



4 Data communication

The meter has following data communication channels:

Communication channel	Completeness	Description
RS232C	Basic	Connection to computer, modem
USB Host	On demand	Storage of logged information on USB Flash
RS485	On demand	Modbus protocol support
M-Bus	On demand	

Note. Either USB or RS485 may be ordered.

Information interfaces

The meter has the following interfaces for data reading:

- RS232;
- USB Host;
- RS485.

RS232 is delivered in basic variant and enables meter connection to a computer, modem (wire modem, GSM/GPRS modem). The same interface provides data transfer from the meter to a computer.

USB Host is used for connection of USB Flash (no limitations for USB storage capacity) with FAT or FAT32 initialization. Data storage on the Flash in «Check» mode is accomplished through connections of the USB Flash the relevant USB port. In this case all data collected by the meter are recorded.

To speed up the process of recording, the device records only information that has been stored from the time of the last recording on current flash. On demand the whole data array can be logged.

RS485 supports two data communications protocols:

- “Sempal” internal protocol for data exchange between meters;
- Modbus RTU protocol.

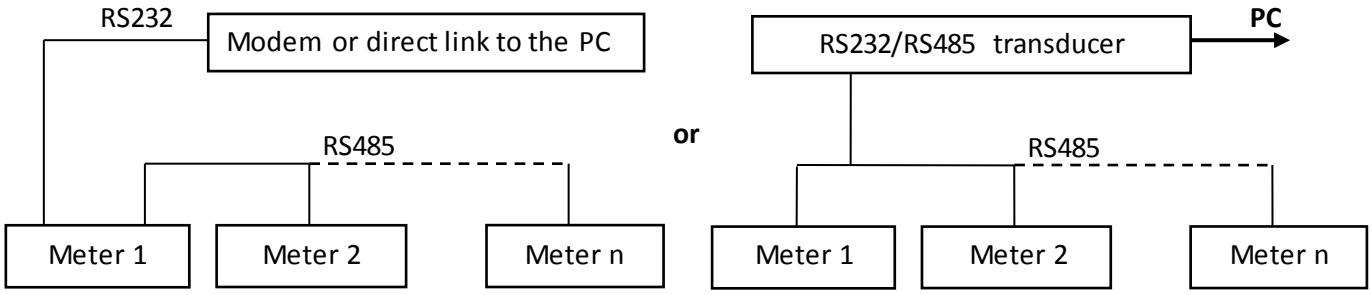
The consumer is able to choose the type of the applied protocol.

While applying “Sempal” protocol, meters can be integrated via RS485 interface. In this case, only one meter is connected to the external communication channel (modem, RS232). It provides access to the entire chain of meters.

Modbus protocol enables the meter connection to the Modbus network. Current status and data loggers are accessed. The interface rate is adjusted by the customer.

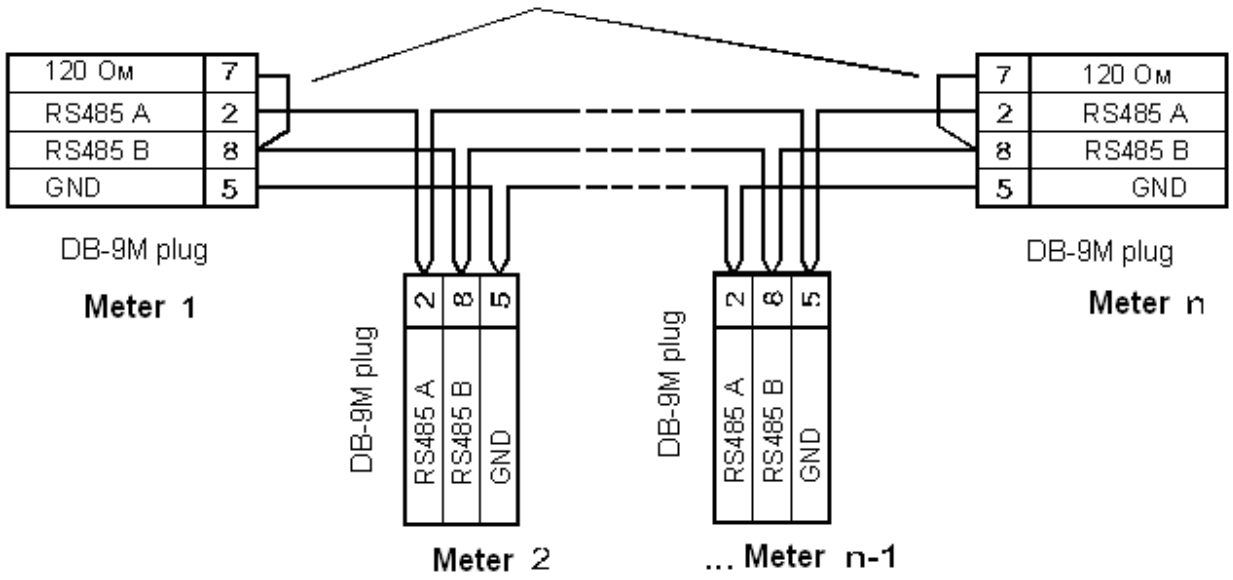
USB Host and RS485 interfaces are delivered by customer's order.

RS485 with Sempal communications protocol



RS485 interface gives a possibility to connect several meters (or other devices manufactured by SEMPAL). The total length of RS485 communication line is up to 2 km. The connecting cable must have 120 Ohm resistance (jumper between 7 and 8 contacts of the connector). The di agram shown below is intended for connection of RS485 cable (wired by the customer). Twisted pair has to be used for the wiring.
Cable connectors have to be connected to 71 connector of each meter's cable.

Jumper must be welded on the first and last meter in the line



Analog interfaces

On customer's demand an integrated unit can be mounted into the meter. It has following options:

- Possibility to measure pressure;
- Two line outputs;
- Two switching outputs.

Line outputs

The consumer shall adjust the type of each output independently – voltage-operated or current-operated. Voltage-operated output may be used for voltage from 0 to 10 V. Current-operated output may be used for current 0 - 20 mA.

Output capacity of voltage-operated output is 20 kOhm. In this case accuracy of representation of the measured value does not exceed 1 %. Maximum current is up to 10 mA.

Switching outputs

For each of switching outputs the following type can be set:

- Active output. Voltage «1» = 10 V with current up to 10 mA. Input current is up to 20 mA;
- Open collector. Maximum voltage 40 V, current 20 mA.

Type of each output is adjusted by the customer independently.

Line output functions

Each output is configured independently and can be operated in the following modes:

- Linear proportional output;
- Threshold output;
- Adjustment.

Proportional output

Each of outputs may be adjusted to form the output signal (voltage or current), in proportion to a certain meter measured value.

Informational parameters may be represented by:

- t1, t2,– temperatures measured by temperature sensors TS1…TS2, respectively;
- P1, P2 – pressure measured by pressure sensors PS1 and PS2, respectively;
- V1, V2 – water volume;
- m1, m2 – mass flows of the water.

The customer chooses an informational parameter and adjusts the parameter variation range and the output signal variation range.

Threshold output

Threshold output operates by the following algorithm.

An informational parameter is selected and two threshold values are set –on threshold and off threshold. If the value of informational parameter exceeds the threshold, output is set to «1», if the value falls below the threshold – it is set to «0».

Adjustment

In this case each output represents one adjustment channel.

The consumer sets parameters for circuit adjustment (transmission ratio for the channel and response speed) and regulated parameter.

The following adjustment algorithms are used for temperature adjustment. The customer's preset temperature for specified temperature sensor is maintained.

Switching outputs functions

Each of switching outputs is configured independently. The output type and the informational parameter are set.

Switching outputs always operate in the threshold mode. This mode corresponds to the threshold mode of line outputs.

5 Meter outputs

Depending on the order, meters may have two analog output voltage signals (0…10 V) or current signals (4… 20 mA), proportional to:

- Temperature of the liquid (water);
- Overpressure of the liquid (water);
- Volume of the liquid (water).

Output impedance of analog potential outputs is 50 Ohm, maximum load current is 10 mA.

Maximum load resistance for current outputs is 300 Ohm.

The limit for reduced voltage error for analog outputs at load resistance of not less than 20 kOhm is ±1%.

The limit for reduced current error for analog outputs at load resistance of not higher than 300 Ohm is ±1%.

Nominal supply voltage to meters may be 220 V or 36 V, or 24 V AC at standard frequency of 50 Hz.

The meter may also have standby power supply (batteries). The standby power supply unit operation time depends on the meter configuration. Having no linear outputs and pressure measuring devices operation time of fully charged batteries is not less than 15 hours.

The Calculator has two active pulse outputs with voltage «1» 3,3 V.

Maximum pulse repetition frequency is 1000 Hz.
Maximum load resistance is 10 kOhm.

Range of pulse weight setting (set by the customer) is from 1 to 9999999 pulses/unit. Where «unit» is unit of measurement of the converted physical quantity. The customer may select the following physical quantities: volume (pulses/m^3), mass (pulses/ton).

Power consumed by meters does not exceed 7 VA.

6 Design and functioning

The transit time principle is based on time difference measurements. When the ultrasonic signal is transmitted toward the upstream side against the flow direction, more propagation time is required (T1). On the other hand, when it is transmitted toward the downstream side with the flow direction, the propagation time is less (T2). That is, the signal is delayed or speeded up by the moving fluid. The difference in time between "T1" and "T2" is proportional to the flow velocity, and the flow volume can be calculated by multiplying it by the cross-sectional area. Temperature of the liquid (water) is measured by platinum resistive temperature detectors.
The flow rate measuring process is continuous. It is conducted several dozen times per second and the obtained data are collected. Once a second, flow data are read and volume is calculated. Temperature and pressure measuring cycle is provided in every 2 seconds. Each measuring cycle lasts for 1 second and includes both measurements of flow rate and the process of the devise self-diagnostics.
The meter can have one or two channels depending on customer's request. Each channel may serve one circuit of water consumption system. So, the meter can perform metering in two circuits at the same time (depending on the required configuration).
Every channel is, actually, an independent computational channel that may process available measuring data (temperature, flow rate, volume, mass, pressure).
Computational channel may have one of the following metering modes:

- «Out of metering»
- «Metering»
- «Stopped».

Switching of metering modes is provided in the «Setup» Menu.

«Out of metering» Mode

This mode is set at shipment and is served for bringing the meter into operation. It is not for metering. In this mode it is possible to provide operations like zero setting, parameters editing (for example, system of units).

«Metering» Mode

This is the mode for metering. While switching to this mode from the «Out of metering» mode, all integral parameters and logged data are deleted. In this mode, all operations that can influence measurement results are forbidden.

«Stopped» Mode

This mode is intended for stopping operation of the water volume calculation without terminating registration. Storage of all integral parameters and data archiving for this channel is suspended. No errors occurring in measuring channels are displayed and recorded.
When required, the channel can be switched once again to the «Metering» mode without resetting archived data and integral parameters. If it is necessary to reset parameters, switch the channel to «Out of metering», and then to «Metering» mode.

All changes in channel operation modes should be fixed in the logbook, as well as the date and time the current mode has been initiated. Such data can be displayed while reading the meter current status.

Pulse channels that are measuring volume have no connection with calculation channels and operate independently and are able to measure volume only.

Maximum number of ultrasonic flow measuring channels depends on type of applied flow meters – 1-path or 2-path flow meters.

7 Preparation for operation

1. Make sure that supply voltage specified on the calculator plate corresponds to real supply voltage.
2. Connect the power supply cable to the three-pole socket.
3. To get skills of the meter operation (after its purchase prior to installation at the facility) and to check the device operation ability together with ultrasonic flow sensors, it is recommended:

- Fill the measurement transducer with water

- Remove air bubbles
- Connect to the appropriate cables of flow sensors.

Cable application (connected unit)	Marking on the cable	Marking on cable lugs of flow meters main (standby) and their arrangement with regard to the flow			
		For modification of Accuracy class 1		For modification of Accuracy class 2	
		Marking	Arrangement	Marking	Arrangement
FlS1 of channel 1	A11	11 (11p)	first downstream	11 (11p)	without any reference to the flow
FlS2 of channel 1	A12	12 (12p)	first down stream	11 (11p)	

- Connect the cable (main) to the calculator.

While sensors are properly connected there are no error messages on Calculator's display. At that «Chan 1: not in work» periodically appears. The flow meter should show zero water flow. If so, it is possible **to set the hydraulic zero** in the **«Setup»** Menu mode.

Warning!

Hydraulic zero setting must be done for flow meters of DN 20 – DN 400. For other flow meters with nominal diameters exceeding 400 mm setting of hydraulic zero is not required.

Follow "**Instructions on hydraulic zero setting"** (attached as video guidance and appropriate comments).

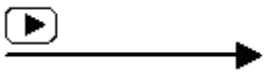
To switch the meter off, it is necessary to disconnect the 3-pole plug from the socket.

7.1 Meter control menu

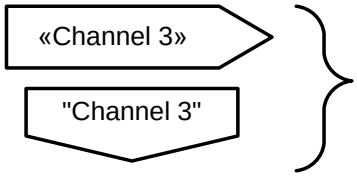
Reference designations

These buttons have the following functionality:

▶ - Right, ▲ - Up, ▼ - Down, ◀ - Left.

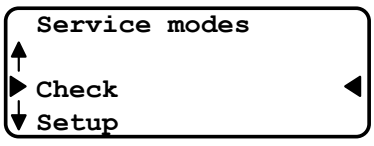


Moved to the next item, if the corresponding button has been pressed (in this case, button "Right")



"Channel 3" – means that there is a continuation on the next page with the relevant heading

Menu items on the display



Signs "▶ ◀" indicate menu item that has been selected and will be initiated, if button "*Right*" is pressed. Press button "*Left*" to return to the previous menu.

Arrows "↑" and "↓" indicate the item of the menu to transfer after pressing buttons "Up" and "Down", respectively.

To get access to certain modes, the password is required. In this case, after pressing the button "Right" it is required to enter the password.

Parameter editing

Editing of parameters can be done in three following steps:

- Indication of parameter current value;
- Editing process will start after pressing the button «Enter»;
- Indication of the result of editing after exiting of Edit process.

After pressing «Enter» button the «  » symbol is appeared on the indicator and it means that editing mode is activated.

There exist two modes of editing:

- ***Editing of the digital value***
- ***Selection of the variant from the list***

Editing of the digital value

Sign " ↕ " indicates to the digit position being changed at the moment. To changed digit position, press buttons "Up" and "Down". To transfer to the next digit position – press button *"Right"*. To complete editing, press button *"Left"*. After that the sign " ↕ " disappears and the indicator will display the stored parameter value. While editing digits with the floating point, the value may differ from the entered one by digit, as it is related to the special features of the internal data representation.

Selection of the variant from the list

Sign " ↕ " to the left from the parameter value indicates that it is suggested to make selection from the list. Change of their parameter value is carried out by pressing buttons "Up" and "Down". To complete editing, press button "Left".

If during editing process, it became clear that the parameter should be left unchanged (for example, "Right" has been pressed), the process of editing may be interrupted without changes in the parameter values by pressing buttons "Up" and "Down" at the same time.

Notes:

1. It should be noted that continued pressing of any button will initiate, i n 0.5 sec, repeated entering of the button digit at the rate of 3 times a second.

If, during 10 min., no button was pressed, the meter will switch from selection of the mode or password entering to the "Indication of basic parameters" mode.

2. If an invalid parameter is entered, the meter will display an error message. Pressing any button will delete the error message and return to the previous menu item.

7.2 Operation procedure

All measured values, parameters of the meter and the meter control commands are described in several sections – meter control **modes**.
Separate service modes («Setup», "Verification") require a password to access.

