

Multirate water meters

MTVS-1/2

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Introduction

This guidance applies to water meters multirate MTVS-1 / 2, corresponding to the specifications XXXX (hereinafter - the instruments).

Before installing and using the instrument to read the manual.

Due to continuing improvements in device design and its software are subject to change.

Security measures

May install, installation, calibration, maintenance and operation of devices available to individuals who possess the necessary skills and familiar with its operational documentation.

A source of danger for the installation and operation of the device is the electrical network, coolant, pressurized to 1.0 MPa and a temperature of 90 ° C.

Erection and dismantling of flow transducers and temperature must be made at all is no excess pressure in the pipe and disconnecting the device from the mains.

At installation, maintenance and calibration device must be respected "Rules of the operation of electrical consumers," the "Safety rules for the operation of electrical consumers."

Purpose of the device

The devices are designed for measurement and metering of volume and temperature of hot water and the amount of cold water.

Applications: water supply facilities and community purpose.

Principle of operation

The algorithm of the device is receiving, processing and storing information received from the following external devices:

- Flowmeter in the pipeline with hot water;
- flowmeter in the pipeline of cold water;
- Temperature sensor on hot water pipes.

Channel Flow Measurement of cold water produces a measurement of the volume and writes it to the archive memory, accompanying the consumed amount of time consumption. Archive appliance daily, with a capacity for one year.

In the channel the hot water unit not only measures the flow of hot water, and measure its temperature, recording the data in the backup memory. This approach allows to take into account not only the quality of the service, but also pay for the consumed water in accordance with its temperature. (See Resolution of the Government of the Russian Federation of May 6, 2011 N 354 "On the provision of public services to owners and users of facilities in apartment buildings and houses").

In accordance with the above decision of providing hot water temperature at the point of parsing at least 60 ° C for open systems and district heating to 50 ° C for closed systems. The temperature at the point of parsing should not exceed 75 ° C. Allowable deviation of the temperature of hot water at random in the daytime between 06:00 and 23:00 should not exceed 3 ° C, and at night from 23:00 to 06:00 5 ° C.

The device measures the flow rate, time consumption and hot water in the following temperature ranges:

For day to <40 40-42 42-45 45-48 48-51 51-54 54-57 57-60> 60> 75 NoT

For night mode <40 40 40-45 45-50 50-55 55-60> 60> 75 NoT

Thus, the archive device is formed by a kind of table that stores the values of consumption and time consumption of hot water in accordance with their temperature range. When an abnormal situation in the channel temperature measuring the flow rate will be recorded in section NoT.

Composition and device unit

The device consists of the following components:

- system unit (SB);
- up to 2 flow transducers with a pulse output (IF) to be installed on piping hot and cold water;
- temperature transducer (PT) to control the temperature of hot water;
- connecting cables.

Sat installed on the wall of a room in a convenient location, easily accessible to the user, and AT and PT - the relevant pipelines.

The system block

Sat is designed as a wall unit with dimensions of 200 x 115 mm.

It consists of 2 parts: **the main unit** and **display, the keyboard panel** (collected on the front panel), which are connected by screws to the deepening under seal.

The basic unit includes:

- the motherboard;

- power supply motherboard and all devices attached to the measuring modules;
- battery backup power. Provides the unit with AC power interruptions;
- terminal blocks to connect the power supply cable, cables, lines and cables with AT various interfaces;
- cable glands for these cables.



The **motherboard includes:**

- CPU;
- non-volatile memory database;
- clock / calendar with battery backup;
- RS-232 interface;

Connector of the RS-232 output on the right side wall of the main unit and closes with a protective cover.

RS-232 interface is standard PC case. The remaining interfaces are implemented by plug-ins.

Display-panel keyboard (the CSA) has a keyboard (9 keys), 4 LEDs for operation modes and backlit LCD display. The display has 2 lines of 20 characters.

Measurement modules

The unit comes with one to two AT connected to Sat pairs of wires and a temperature measurement module.

AT can be arbitrary, having a pulse output such as "dry contact" with a pulse repetition frequency of 100 Hz and a pulse duration of 20 ms to mene.

Filling the block

Unit is provided with seals to prevent the possibility of disassembly, alteration or reconfiguration without apparent damage.

Configuration parameters are protected from change a jumper is installed on board the system unit.

The outer cover is sealed through the holes that do not allow to remove it without damaging the seal.

Sealing of the measuring modules

Sealing test modules implemented after verification. The method of sealing depends on the design of the measuring unit.

After installing the measuring unit, he sealed the connector on your.

Filling the system unit

Filling the system unit by a representative power supply organization.

Protective jumper block is located on the motherboard settings, the system unit.

After all the settings for the acceptance of its operation, to protect against changes in these parameters representative of the power supply organization must:

- jumper in position "B";
- seal the front panel mounted Sat filling, using for this purpose the holes on the base unit and DCT.

Characteristics of the instrument

Technical characteristics

Nominal diameters (DN) of the primary flow transducers, the smallest (G_{Vmin}) and maximum (G_{Vmax}) values of the measured volumetric flow device according to Du and the dynamic range of volumetric flow rate $D = G_{Vmax} / G_{Vmin}$, the specification of the applicable flow .

The value of the pressure loss for an arbitrary flow is defined as:

$$P = P_{G_{Vmax}} \cdot (G_V / G_{Vmax})^2, \text{ where:}$$

$P_{G_{Vmax}}$ – differential pressure at maximum flow;

G_{Vmax} – maximum flow rate for the selected DN.

