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SAU-M6

**Three-channel level
monitoring device**

Passport and user manual



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This paper is destined for operating staff to get to know the construction, mode of functioning and servicing of the level monitoring device SAU-M6.

SAU-M6 device is certificated. The certificate of conformance №03.009.0102.

1. PURPOSE

1.1. General information

1.1.1. In common with level sensors and actuators SAU-M6 device is destined for automation of engineering processes, connected with monitoring of the fluid level in some reservoirs, settling tanks, etc. Electrical conduction of the fluid must be high enough.

1.1.2. The fluid level monitoring realizes using conductometric (controlling electrical conduction of the medium) sensors (sondes), put by the user on the marks, assigned by the process conditions: "Level 1", "Level 2", "Level 3". There are three LED indicators on the front panel of the device for visual monitoring of the fluid level. Each of LED indicators lights up as soon as the signal of the sensor is taken.

1.1.3. There are three electromagnetic relays built in the device. Each of them is connected with the level sensor and acts when the fluid level becomes higher or lower than the sensor.

1.2. Service conditions

The device satisfies the climatic requirements YXЛ4 according to the all-Union State Standard 15150-69 and it is destined to be used under the following conditions:

- closed explosion-proof spaces with no vapour and gas corrosive to the device;
- air temperature from +1 °C to +50 °C;
- the upper limit of ambient air humidity 80%;
- atmospheric pressure from 86 to 106,7 kPa.

2. PERFORMANCE SPECIFICATION

Basic specifications of the SAU-M6 device are given in the table 1.

Table 1

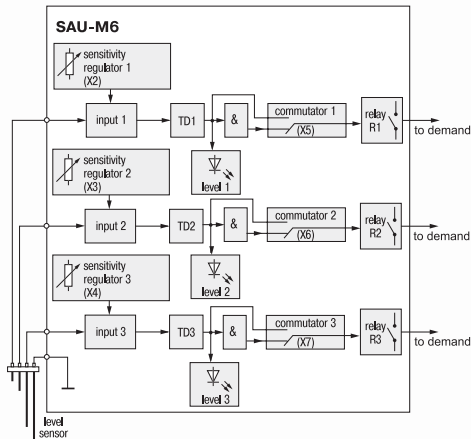
Item	Magnitude
Operating supply voltage	220 VAC, frequency 50 Hz
Operating voltage range	+10%...- 15% of operating supply voltage
Power consumption	6 W max
Number of level-monitoring channels	3
Level-sensors supply voltage, not more than	10 VAC, frequency 50 Hz
Number of relay outputs	3
Permissible load on the relay's contacts	4A max
Degree of the case protection	IP44
Size	130x105x65 mm
Weight	0.7 kg max
Mean life cycle	8 years

3. MODE OF FUNCTIONING AND CONSTRUCTION OF THE DEVICE

3.1. Mode of functioning

3.1.1. The functional diagram of SAU-M6 device is given in the pic. 1. The device consists of three level monitoring channels. Each of them operates the same functions and consists of the following main items:

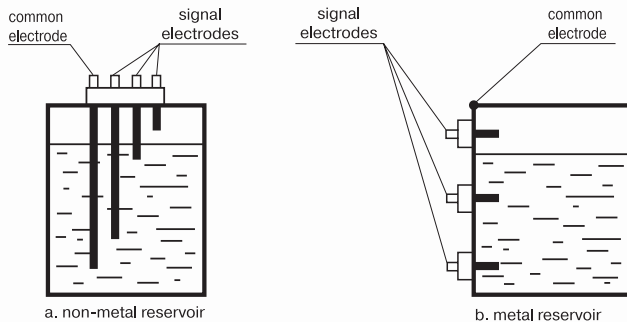
- level sensor;
- input;
- threshold device (TD) with signal LED;
- output relay (R).



Pic. 1

3.1.2. Conductive fluid probes are used in the device as the level sensors. Conductive fluid probes can be used for fluid level monitoring if the fluid is electroconductive. For example, acid and alkali solutions, molten metals, water and water salt solutions, milk, etc. The simplest construction conductive fluid probes are metal corrosion-strong electrodes, sealed from each other. One of electrodes is common for all monitoring channels. It should be placed in the reservoir so that the test portion of it is always in the fluid in the all monitoring range (from the lower level to upper level inclusive). This electrode should be connected to the contact “Common” of the device (pic. 2, a).

Note. If your reservoir is made of metal you can use it body as the common electrode (pic. 2, b).



Pic. 2

The rest electrodes are signal. They should be placed at appropriate levels and be connected to signal inputs 1, 2, 3 of the device (contacts “Level 1”, “Level 2”, “Level 3” at the connection diagram, app. A).

When the reservoir fills up electrodes connects with the fluid. On account of that current lines between common and appropriate signal input close-in. The device fixes it as reaching one of given levels.

CAUTION! Conductometric method of fluid level monitoring may be not effective if you use suspension or emulsion instead of fluid because of particles sedimentation. It may result to sealing sensors electrodes.

3.1.3. Level sensor's signals entry to appropriate inputs and transforms to optimal for further processing electrical signals.

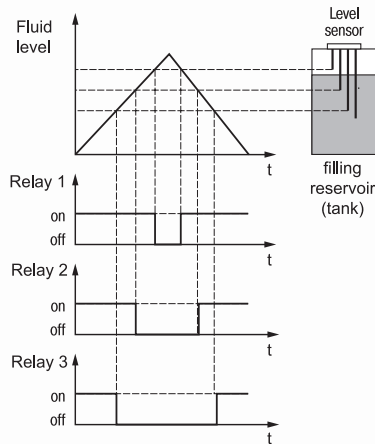
3.1.4. There are stepped commutators X2 (X3, X4) in every channel of the device. They are electroconductivity sensitivity regulating devices of level monitoring channels. So SAU-M6 device can work with different fluid mediums.