«Display of all measured parameters» Mode
Being switched on, the device goes into the mode of displaying all measured parameters: all temperatures being measured, all measured flow rates and volumes, and measured pressure s.
To transfer to other operation mode, it is necessary to get into the main menu.
The main menu is used to select each parameter of the computational channels, all measured parameters, or to select certain additional meter modes.

«Calculator Channel» Mode
Displays all selected parameters of computational channel.

«Service » Modes
In this mode, the following items of the menu are displayed: «Check», «Setup», "Verification", adjustment of communications channels parameters, modem, units, …

«Check» Mode
«Check» Mode is intended for display of parameters to be controlled. «Check» Mode does not interrupt measuring process and may be used both by representatives of supervising agencies and by the customer. In particular, this mode depicts meters that are being in «Setup» and "Verification" modes.
This mode is used for reviewing the meter data history and the logbook of events. Copying of information to the USB Flash is possible in this mode also.

"Setup" Mode
"Setup" Mode is used by the customer for putting the meter into operation and is intended for setting hydraulic zero of volume measuring channels (the required initial balancing of the measuring section), entering the required parameters (pressure, water temperature, …), as well as f selecting the metering mode.
It should be remembered that after the meter is put into operation (the meter is in the metering mode "Register") is not possible to access the "Verification" mode. Apart from that, there is no access to such items of "Setup" menu that should not be changed while in metering.

"Verification" Mode
"Verification" mode is intended for assessment of measurement errors and calculation errors in a number of basic metrological parameters of the meter, as well as for checking correctness of the display.
"Verification" mode is used for automatic checking of the meter metrological characteristics in the course of the periodic verification. Verification can be carried out by the manufacturer only or its authorized representative with participation of the auditor.

“Limit prolongation” Mode
It is intended for password entering if time limit prolongation is needed. In this menu, a password is requested to prolong the limits for operation or for disabling this mode. Passwords are issued for a certain date and are valid for 24 hours. This mode is accessible only, if it disabled at shipment.

«Password entering» Mode
Access to service modes **«Setup» and "Verification"** is provided only after **the relevant passwords are entered to avoid unauthorized access to** parameters stored in the calculator. The consumer has to enter a password after a relevant mode has been chosen in the menu.
The manufacturer has set the following **standard passwords for service modes** :

MODE	STANDARD PASSWORD
«Setup»	25205757
"Verification"	31415926

At customer's request the manufacturer may set **INDIVIDUAL PASSWORDS** for service modes**,** which is **equivalent to the additional ELECTRONIC SEALING of the** calculator and **guarantees protection of collected information from unauthorized persons.**

The password is represented by 8 digits and must be entered to get access to one of the service modes.

Symbols **«***» on the indicator mark bits for entering password digits.

Non-masked (open) value of input digit is displayed only at the digit place, in which entering of the password digits is required (editing).

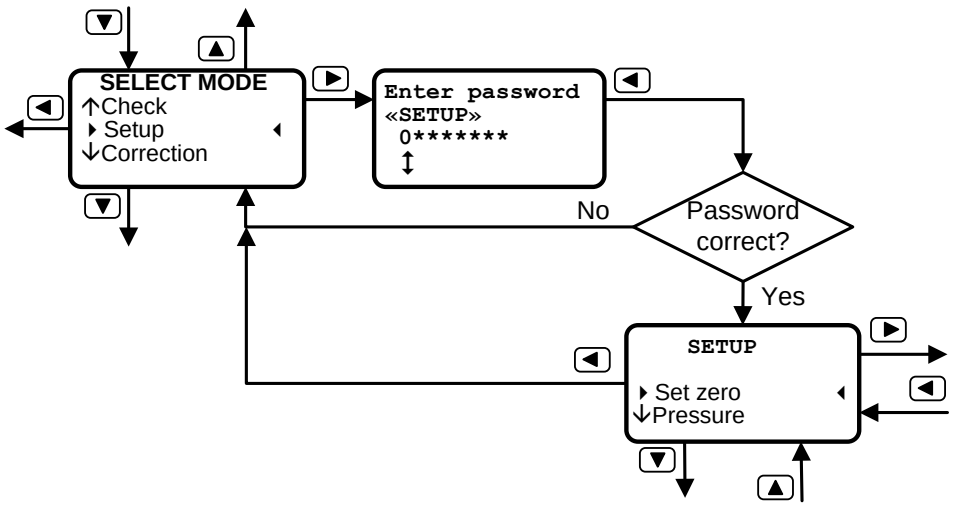
While entering a password, press the button ▶ to move the cursor one digit placed to the right to change certain places of the password.

Pressing buttons ▲ and ▼ changes the value of the edited digit.

Pressing button ◀ – terminates entering the password.

If in 10 min no button was pressed, the meter transfers from the «Enter password» mode to «Display of basic parameters» mode.

Figure gives an example of password entering to get access to the «Setup» mode.



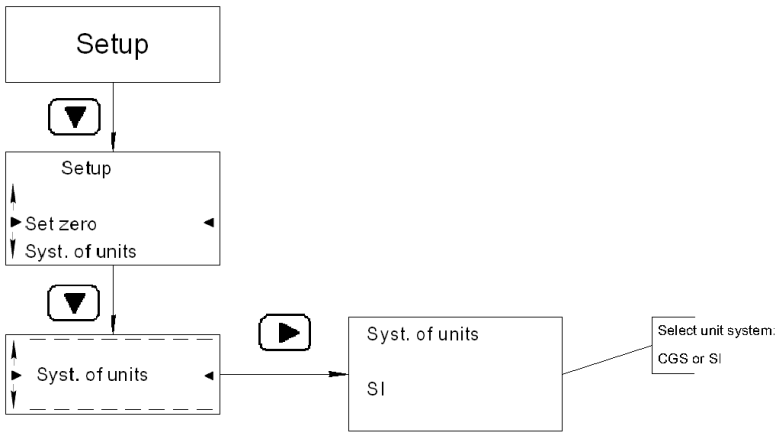
7.3 How to start metering process

To start metering process, please follow next steps:

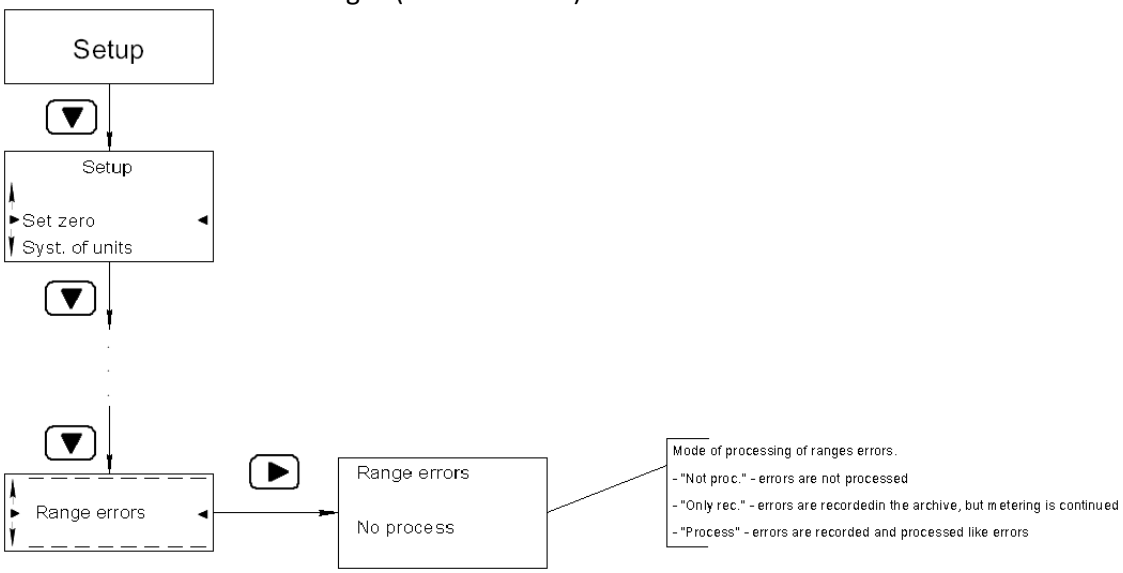
1. Open valves and fill the system with water.
2. Make sure there are no leaks while fixing flow meter on the pipeline.
3. Withstand the operating conditions of the system for at least 15 minutes for completion of the transition process and the removal of air from the water.

In the steady state the calculator screen should display current water flow rate. Error massage should not be presented, while periodically appears «Chan 1: not in work».

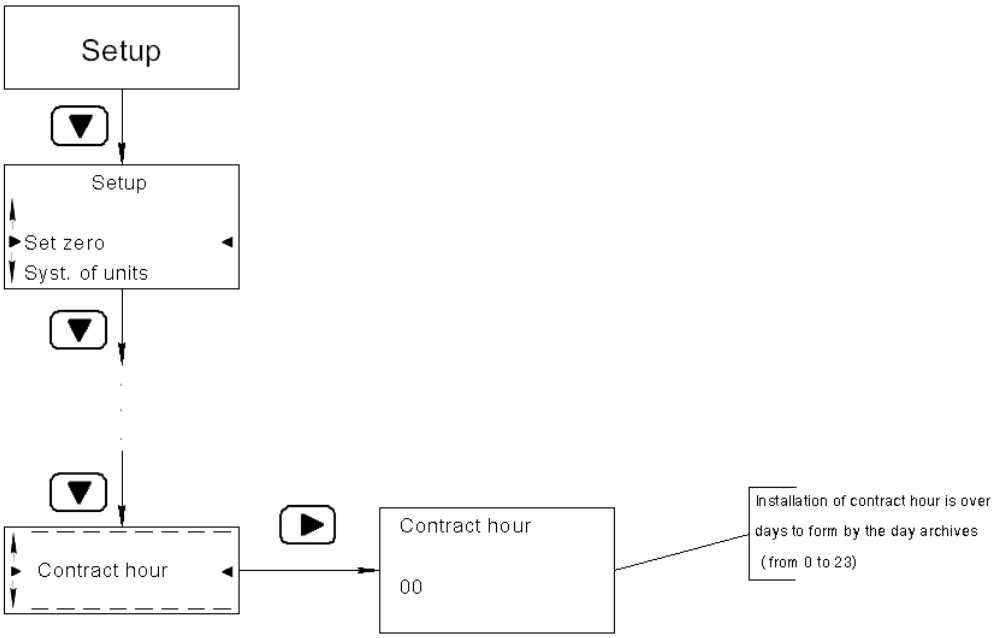
4. Slightly loosen the clamping nut on flow sensors and purge air.
5. Close valves on both sides of the flow meter.
6. Enter into «Setup» mode (password to login 25205757) (VIDEO HELP-1-2).
7. Install hydraulic zero for each flow measurement channel. (VIDEO HELP -3).
8. If necessary, install the SI system of units (default on GHS), for this follow the algorithm of actions shown below (VIDEO HELP -4):



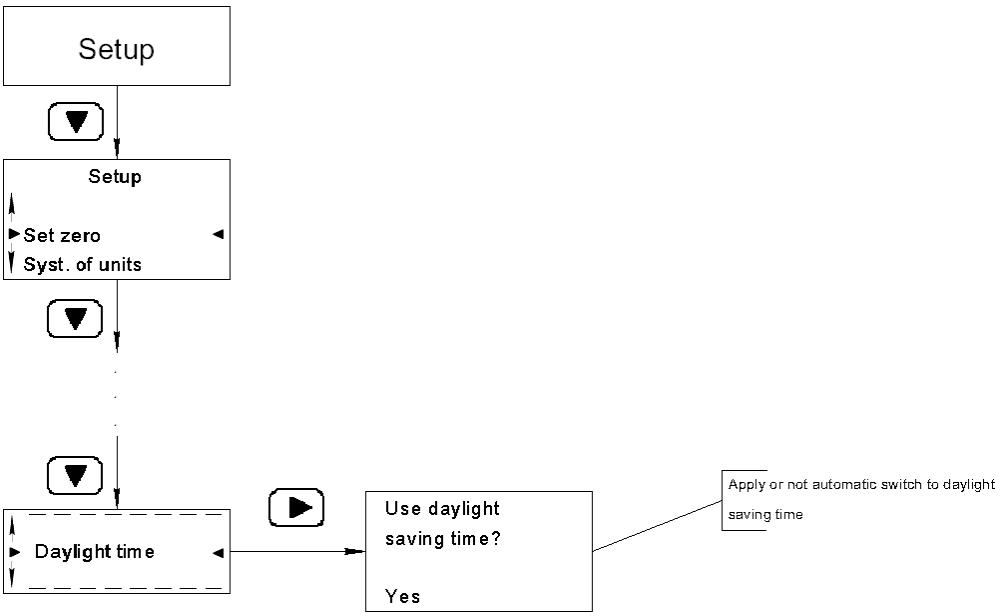
9. Set the error mode ranges (VIDEO HELP-5):



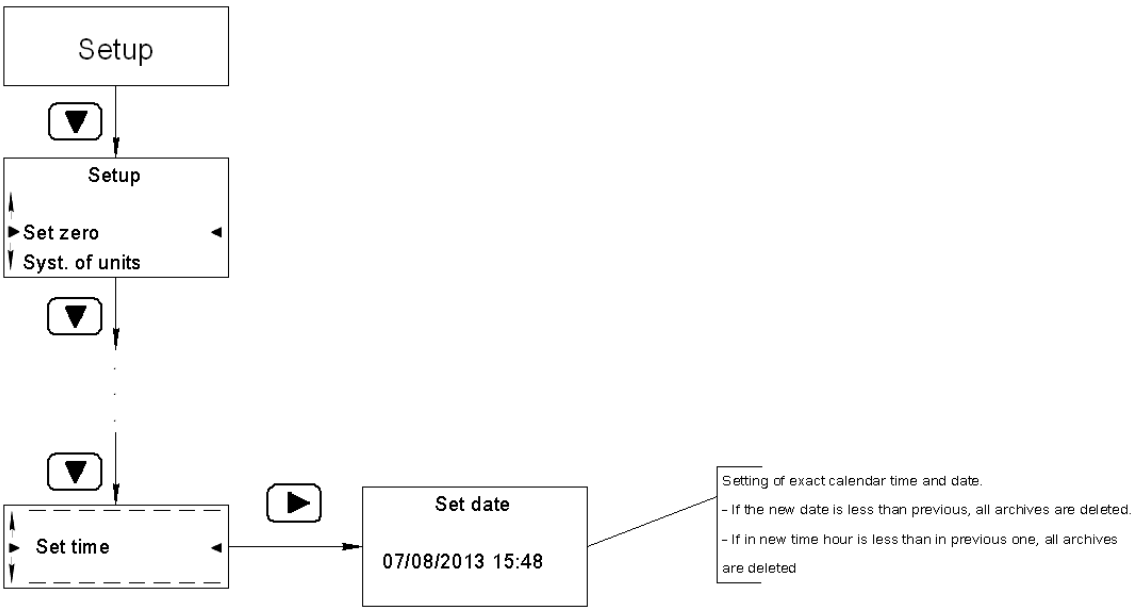
10. Set the completion of the contract hour day (VIDEO HELP -6):