Coolant temperature measurement range - from 0 C to 125 C.

Sat degree of protection - IP20.

The power consumed by components of the device is not more than 1W in active mode (measurement mode) and not more than 0.02 watts in standby mode.

Weight of not more than 400 grams.

Norm of mean time to failure based maintenance, regulated operating manual, 50,000 hours

Full average lifespan 12 years.

Operating conditions

The ambient temperature for SB	from +5 to +50 C
Relative humidity at 35C and lower temperatures without condensation:	Up to 95%
Atmospheric pressure:	from 84.0 to 106.7 kPa
Rated mains voltage:	220 V
Mains voltage deviation from nominal:	from -15% to +15%
The nominal line frequency	50 Hz
Frequency deviation from nominal supply:	not more than 2%
The magnetic constants and / or variable frequency AC field	no more than 400

strength:	A / m
Working pressure of the medium:	less than 1.6 MPa
Prohibitive (Compression) Pressure:	no more than 2.5 MPa
Fluid temperature:	from 0 to 125 C

Operating conditions must comply with AT characteristics specified in their manual.

Functionality

The instruments provide output to display the following information:

- the accumulated volume of hot water in cubic meters (cumulative);
- accumulated volume of cold water in cubic meters (cumulative);
- accumulated time of use hot water in hours (cumulative);
- accumulated time of using cold water in hours (cumulative);
- device operating time in hours;
- current value of the volumetric flow rate of hot water in cubic meters;
- current value of the volume flow of cold water in cubic meters;
- current value of the temperature of hot water consumed in degrees Celsius;
- the current time of hot water in minutes;
- the current time of consumption of cold water in minutes;
- the current date and time;
- information on the modification of the instrument, software, configuration parameters and status of the device.

The instruments provide backup in the nonvolatile memory the following parameters:

- Daily volume of hot water (cumulative) by the daily flow of in accordance with the temperature in cubic meters;
- Daily volume of cold water (cumulative) in cubic meters;
- Daily time use of hot water (cumulative) in minutes;
- Daily time use cold water (cumulative) in minutes;
- Daily operating time of the device in hours;
- total time of using hot water from the input device in operation (cumulative) in hours;
- total time of use with cold water after putting the device in operation (cumulative) in hours;
- the total accumulated volume of hot water, without reference to its temperature, after putting the device into operation in cubic yards (cumulative);
- accumulated volume of cold water after putting the device into operation in cubic yards (cumulative);
- device operating time in hours;
- date and time of the battery backup power;
- the date and time of receipt of the signal low battery power backup.

Capacity archives 1 year.

When you unplug the power supply all the information recorded in the archive data is stored in nonvolatile memory for at least 10 years.

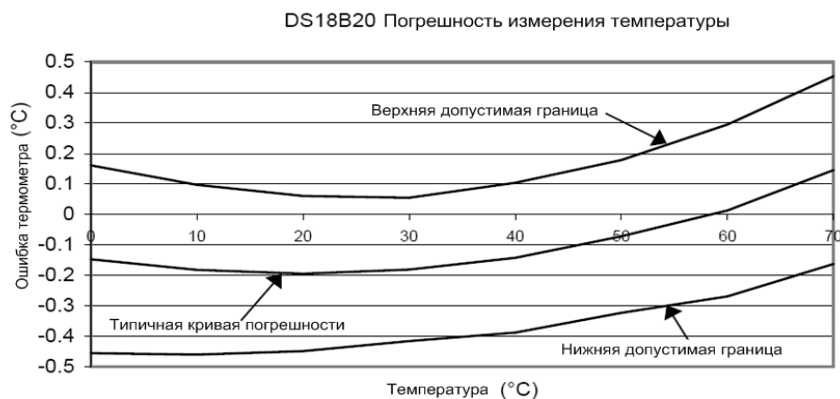
Blocks allow the issuance of the RS232 interface the values of all measured values and all archived data.

Metrological characteristics

Maximum permissible relative error in the measurement of volume (flow rate) correspond to the limits specified in the passport to use when.

To measure the temperature of the coolant used e-Fri

Maximum permissible absolute error of temperature measurement Fri should not exceed the values given in the graph.



The resolution of the instrument when measuring the temperature of the coolant without error is $\text{Fri} \pm 0,0625 \text{ C}$.

Error of the instrument should not go beyond the above values when operated under the conditions specified in section 4.2.

Algorithm for the accumulation of integrators and calculation of the average temperature

Accumulation (integration) of the amount of cold and hot water is produced by adding a period of time proportional to the price momentum established by AT and instantaneous flow rate as follows:

$$V_n = V_{n-1} + \Delta V_n; V_n = V_{n-1} + \Delta V_n;$$

where

V_n – values of the integrators at time n ;

V_{n-1} – the values of the integrators in the previous point in time ($n-1$);

$\Delta V_n = Gv_n / l/\text{imp}$ - volume of water passed through the pipeline in the interval between two pulses of the meter.

In calculating the average temperature (for the time of consumption) are used, the temperature values measured between the two pulses of the meter. T.e. That is, if the meter has a price momentum $1l/\text{imp}$, the first temperature measurement will be made at the time of receipt of the first pulse (passing through a pipe of 1 liter of water) and the second after receiving the second pulse. The average value of temperature, thus, will be formed on the water consumption of 2-m liters. The next measurement temperature occur on the arrival of the next pulse from the AT, but the average will be calculated between the temperature of the previous measurements and measured after the arrival of the last pulse. Accordingly, the decomposition rate on temperature will be produced at an amount equal to twice the price momentum in the.