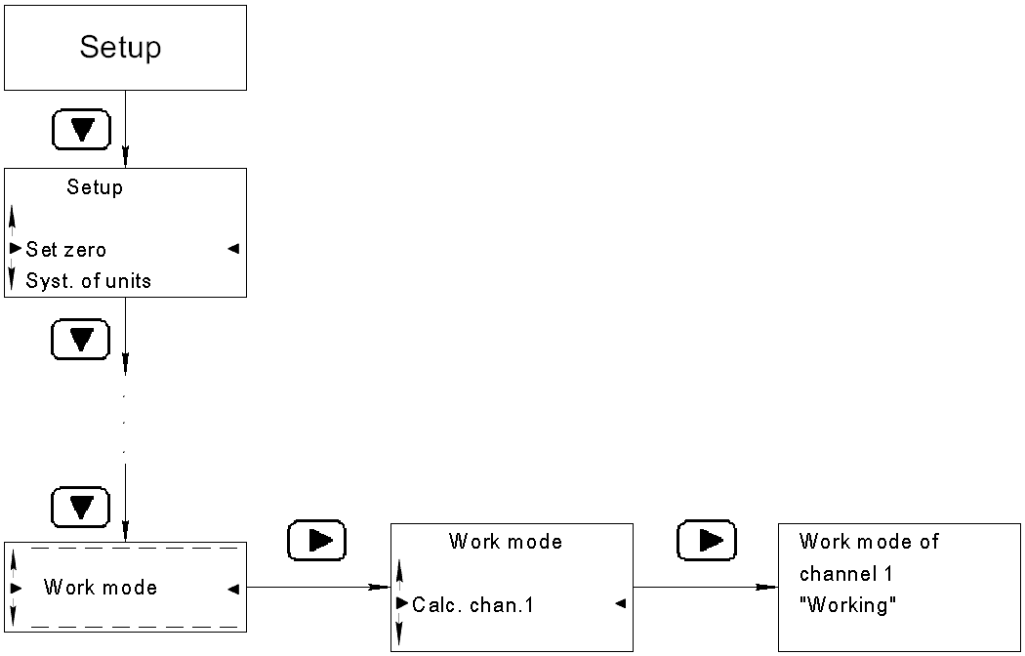
11. Set or cancel application of daylight saving time (VIDEO HELP -7):



12. Check and, if necessary, set the time and date (VIDEO HELP -8):



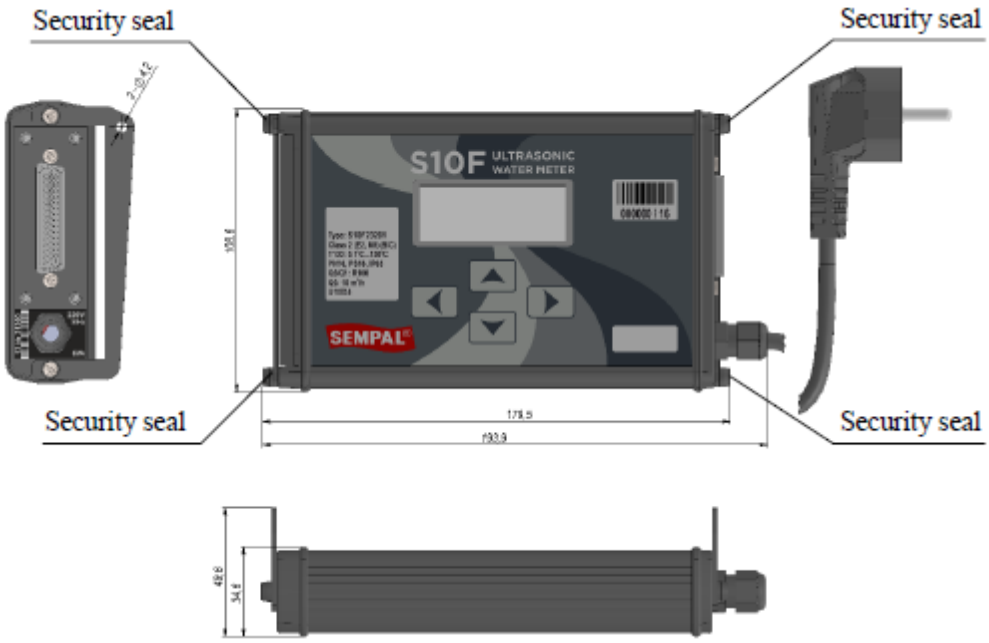
13. To complete the entry in “Metering” (work) mode (VIDEO HELP -9):

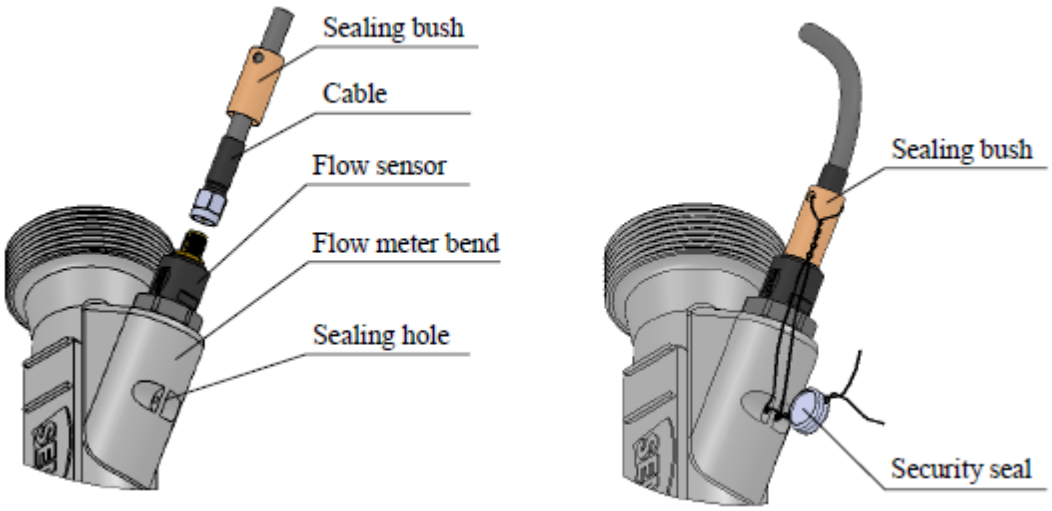


14. Exit from the “Setup” and check the flow meter – it should show zero water flow. Message “Chan 1: not in work” on the screen does not appear.
15. Fully open the shut-off valve. The flow meter should show the current water flow, thus there should be no error messages.

8 Marking and sealing

The meter components are sealed to prevent unauthorized access to adjustment. The calculator is sealed by applying two ink seals with symbols “CEM” on front side and special hidden manufacturer symbol on back side. Seals are placed on Calculator’s side panel fixing screws and on flow sensors.





These seals may only be broken by authorized laboratories in case of test and reverification of the meter. The sealing must be provided by an authorized laboratory using the sealing stamp and the security mark.

9 Procedure for installation and mounting

9.1 Unpacking and degreasing

Unpacking and degreasing of meters are carried out after they have been kept indoors for 2 hours at ambient temperature from 10 to 30°C and relative humidity of no more than 80 %.

To unpack, please follow the instructions:

- Open the packing boxes;
- Take out the package with the calculator and operational documentation;
- Check completeness of the meters according to your order;
- Take meter components out of the packing boxes, visually inspect and make sure that there are no mechanical damages, coating and isolation faults in connecting cables.

9.2 General requirements to the place of Meter's installation

While choosing the place for Meter installation, please pay attention to the nearby radio and television stations (radiofrequency interferences), subways (pulse interferences and "noise" in power supply lines), close location to high-voltage overhead transmission lines (electromagnetic interference), powerful electric motors (supply line surges), equipment operating with large transformers (magnetism), and close vicinity of electric welding equipment (all types of interferences). If such interferences are available, length of communication lines between flow meters and the calculator must be minimal and their length should be determined by the level of interferences at the particular facility.

To reduce the level of interferences from the overhead power transmission lines, it is recommended to install RF filters. The level of electronic interferences can be reduced by applying additional estimated screening devices around the meter and the source of interferences. The effect of interferences can be significantly reduced by using the shortest possible connecting lines.

Places of flow meter and temperature sensor installation must be protected from direct contact with water, dirt, oil and aggressive fluids.

The content of acid and alkali vapors in the area of premises where meters are installed must be within the sanitary norms and rules.

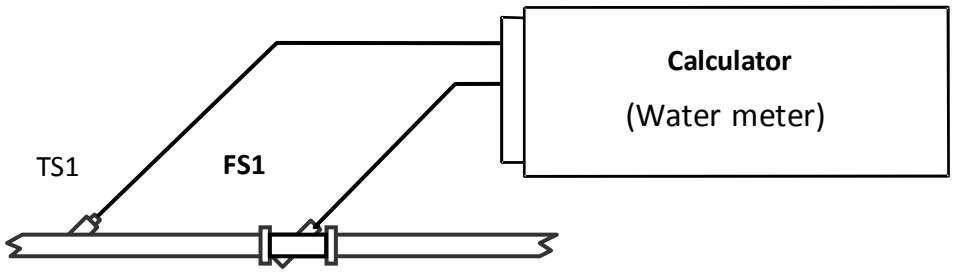
While mounting the flow meter on the open air, it is recommended to provide protection from direct contact of ultrasonic flow sensors with precipitations.

Installation of standard flow meters with possible short time flooding is permissible when the following means for protection are applied.

Places for ultrasonic flow sensors or temperature sensors connection must be protected from contact with water by applying ceiling couplings, profiled sealing components or other means recommended by the manufacturers.

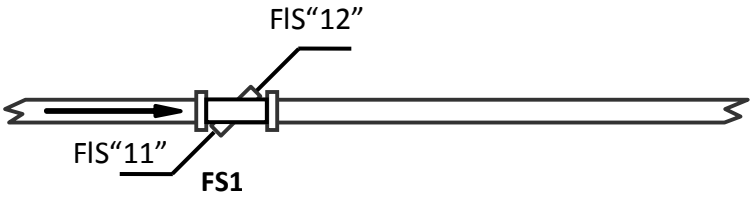
9.3 Configurations

Configuration 1



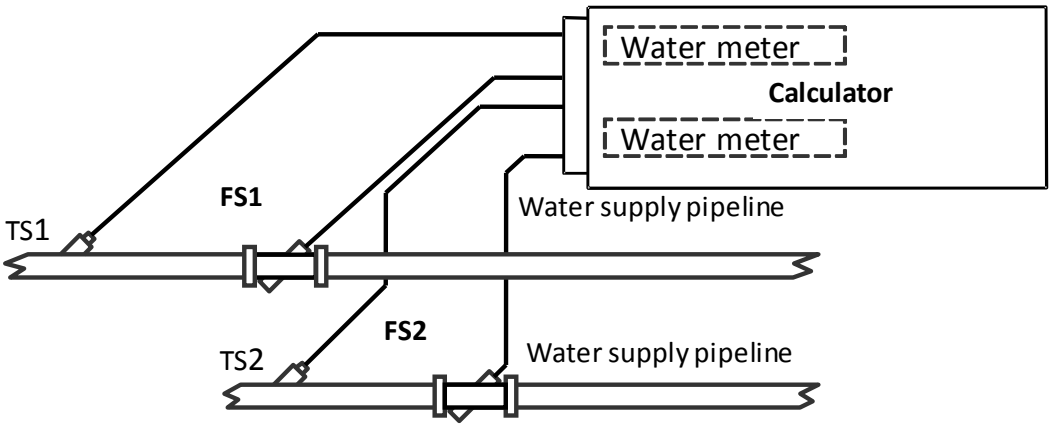
One water meter
Main function is measurement of the water volume (mass) or flow rate

Configuration 1/1



One water meter
Main function is measurement of the water volume or flow rate

Configurations 3



Two independent water meters

9.4 Requirements to the place of flow meter installation and arrangement

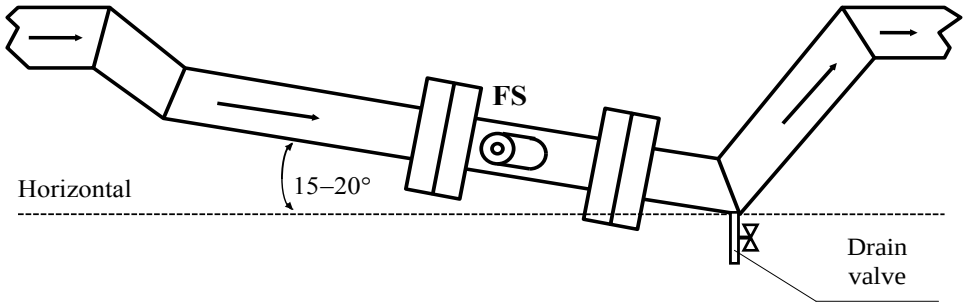
Flow meter should be installed as far as possible from the source of vibration, physical shocks, electromagnetic interferences (electric motors, pumps, compressors, etc.). The pipeline with installed flow meter must be protected from effect of electric current by protective grounding circuit.

The distance between the flow metering section and the place of the calculator installation must be minimal and should not exceed 100 m.

In any case, the flow metering section must be always filled up with water because of measuring principle. Other way meter stops operation and an error message is displayed.

Flow metering sections can be mounted vertically, but, in this case liquid must be supplied upwards to provide filling of the flow metering section with water.

If flow meter operates in conditions, when flow metering section is not completely filled with liquid due to interruptions in liquid supply or when contaminated liquid (detached scum, rust, etc.) is used, it is preferable to apply the variant of installation presented in Figure.



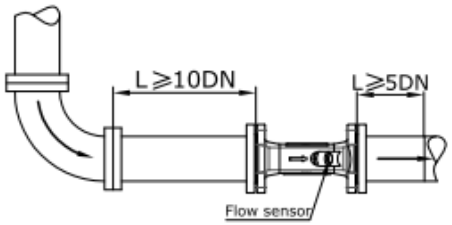
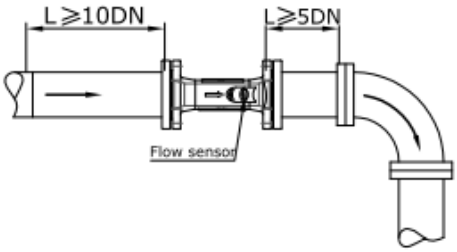
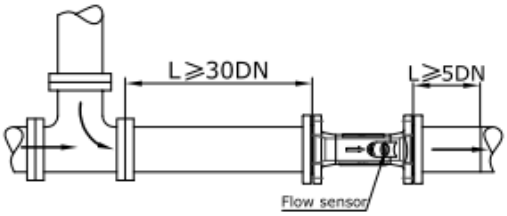
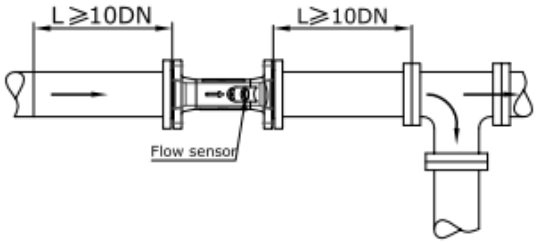
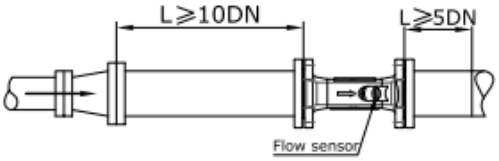
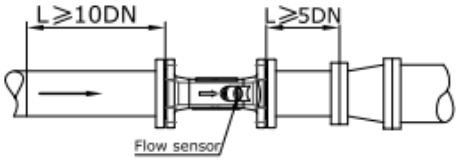
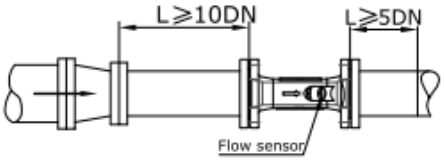
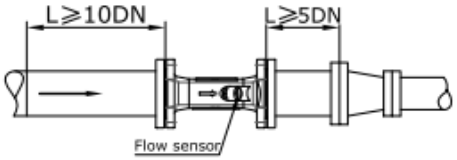
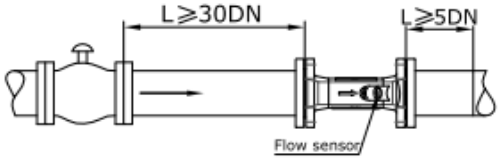
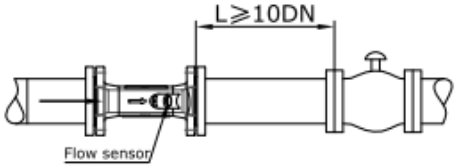
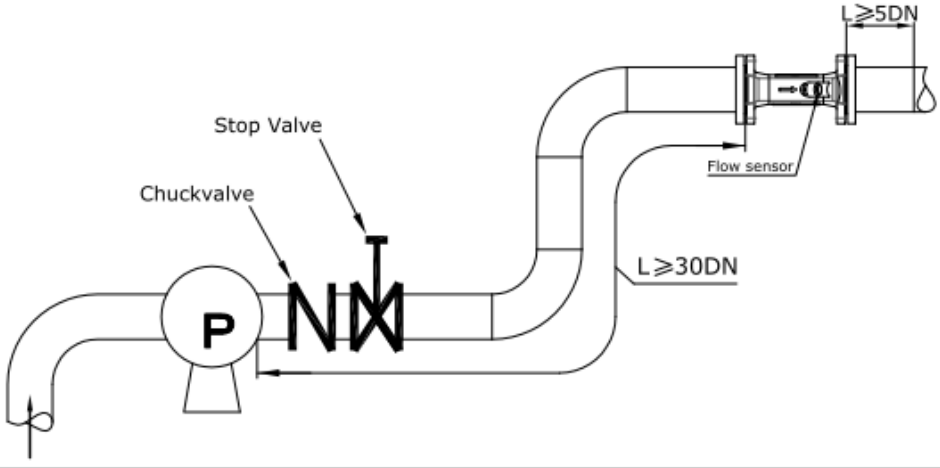
To remove the liquid from the lower section of the pipeline, the drain valve is foreseen.

While installing the flow meter, **please, pay attention** to the following requirements:

– the pipeline section chosen for flow meter installation, should be located in horizontal plane (a deviation from a horizontal within the limits of $\pm 20°$).

– bushes for flow sensors are also arranged in horizontal plane with a deviation from a horizontal line no more than $\pm 20°$.

Minimal straight pipe distances downstream and upstream of flow disturbances in accordance with specified meter accuracy should be not less than mentioned in the Table

Structural condition	Upstream straight pipe length	Downream straight pipe length
90° bend		
T shape joint		
Increasing Diameter		
Reducing Diameter		
Control valves	 Flow control at upper side	 Flow control at lower side
Pump		

9.5 Installation of meter componentry

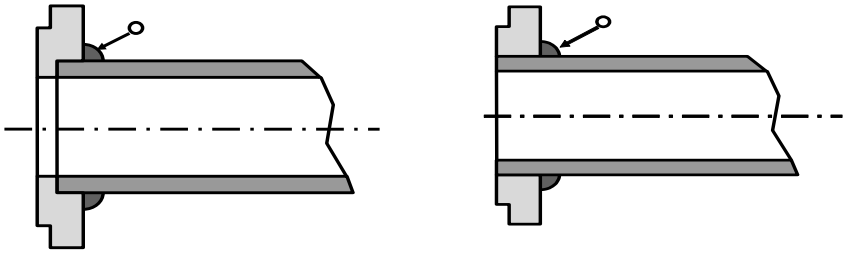
Pipe branch with sleeve nut, which is included in delivery sets for DN20 and DN32, is a part of straight section and applied for further welding to pipeline to create required distance of straight section.

The axis of a branch pipe and straight section should be a uniform coaxial line without significant jogs and bends. Transition 'jump' from a branch pipe to a pipe should not exceed 0.5 mm (± 2.5%) for DN20 and 0.8 mm (± 2.5%) for DN32

It is strongly prohibited to apply another place of FS to prevent FS revolution (PS connectors, FS body, faces with marking).

While connecting flow meter's flange to the pipe, the flange bore can be reamed to external pipe diameter with the least allowable tolerances. The schemes for flange welding are given.

Flange mounting to the pipeline should be carried out without metal sagging on the internal pipe surface. Otherwise change of velocity profile can lead to additional meter error.
After flow meter installation the flange painting should be done.



WARNING!

Please avoid welding of flanges to the pipeline if flow meter has been installed! It can lead to flow meter damage because of overheating.

9.6 Procedure for installation of flow meters

The below procedure for installation of flow meters is applicable to DN32 - DN1200.
DN20 is delivered with the installed and sealed flow sensors that can be dismantled at the manufacturer's place only.

After mounting the measurement transducer on the pipeline, it is necessary to install ultrasonic flow sensors as follows:

- If necessary, remove dirt and contaminations from the internal surfaces of bushings;
- To prevent fixing nuts and water meter material from diffusion, lubricate the bushing threads and the lateral cylindrical surface of ultrasonic flow sensors with graphite containing lubricant;
- Working surface of flow sensor (butt end) must be free from lubricant;
- Install ultrasonic flow sensors into the bushings (pockets) of the flow metering section.

Marking is applied on cable outputs for the delivered sensors of meters modification **for Accuracy class 1***. This being the case, the flow sensor with marking "11" (or "21" for the second flow measuring channel) must be inserted into the branch pipe of the flow metering section located **first downstream liquid flow** (water), the flow sensor with marking "12" (or "22" for the second flow measuring channel) into the second branch pipe of the flow metering section**.

While connecting FlS used in the 2-path FS, follow guidance in Chapter 7 of this Operating Instructions.

- In tightening FlS nut, the torque applied to the wrench must be equal to 40...45 N·m, and provide for the «zero» gap between the mounting surface of the FS and the ring plane of the FlS outside its sealing gasket. For FlS fitted on FS of DN 32, the torque must be equal to 18...20 N·m.

* There may be no marking on cable output of sensors delivered with meters modification **for Accuracy class 2**.

** This instruction is compulsory for meters of **Accuracy class 1** only.

WARNING!

Ultrasonic flow sensors contain piezoceramic elements and thin-walled design elements, which have the increased fragility and do not permit shock and excessive compressing loads.

Considering the above-mentioned,

IT IS FORBIDDEN TO:

- To change places of flow meters intended for different measuring channels;
- In transporting and mounting, to drop ultrasonic flow sensors or knock them;
- To install and dismantle flow metering sections with installed ultrasonic flow sensors (except for cases when the flow meter is delivered with installed flow sensors);
- To carry out welding or fitter's works on the line near the flow metering sections with installed ultrasonic flow sensors (except for cases, when the flow meter is delivered with installed flow sensors);
- To apply extra heavy torque for flow sensor tightening;
- To dismount flow sensors stuck to the flow metering section, while accomplishing current and regular servicing.

Procedure for installation of pressure transducers

Pressure transducers shall be installed strictly in the vertical position. **The use of taps is compulsory!**

Procedure for Installation of the calculator

Calculator can be mounted in the horizontal position (on the table, on the stand or on a special shelf) or vertically (on the wall or instrument board).
To install the calculator, use two angles (part of the delivered set) and brackets on the calculator side walls.
The calculator ground contact is connected to the three-pole plug and must ensure reliable contact with the grounding circuit on the premises the device is mounted in.

Gasket and connection of cables
After installation of all meter components they must be connected by applying cables delivered with the device as follows:

1) Laying of cables;
2) Connection of cables to the calculator, temperature sensors and ultrasonic flow sensors.

Laying of cables shall be carried out by taking into account the below requirements:

- cable fastening elements must exclude the possibility of their contact with the pipelines and other elements of the construction that have temperature below minus 40 °C or exceeding 70 °C;
- Measures should be taken to protect cables from mechanical damage by laying them in pipes, hoses, boxes, etc. It is permissible to a cables intended for the same meter in one protection construction;
- In mounting two and more meters of one water supplying facility laying of cables to each of them must be carried out in separate protection constructions separated by not less than 5 cm to prevent any mutual electromagnetic interferences effects.
- After the cables had been laid, they must be connected to the meter components by taking into account the cables marking.

Excessive cable length must be carefully rolled and allocated in the device enclosure or nearby.

WARNING!

- **It is forbidden to lay cables along power supply lines or their protective constructions.**
- **In the event the meter is energized from the power supply network of 24 or 36 V, measures should be provided to exclude the calculator or sockets connection to 220 V - for example, 220 V sockets must be located at a distance that exceeds the meter power supply cable length.**

Connection of the cable and its components to the calculator and to all sensors must be carried out as follows:

In defining 'switch' positions on connectors of the connected units and elements of the cable, **plug connectors carefully without appreciable effort and avoiding mutual rotation of the components being joined**; the **sleeve nut should be tightened last** to prevent possible crumpling (bending, breaking) of the connector contact parts (pins) at partial lengthwise coupling.

In connecting sensors to cable connectors one should strictly comply with the marking applied on the label attached to cables and cable lugs of flow meters.

10 Data reading

Data reading from the display

The main menu of the meter includes the following:

- Display of parameters used by each calculation channel: flow rates, temperature and pressure, as well as calculation channel results – current and integral parameters.
- Display of all measured initial parameters – all flow rates, temperature and pressure – current and integral parameters.
- Display of current errors (if errors are not available, the menu item is not highlighted)
- Access to service menu.

After energizing, the meter is in the mode displaying all measured parameters.

In «Check» mode, the user may review the data logger (hourly and daily) and the logbook of events.

Data copying to USB Flash

If the meter has the interface for the USB Flash (depending on the order), ALL information can be copied to the USB Flash. Any USB Flash may be used, with FAT or FAT32 file system.

To copying, perform the following operations:

- Connect a USB Flash to the relevant port;
- In «Check» menu, select “USB Flash”
- Select the data store mode – «Copy» or «Copy all».
- Wait for the message of operation completion.

«Copy» or «Copy all» modes differ, as in the first case, only that information is copied that hasn't been copied to the Flash before. The second mode is intended for copying all available information stored in the archive.

Reading via RS232

In its basic configuration, the meter has RS232 interface, which enables connection of the computer, data reader or modem.

In connecting to the computer or data reader, the procedure is described in the operating instructions for the Data Reader or data reader software. No additional operations with the meter require.

To work with modems, the meter must be configured. To do so, in menu «MDM», select the required type of modem. Modem drivers can be downloaded by applying special software. If necessary, the consumer can add new or modified modem drivers.

After connecting the modem, two variants of the communication channel control.

- wire modem or GSM modem in CSD mode of data transfer (hereinafter, CSD mode)
- GSM modem in GPRS mode of data transfer (hereinafter, GPRS mode).

In CSD mode, the meter waits for the incoming call. After that, the meter picks up the receiver and establishes the communication channel. After that, it waits incoming commands to transmit data. In this mode, it is possible to set the time interval, during which the meter will pick up the receiver, as well as the number of ringing signals to respond. This procedure is used with wire modems connected in parallel to ordinary phone sets.

In GPRS mode, the meter communication with the server is provided via Internet. To do so, network access parameters must be determined. Settings of GPRS (entered by applying special software only - available free of charge on the company's web-site):

- Access point name GPRS – provided by the mobile network operator;
- User's name – provided by the mobile network operator;
- Password – provided by the mobile network operator;
- IP address of the server – real IP address of the computer to contact. This address is provided by the Internet provider;
- IP port of the server. This parameter depends on the server settings.

The device may communicate to provide information on the following events:

- If requested. In case of the incoming call, the device immediately disables and initiates GPRS Channel
- By task scheduler. Periodicity of meter communications. The following time intervals are possible – once a month, once a week, once a day, or with preset interval in hours (for example, every 3 hours).

Reading via RS485

The meter maintains two communication protocols (selected by the user from the menu) – Sempal and Modbus. In any case, the rate of data transfer (2400, 4800, 9600, 19200, 38400, 56000, 115200 baud) should be selected. In Modbus protocol, parity verification mode can be preset.
Sempal protocol is intended for connecting several meters. So, somewhat like a network can be created. In this case, it will be sufficient for only one meter to have access to the external network (modem, computer, …). Access to any network connected meter is accomplished through the main (the one with the external connection) meter.
Modbus protocol is intended for connection of meters to the Modbus network. The protocol is maintained by Modbus RTU. Options to enable current Meter data and archived Meter data reading are available.

11 Error codes

Diagnostic errors are subdivided into groups depending on their priority. The smaller the number or the group the more important error is. Apart from that, error code includes its number and the number of the measuring channel where error has been occurred.

Let's examine the error example:

Error 1.3.1
Short-circuit in TS1

Here, 1.3.1 is an error code that denotes the group (first digit), error number (second digit) and the number of the measuring channel (third digit). In this case, the number of the measuring channel is the number of the temperature sensor. One error occupies two lines on the indicator. Therefore, two different errors may be displayed at the same time (indicator has 4 lines). *Code of the above error will be represented in the printout as «***1_3_1»***.*

System errors

As mentioned above, the lower the number of the error, the higher its priority. System errors have no priorities. System errors are errors of internal meter's hardware, which generally close out operation of the meter. In case of such errors parameters are not measured. System errors are displayed on the indicator as follows (example):

«SYSErr02»

The number means the error type. If possible, the system errors are registered in the logbook of events with comments.
In case of a system error, the meter should be returned to the manufacturer for repair.

Group «0» errors

This group «0» includes the following errors:

– «**0_1_0**» - Error of flow rate measuring unit. Flow rate measurement in both channels is impossible.
– «**0_2_0**» - Error of ADC. Temperature measurement in all channels is impossible.
– «**0_3_0**» - Error of calibration for temperature sensor.
– «**0_4_0**» - Error of calibration for pressure sensor.

Group «1» errors

This group includes errors referring to temperature measurement (sign «x» specifies the channel number):

– «**1_1_x**» - break of temperature sensor x.
– «**1_3_x**» - shorting (short-circuit) of temperature sensor x.
– «**1_4_x**» - faulty temperature sensor x. Resistance of specified sensor goes beyond permissible limits.
– «**1_5_x**» - error of temperature sensor x coefficients. Wrong coefficients have been entered for the specified temperature sensor. This error may occur after sensor calibration or while manual entering new values during verification.
– «**1_6_x**» - temperature sensor x is below the permissible level. Temperature measured by specified sensor is below the permissible level (below $-50\ ^0$C).
– «**1_7_x**» - temperature sensor x exceeds the permissible level. Temperature measured by specified sensor exceeds the maximum permissible level (above $+150\ ^0$C).

Group «2» Errors

This group includes flow rate measurement errors referring to one of applied pair of flow sensors (one of enabled chords for sound propagation).

– «**2_1_x**» - the error of flow sensors in path «x». This error can be caused by following reasons:
  – failure of flow sensors;
  – failure of flow sensors' cable – breakdown or fault;
  – no water in flow meter.

Group «3» Errors

This group includes errors referring to flow rate measurement. If multi-path flow meter is applied the error in measurement along one of sound paths not necessary leads to flow measurement error of flow meter**.** (sign «x» indicates the channel number):

– «**3_1_x**» - flow measurement by flow meter x is impossible. This error may be caused by the following:
  – Faulty flow meters;
  – Faulty cable of flow meters –break or short-circuit;
  – No water in the flow meter.
– «**3_2_x**» - temperature of flow meter x. As far as temperature sensor is faulty it is impossible to measure flow. This error indicates the error of temperature sensor measurement.
– «**3_3_x**» - velocity in flow meter x is too high. Volumetric flow rate in flow meter x exceeds the maximum permissible for this type by more than 2 times.
– «**3_4_x**» - flow rate in flow meter x is within the range of [0.5·Qmin, Qmin].
– «**3_5_x**» - flow rate in flow meter x exceeds Qmax.

Group «6» errors

This group includes pressure measuring errors (sign «x» indicates the channel number):

– «**6_1_x**» - Pressure sensor x is below the tolerance. Measured pressure is below zero. It can be caused by object conditions (underpressure), or with breakage of certain sensor.

– «**6_2_x**» - Pressure sensor x is over the tolerance. Measured pressure is above 20 kgf/cm^2. It can be explained by the fact of increased pressure on the object and faultiness of pressure sensor.

– «**6_3_x**» - PSx parameters are incorrect.

Pressure measurement errors don't affect flow rate and temperature measurements.

In hourly and daily archive printouts there is a value of error appearance duration (Terr). This value includes errors referred to flow measurement channel and errors, which lead to impossibility of flow rate measurement. Errors of a flow meter and errors of temperature measurement are included here.

Printouts have a field 'Error types', in which presence of certain error type is displayed. In total up to four various types of errors can be displayed within an hour and up to 8 types of errors can be displayed within a day. The error is displayed on printout only if its duration exceeds 1 minute.

Errors are displayed by letters of the Latin alphabet. The certain letter meets to each type of errors :

A – system errors (error group 0);

B – temperature measurement errors (error group 1);

C – flow rate measurement errors (error group 3);

D – flow rate measurement errors (error group 2);

F – pressure measurement errors (error group 6);

For example, record 'BD' means, that there were errors of group 1 and group 2. More detailed information on these errors can be taken in the error history printout.

In error archive printout the error code in the above described format and duration of this error in hours are mentioned. Within one hour up to 4 polytypic errors can be registered (in history) and for a day - up to 8 polytypic errors can be registered. If the number of errors is more than it was mentioned, than the most significant errors are stored.

The list of certain faultiness and methods of their elimination are resulted in table

Appearance of faultiness	**Possible reason**	**Method of elimination**
1. There is no indication on the indicator	The battery is completely discharged or not installed.	Replace (install) the battery.
2. The meter does not react on button pressing	The calculator is faulty	Provide a repair of the calculator

The notice: A repair of the calculator should be provided by specialized manufacturing division.

12 Manufacturer's warranty

The manufacturer warrants compliance of the produced Water meters with all technical requirements for 48 months from the date of shipment.

Installation and startup operations of the Meter should be carried out by authorized company performing such installation procedures.

The warranty covers defects of the meter components that are part of the delivery set and were closed by a workmanship defect, defects in the material and completing items.

The warranty provides for the replacement of defective parts and check of their serviceability by the manufacturer.

The faulty device should be delivered to the manufacturer for testing and repair.

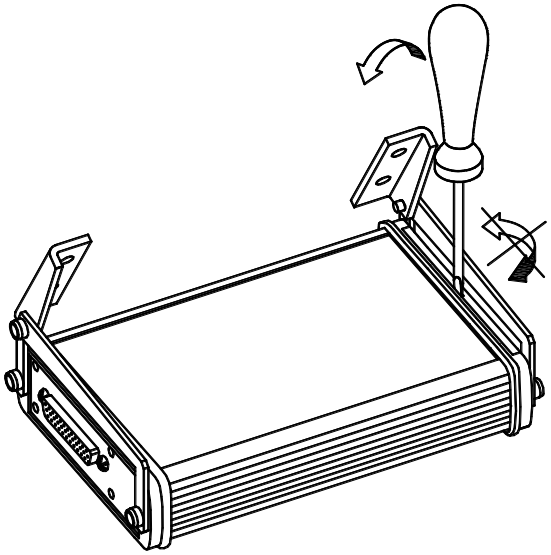
The warranty is not provided as compensation for dismantling, transportation and reinstallation costs, as well as any other fault related expenses.

Faults revealed within the warranty period should be noted and submitted to the authorized representative of Manufacturer.

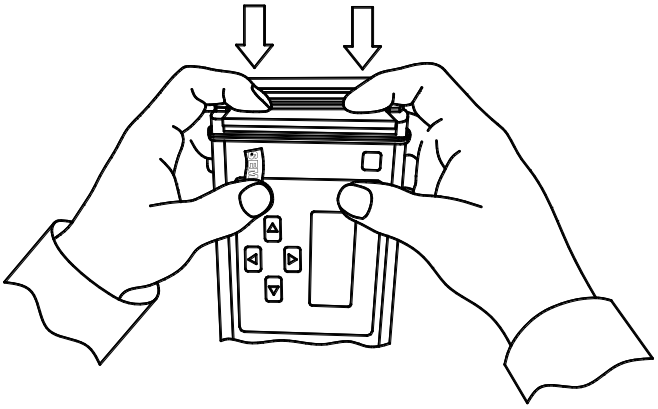
Annexes
Annex 1

Accumulator installation and replacement

To open the accumulator section cover



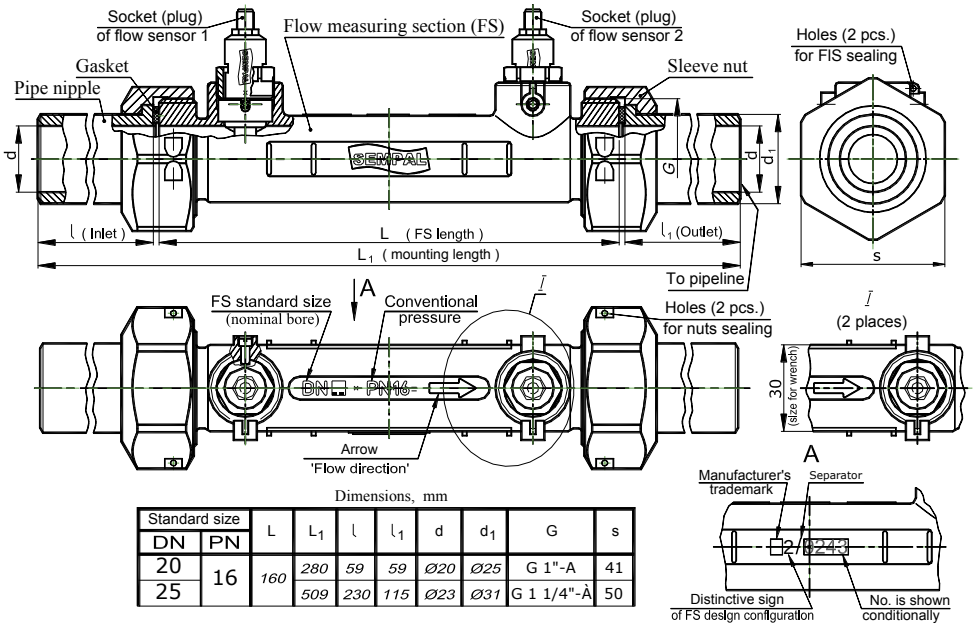
To close the accumulator section cover



Annex 2

Dimensioned sketches

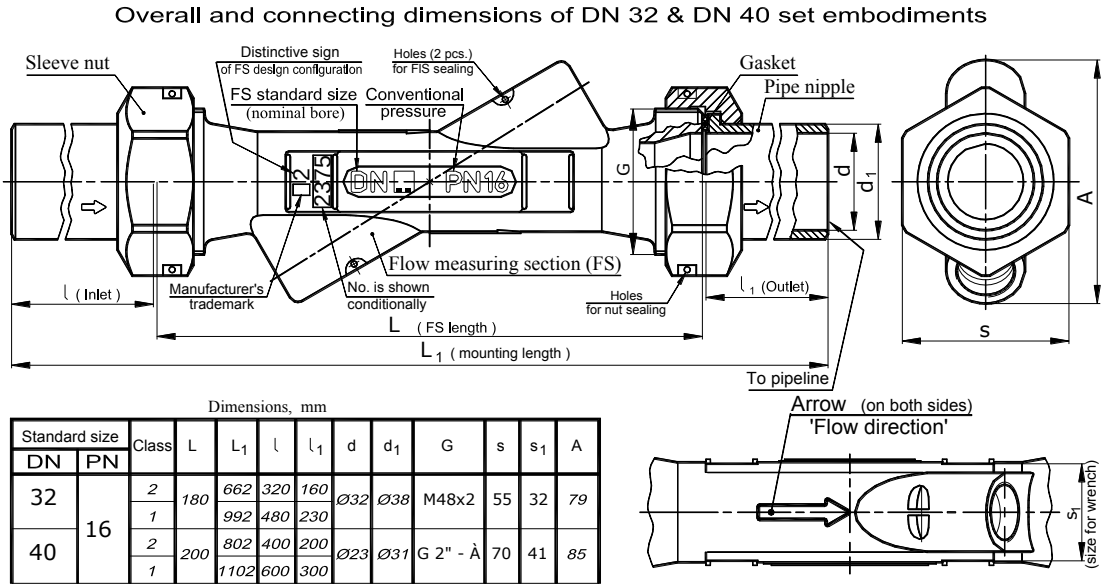
Overall and connecting dimensions of DN 20 & DN 25 set embodiments



Dimensions, mm

Standard size		L	L_1	l	l_1	d	d_1	G	s
DN	PN								
20	16	160	280	59	59	Ø20	Ø25	G 1"-A	41
25			509	230	115	Ø23	Ø31	G 1 1/4"-À	50

Overall and connecting dimensions of DN 32 & DN 40 set embodiments

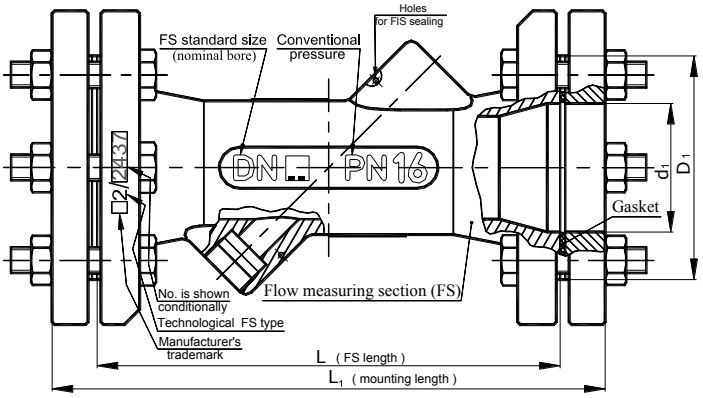


Dimensions, mm

Standard size		Class	L	L_1	l	l_1	d	d_1	G	s	s_1	A
DN	PN											
32	16	2	180	662	320	160	Ø32	Ø38	M48x2	55	32	79
		1		992	480	230						
40		2	200	802	400	200	Ø23	Ø31	G 2" - À	70	41	85
		1		1102	600	300						

Overall and connecting dimensions of DN 50 ... DN 100 set embodiments

Fig. 1.



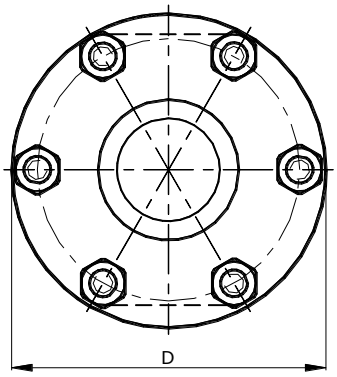
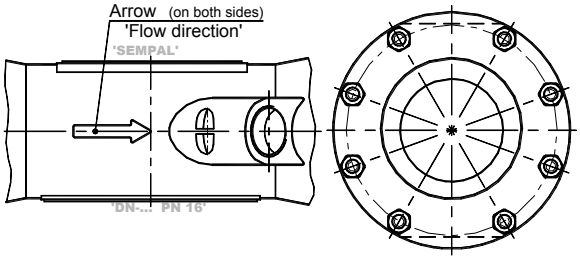


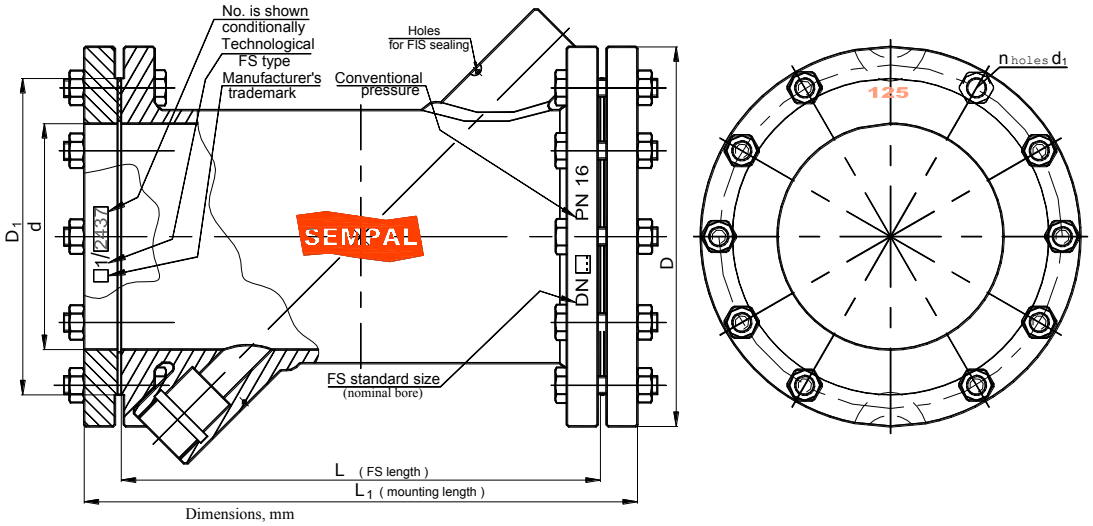
Fig. 2. FS-100 flange view

Dimensions, mm

Standard size DN	PN	d	D	D_1	L	L_1	n (quantity)	Bolts (items per flange)	Note
50	16	Ø50	Ø122	Ø87	180	230	6	M10x50	
65		Ø65	Ø144	Ø109	200	250			
80		Ø80	Ø155	Ø120	210	260			
100		Ø100	Ø184	Ø149	230	280	8		see fig.2



Overall and connecting dimensions of DN 125 & DN 150 set embodiments



Dimensions, mm

Standard size DN	PN	d	d_1	D	D_1	L	L_1	n (quantity)	Bolts, size (items per flange)	Note
125	16	Ø119...131	Ø11	Ø210	Ø175	265	309	10	M10x50	
150		Ø143...156	Ø13	Ø236	Ø195	315	359		M12x50	

1 - path flow measuring sections (FS)

Fig. 1. Embodiments (1 & 2) FS-200...1000 with standby flow sensors FIS

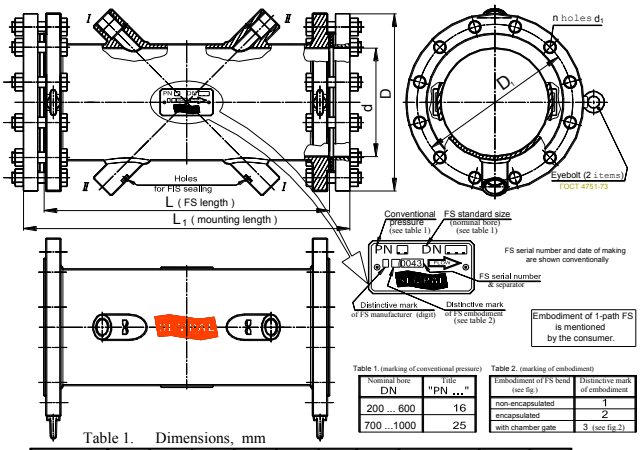


Table 1. (marking of conventional pressure)

Nominal bore DN	Title "PN ..."
200 ... 600	16
700 ...1000	25

Table 2. (marking of embodiment)

Embodiment of FS bend (see fig.)	Distinctive mark of embodiment
non-encapsulated	1
encapsulated	2
with chamber gate	3 (see fig.2)

Table 1. Dimensions, mm

Standard size DN	PN	d	D	D_1	L	L_1	d_1	n (quantity)	Bolts (items per flange)	Eyebolt (2 items)	Note
200	16	Ø190 / Ø205	Ø335	Ø295	540	598	Ø22	12	M20x90	M12-7H	Complementary flanges are delivered in a set (not shown on the Fig.)
250		Ø235 / Ø255	Ø405	Ø355	620	680	Ø26		M24x100		
300		Ø285 / Ø310	Ø460	Ø410	680	740					
350		Ø335 / Ø360	Ø520	Ø470	740	804		16			
400		Ø385 / Ø410	Ø580	Ø525	820	892	Ø30		M27x110		
500		Ø480 / Ø510	Ø710	Ø650	970	1062	Ø33	20	M30x140	M20-7H	
600		Ø585 / Ø610	Ø840	Ø840	1110	1206	Ø36		M36x150		
700		Ø690	Ø910	Ø910	1240	1340	Ø39	24	M36x150		
800		Ø795	Ø1020	Ø1020	1360	1464			M36x160		
900		Ø900	Ø1120	Ø1120	1500	1614		28	M36x170	M24-7H	
1000		Ø1000	Ø1255	Ø1255	1550	1672	Ø45		M42x180		
700	25	Ø690	Ø960	Ø960	1240	1356	Ø45	24	M42x170	M30-7H	
800		Ø795	Ø1075	Ø1075	1360	1492			M42x190		
900		Ø900	Ø1185	Ø1185	1500	1648	Ø53	28	M48x220		
1000		Ø1000	Ø1315	Ø1315	1550	1720	Ø56		M52x250		

1 - path flow measuring sections (FS)

Fig. 2. Embodiment (3) FS-200...1000 with flow sensors lock chamber (FIS)

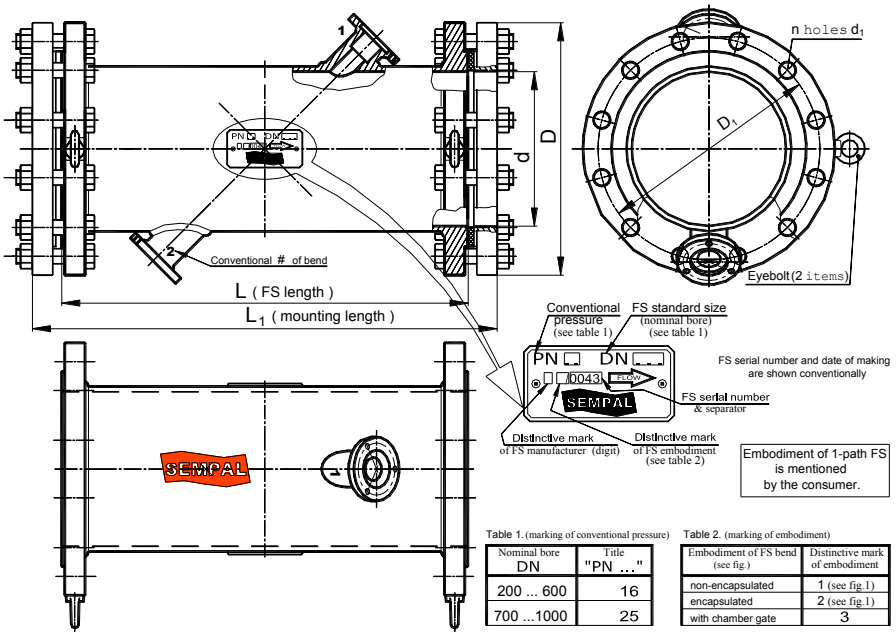


Table 1. (marking of conventional pressure)

Nominal bore DN	Title "PN ..."
200 ... 600	16
700 ...1000	25

Table 2. (marking of embodiment)

Embodiment of FS bend (see fig.)	Distinctive mark of embodiment
non-encapsulated	1 (see fig.1)
encapsulated	2 (see fig.1)
with chamber gate	3

Dimensions - see Table 1, Fig. 1

2 - path flow measuring sections (FS)

Fig. 1. Embodiments (4 & 5) FS-200...1200 with standby flow sensors (FIS)

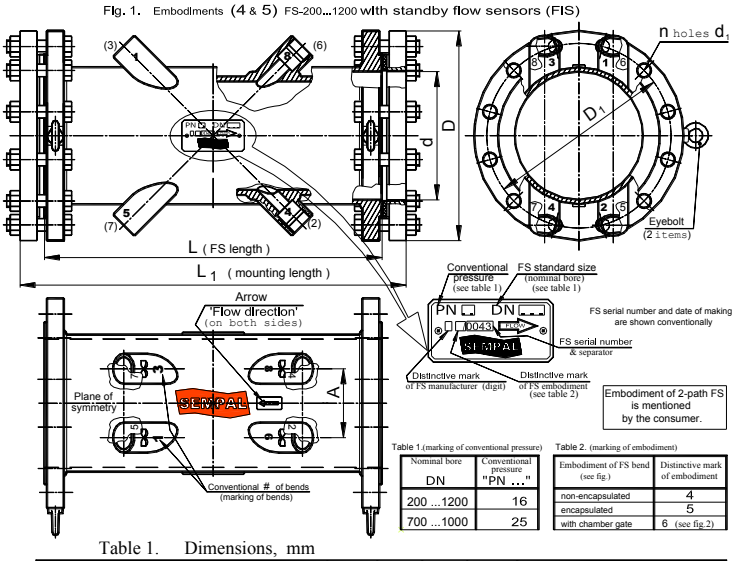


Table 1.(marking of conventional pressure)

Nominal bore DN	Conventional pressure "PN ..."
200 ...1200	16
700 ...1000	25

Table 2. (marking of embodiment)

Embodiment of FS bend (see fig.)	Distinctive mark of embodiment
non-encapsulated	4
encapsulated	5
with chamber gate	6 (see fig.2)

Table 1. Dimensions, mm

Standard size DN	PN	d	D	D_1	L	L_1	A	d_1	n (quantity)	Bolts, size (items per flange)	Eyebolt (2 items)	Note
200	16	205	335	295	540	598	111	22	12	M20x90	M12-7H	Complementary flanges are delivered in a set (not shown on the Fig.)
250		255	405	355	620	680	140	26		M24x100		
300		310	460	410	680	740	168		16			
350		360	520	470	740	804	195					
400		410	580	525	820	892	220	30		M27x110		
500		510	710	650	970	1062	278	33	20	M30x140	M20-7H	
600		610	840	840	1110	1206	330	39		M36x150		
700		690	910	910	1240	1340	372		24			
800		795	1020	1020	1360	1464	430			M36x160		
900		900	1120	1120	1500	1614	486		28	M36x170	M24-7H	
1000		1000	1255	1255	1550	1672	540	45		M42x180		
1200		1200	1485	1390	2000	2148	648	52	32	M48x220	M30-7H	
700	25	690	960	960	1240	1356	372	45	24	M42x170		
800		795	1075	1075	1360	1492	430			M42x190		
900		900	1185	1185	1500	1648	486	53	28	M48x220		
1000		1000	1315	1315	1550	1720	540	56		M52x250		

2 - path flow measuring sections (FS)

Fig. 2. Embodiment (6) FS-200...1000 with FIS with chamber gate

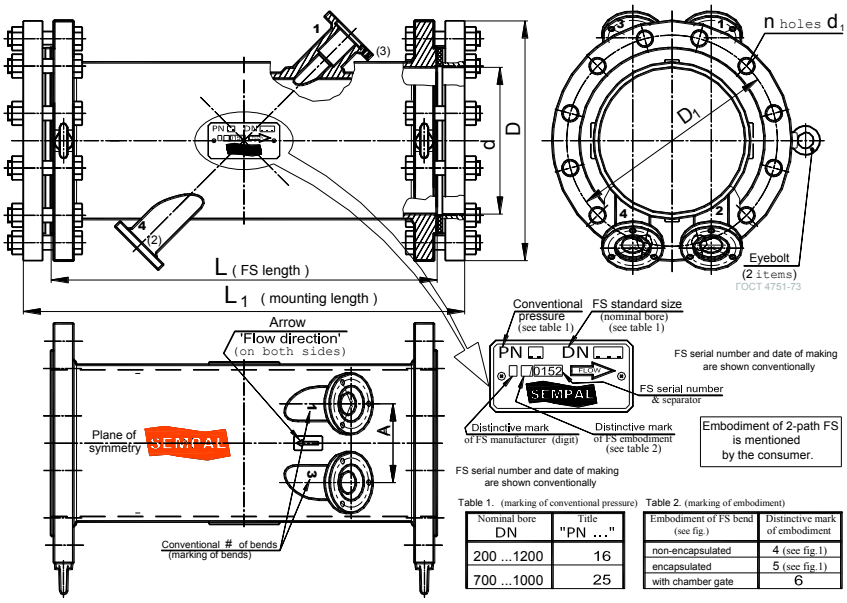


Table 1. (marking of conventional pressure)

Nominal bore DN	Title "PN ..."
200 ...1200	16
700 ...1000	25

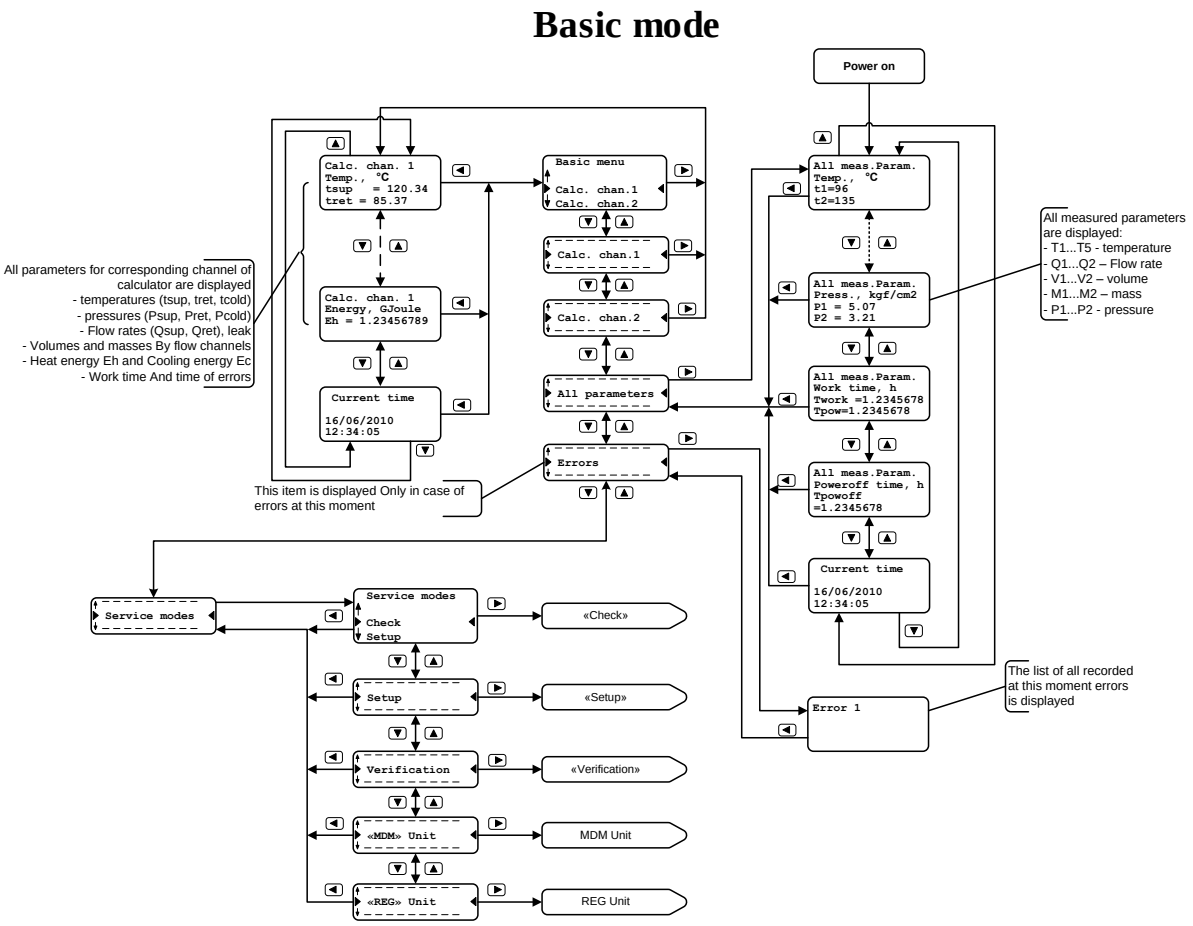
Table 2. (marking of embodiment)

Embodiment of FS bend (see fig.)	Distinctive mark of embodiment
non-encapsulated	4 (see fig.1)
encapsulated	5 (see fig.1)
with chamber gate	6

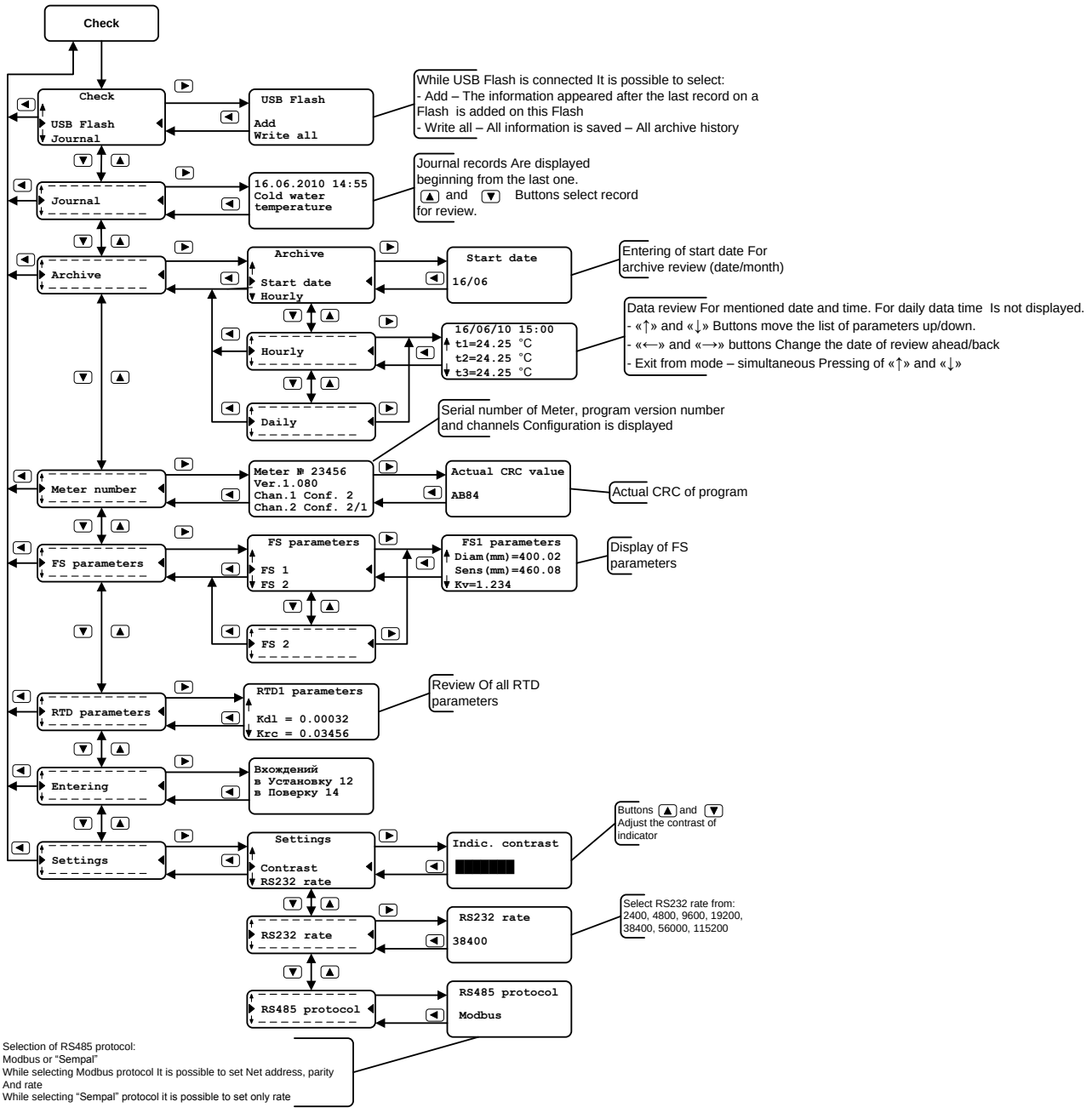
Dimensions - see Table 1, Fig. 1

Annex 3

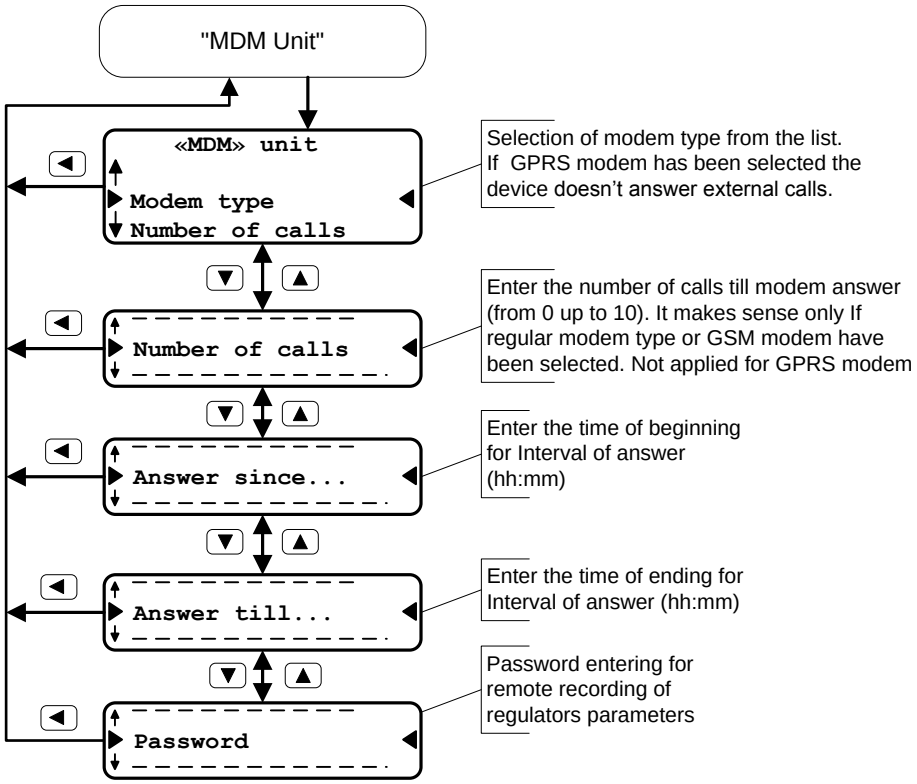
Menu modes for FS10 with 2 measuring channels



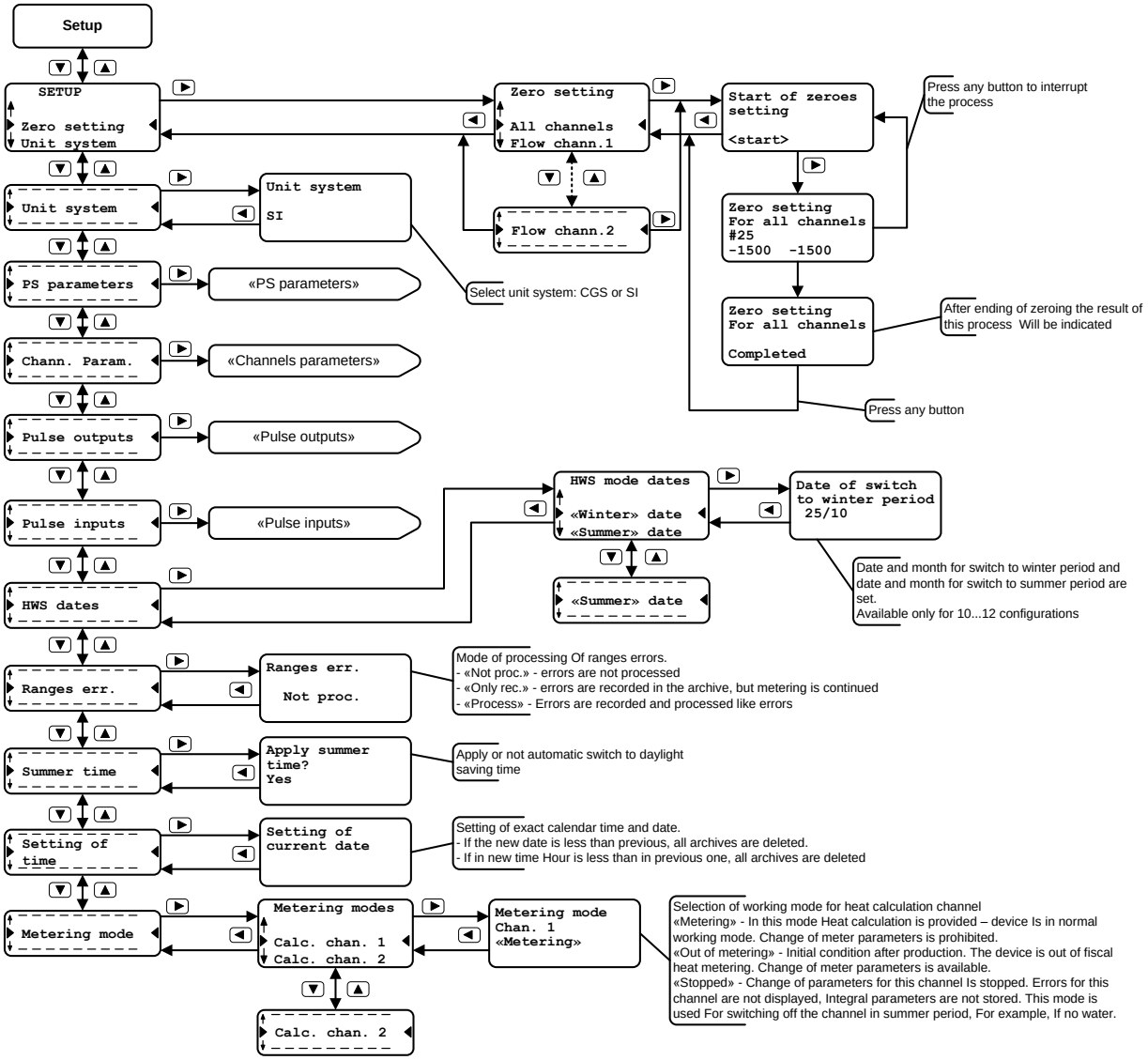
"Check" mode


Check
Check
USB Flash
Journal
USB Flash
Add
Write all
While USB Flash is connected It is possible to select:
- Add – The information appeared after the last record on a Flash is added on this Flash
- Write all – All information is saved – All archive history
Journal
16.06.2010 14:55
Cold water temperature
Journal records Are displayed beginning from the last one.
and Buttons select record for review.
Archive
Start date
Hourly
Start date
16/06
Entering of start date For archive review (date/month)
Hourly
16/06/10 15:00
t1=24.25 °C
t2=24.25 °C
t3=24.25 °C
Data review For mentioned date and time. For daily data time Is not displayed.
- «↑» and «↓» Buttons move the list of parameters up/down.
- «←» and «→» buttons Change the date of review ahead/back
- Exit from mode – simultaneous Pressing of «↑» and «↓»
Daily
Serial number of Meter, program version number and channels Configuration is displayed
Meter number
Meter № 23456
Ver.1.080
Chan.1 Conf. 2
Chan.2 Conf. 2/1
Actual CRC value
AB84
Actual CRC of program
FS parameters
FS 1
FS 2
FS1 parameters
Diam(mm)=400.02
Sens(mm)=460.08
Kv=1.234
Display of FS parameters
FS 2
RTD parameters
RTD1 parameters
Kdl = 0.00032
Krc = 0.03456
Review Of all RTD parameters
Entering
Вхождений
в Установку 12
в Поверку 14
Settings
Contrast
RS232 rate
Indic. contrast
Buttons and Adjust the contrast of indicator
RS232 rate
38400
Select RS232 rate from: 2400, 4800, 9600, 19200, 38400, 56000, 115200
RS485 protocol
Modbus
Selection of RS485 protocol:
Modbus or "Sempal"
While selecting Modbus protocol It is possible to set Net address, parity And rate
While selecting "Sempal" protocol it is possible to set only rate

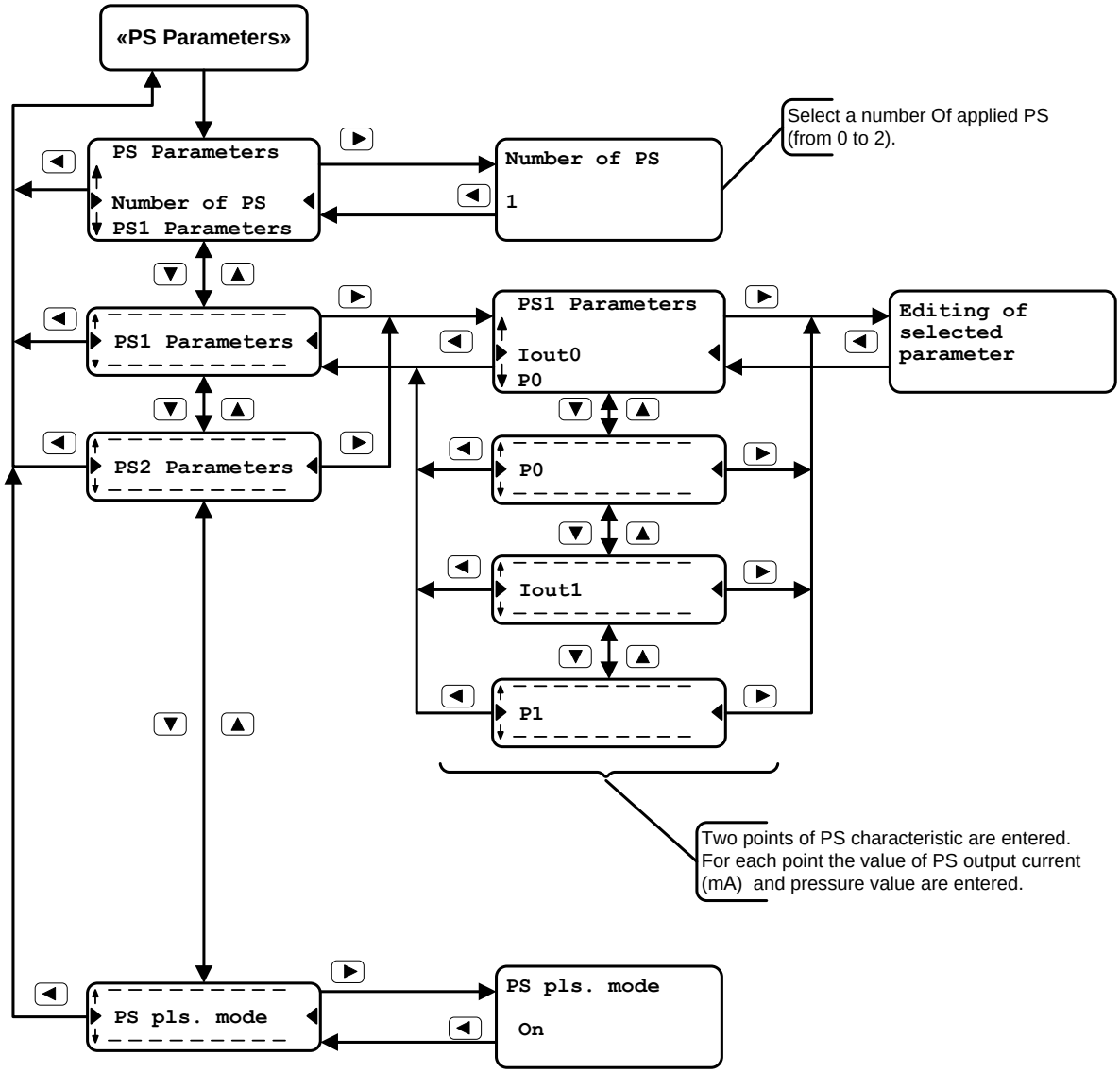
MDM mode


"MDM Unit"
«MDM» unit
Modem type
Number of calls
Selection of modem type from the list. If GPRS modem has been selected the device doesn't answer external calls.
Number of calls
Enter the number of calls till modem answer (from 0 up to 10). It makes sense only If regular modem type or GSM modem have been selected. Not applied for GPRS modem
Answer since...
Enter the time of beginning for Interval of answer (hh:mm)
Answer till...
Enter the time of ending for Interval of answer (hh:mm)
Password
Password entering for remote recording of regulators parameters

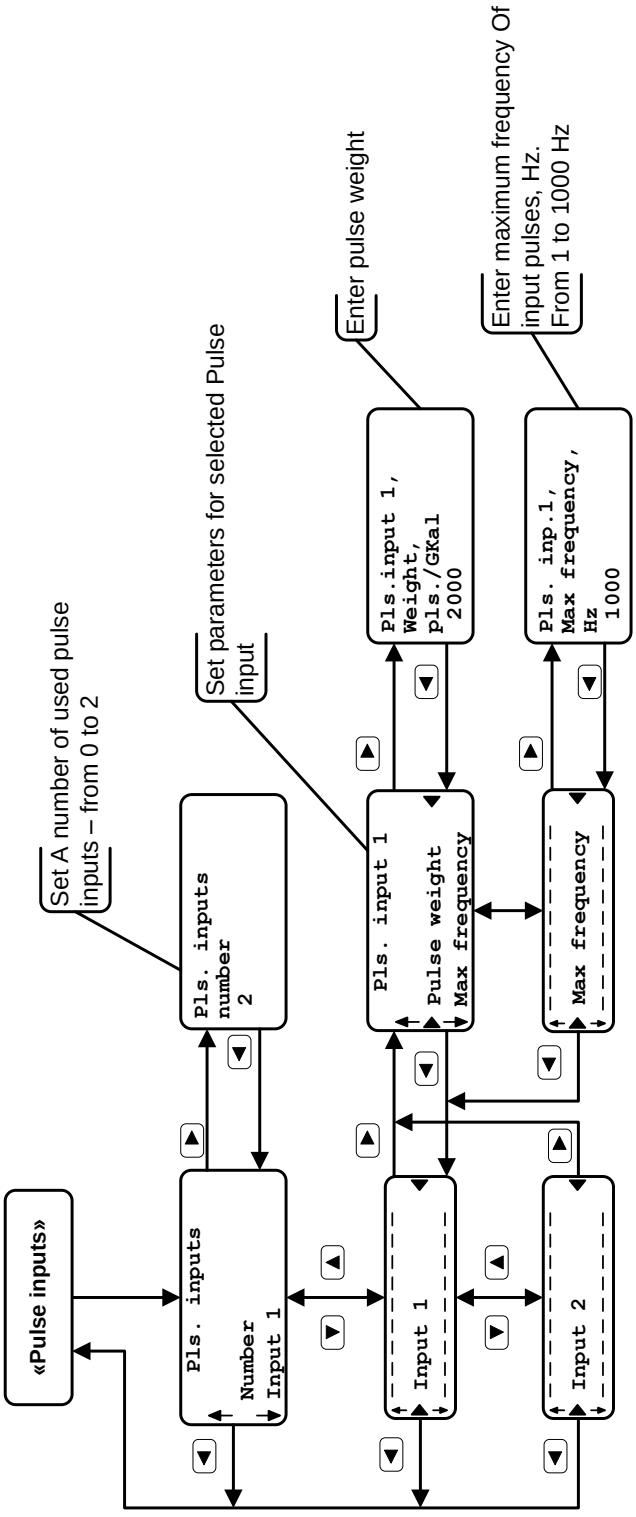
"Setting" mode



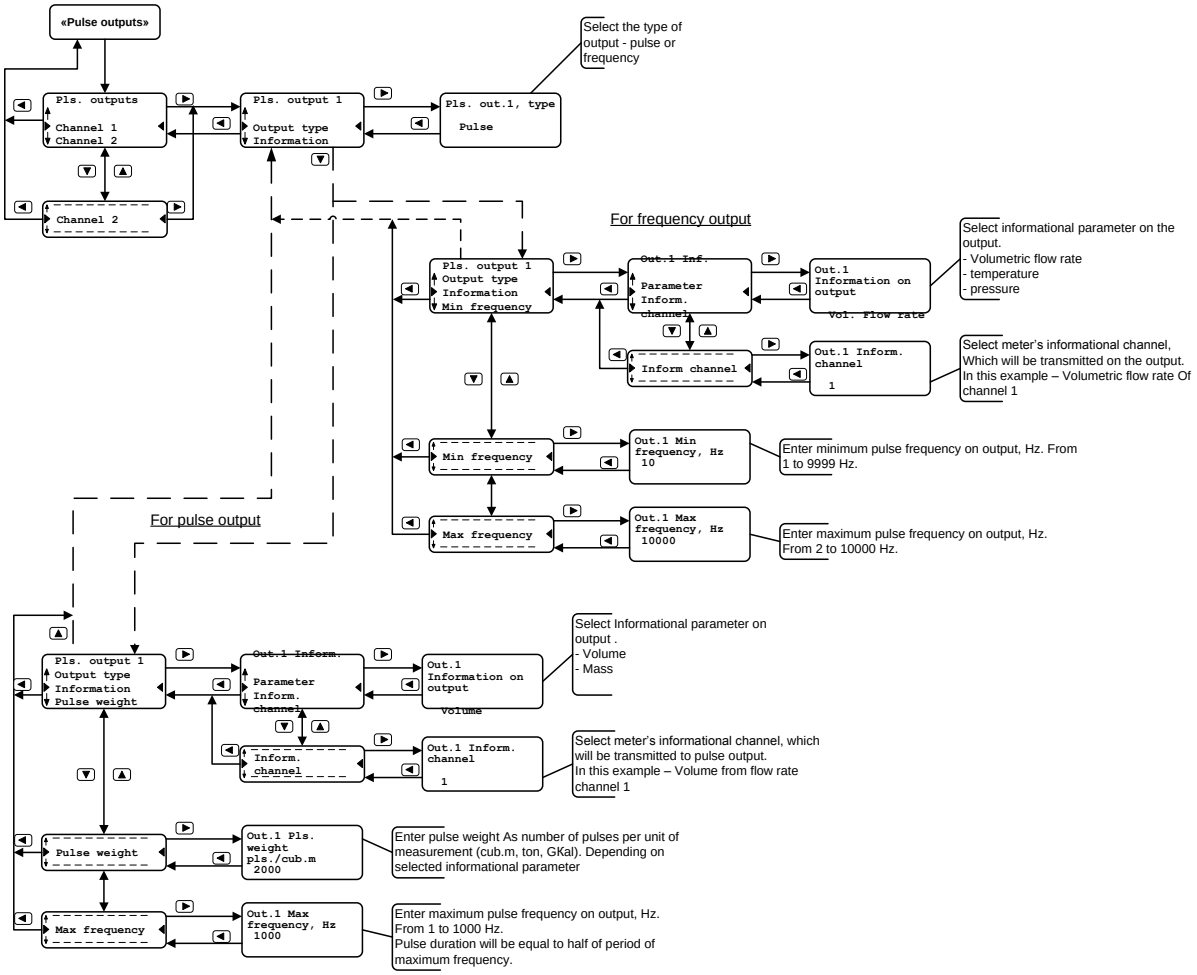
"Setting/ Pressure Sensors parameters"



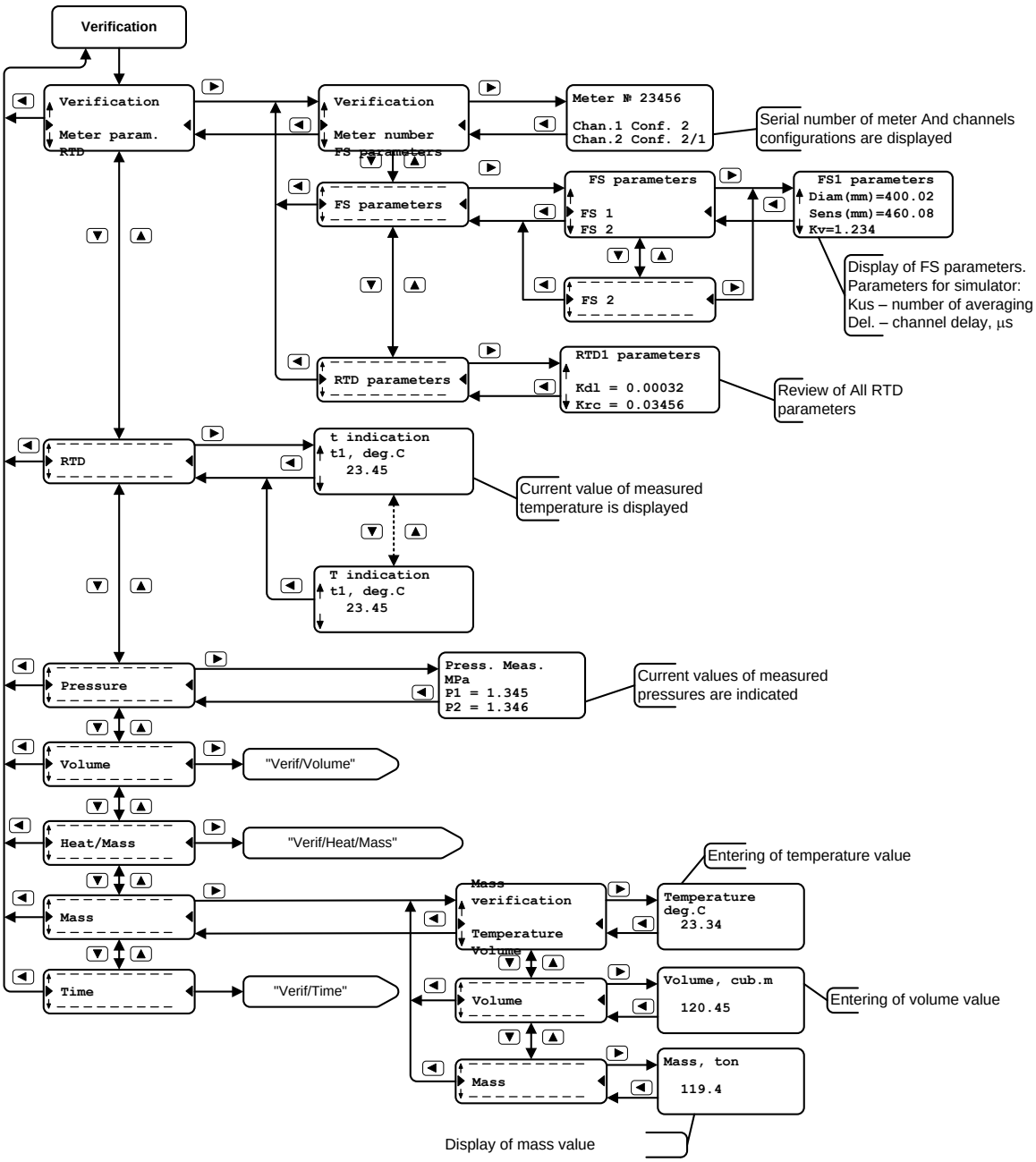
"Setting/ Pulse inputs"



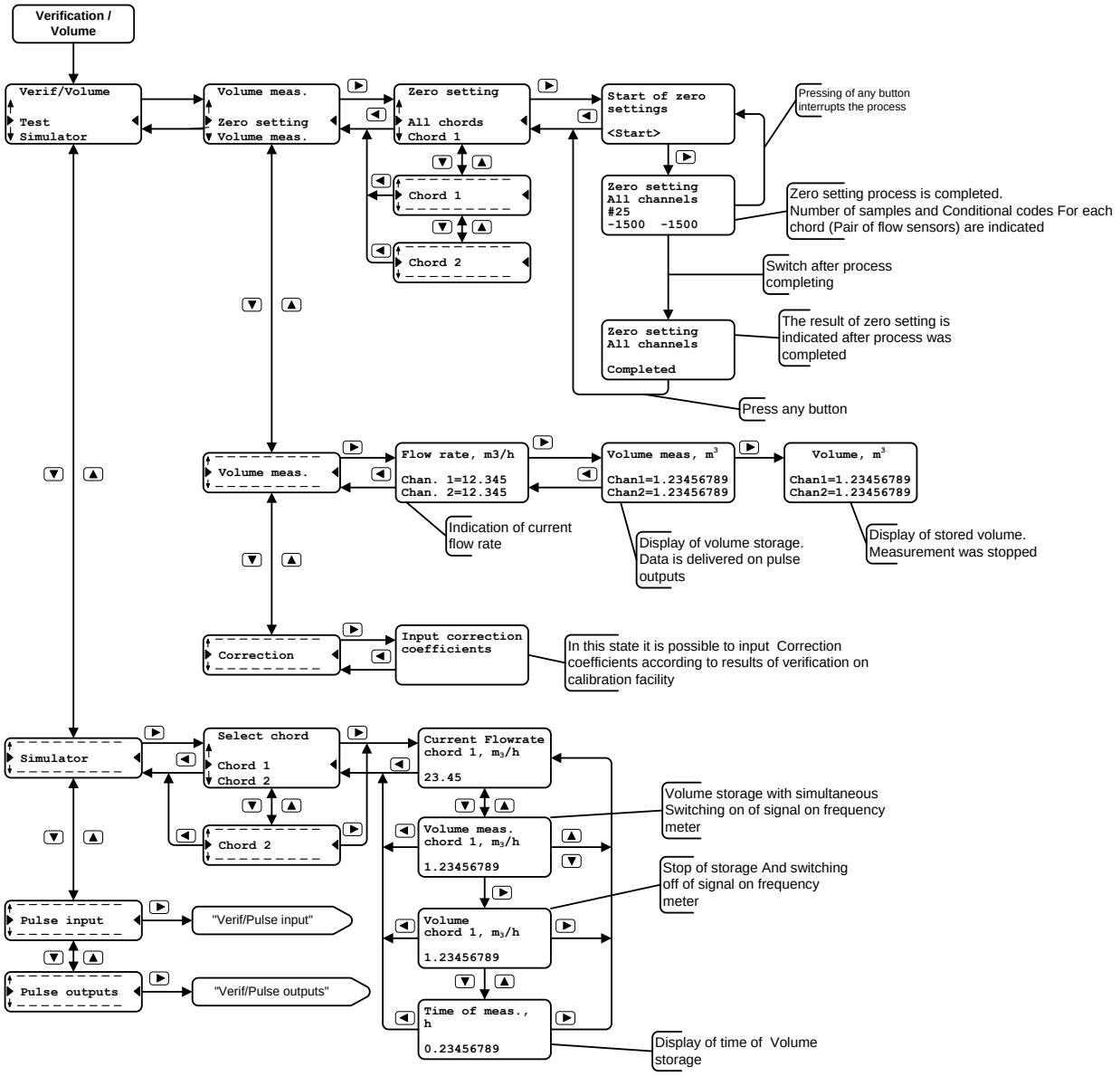
"Setting/ Pulse outputs"



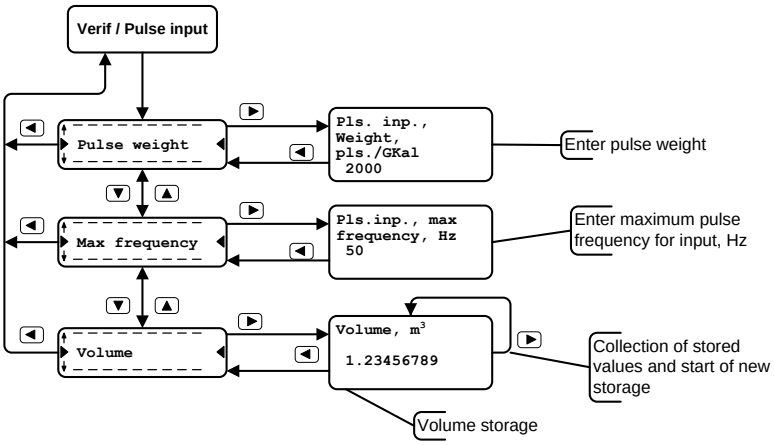
"Verification"

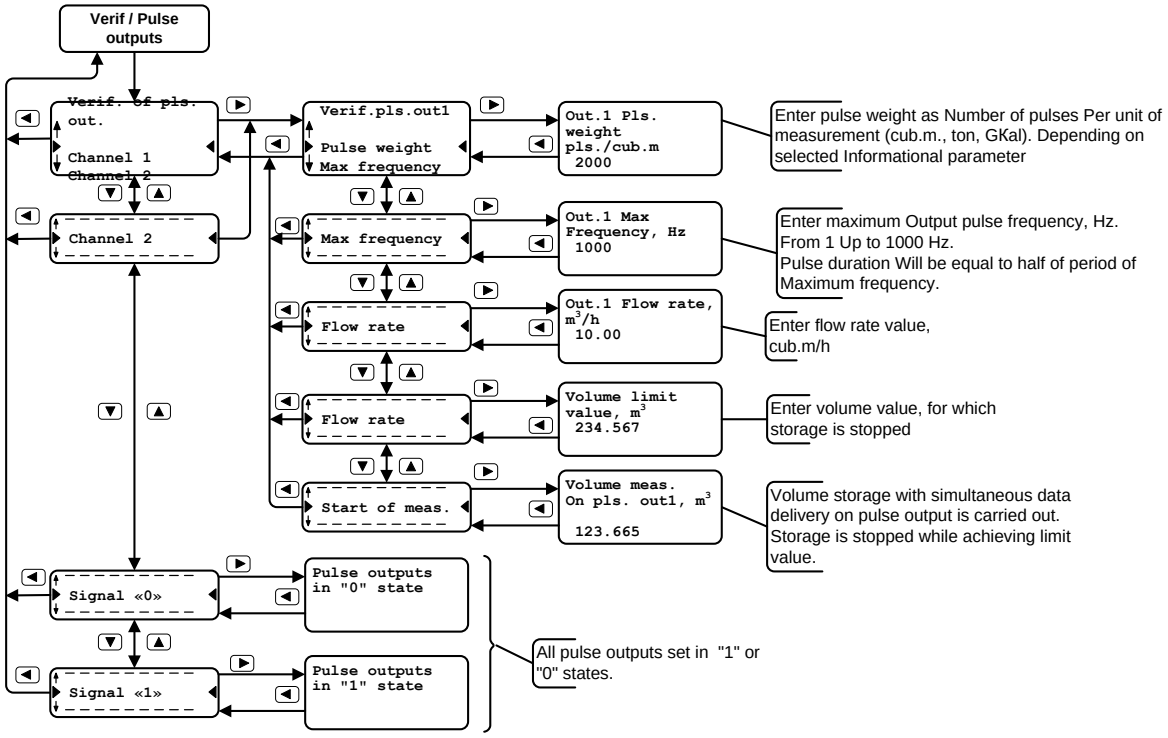


"Verification/Volume"



"Verification/Pulse input/outputs"





"Verification/Time"