3.1.5. Threshold devices are destined to fix when the fluid level is as high as conductometric sondes (given levels) and to signal by lighting up LEDs LEVEL. Apart from that threshold devices generate signals for output relays control.

3.1.6. Output relays are destined to control external equipment. External equipment supports performance of the level monitoring engineering process. Operation of relay will happen if appropriate signal electrode contacts with the fluid.

The mode of relay's behaviour in every channel may be changed by the user using commutators X5 (X6, X7), pic. 1. It may be used for functionality enhancement of the device. Depending on relay's commutator output relay can become "on" or "off" when sensor's electrode contacts with the fluid.

The time history of output relay's working when all relays become "off" if level sensor's signal comes is given in pic. 3.



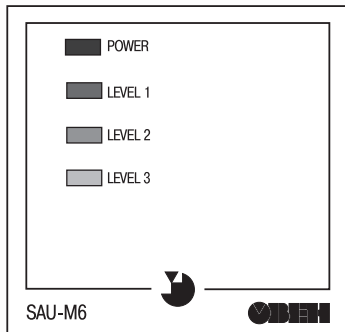
Pic. 3

3.2. Construction of the device

3.2.1. The device's case is made of plastic. The case is destined for fasten on the wall (H-type). Dimensions of the device are given in app. B.

3.2.2. There are LED indicators on the front panel of the device (pic. 4):

- POWER (green) – glows when the power is on and built-in power supply unit functions properly;
- LEVEL 1, LEVEL 2, LEVEL 3 (red) – glows as soon as the signal of the appropriate level sensor is taken.



Pic. 4

3.2.3. The device consists from two printed-circuit boards, connected to each other.

There are signal LED indicators in the one of printed-circuit boards.

There are level monitoring channel's scheme items, electric power supply unit and commutators X2...X7, which are destined to set the sensitivity of the level monitoring channels and to change the mode of behavior of the output relay's in the second printed-circuit board.

Commutators consist of double-row rectangular pintle connectors. Jumper straps should be put on the neighbouring contacts to commute electrical signals.

Also there is 17-contact connector block destined to connect external connections cables by screws on the second printed-circuit board.

To work with printed-circuit boards and connector block you should unscrew the front panel of the device from the case.

4. SAFETY MEASURES

4.1. SAU-M6 device satisfies 0 protection range according to the all-Union State Standard 12.2.007.0-75.

4.2. "The rules of exploitation user's electrical installations", "The rules of protection of labour using user's electrical installations" and demands of the all-Union State Standard 12.3.019-80 are obligatory to keep while using and servicing the device.

4.3. Any connections to the device and its servicing are possible to do only if the power of the device and actuators is off.

4.4. Work with the device is possible only after reading this passport and user manual.

5. MOUNTING AND PREPARATION FOR WORK

5.1. Level sensors mounting

5.1.1. Install level sensors on the marks, assigned by the process conditions.

5.1.2. After mounting conductometric sondes check up if there is any bridging of their electrodes or bridging of electrodes and metal reservoir body.

5.2. External connections mounting

5.2.1. Prepare and install cables to connect SAU-M6 device with level sensors, external equipment and power supply unit 220 VAC, 50 Hz. It is recommended to use cables with copper multi-stranded cable cords. Cable cord's ends should be thoroughly stripped before connection. Cable cord's profiles must be not more than 0.75 mm².

CAUTION! Device's connector block withstanding voltage is 300 VAC maximum and it should be taken into account when supply voltage and external equipment are connecting to the connector block. It's inadmissible to connect to contacts 7...17 different branches of three-phase circuit 380/220 VAC.

5.2.2. Following external noise can influence on the device's work:

- electromagnetic interference, appear under the influence of electromagnetic fields;
- noise, appear in supply main.

5.2.3. It is necessary to carry out following advices to reduce the influence of electromagnetic interference.

5.2.3.1. It is necessary to reduce the length of the signal lines including 'device-sensor' lines and to single them out to independent channel separated from power cables during installation.

5.2.3.2. Support safe signal lines screening. Screens must be electrical insulated from external equipment over the whole channel and connected to the contact "Common" of the device ($\perp$). If it is impossible to insulate over the whole channel or contact "Common" the screen should be connected to earthing point of the system, for example, to grounded contact of control panel.

5.2.3.3. It is necessary to set the device into metal box. There mustn't be any power facilities. The case of the box must be grounded.

5.2.4. It is necessary to carry out following advices to reduce noise, appear in supply main.

5.2.4.1. It is necessary to connect the device to supply main separately from power facilities.

5.2.4.2. It is necessary to take account of effective grounding organization rules mounting the system:

- all grounding lines install according to the star-connected circuit and support good contacting with grounding item;
- all earthed circuits must be made from thick cables;
- it is prohibited to connect the contact "Common" of the device with earthed circuits.

5.2.4.3. Set supply main noise filters in device's supply lines.

5.2.4.4. Set spark filters in power facilities commutation lines.

5.3. Preparation for work

5.3.1. Prepare place to set the device according to dimensions given in app. B.

5.3.2. It is necessary to check the commutator's bridges in X2...X7 commutators, to bring to conformity with characteristics of engineering process taking into account information given in tables 2 and 3 before setting up the device.

Commutators X2, X3, X4 are used for step control of sensitivity level monitoring channels "LEVEL 1", "LEVEL 2", "LEVEL 3" accordingly. Choosing their position realizes according table 2 before startup of the device.

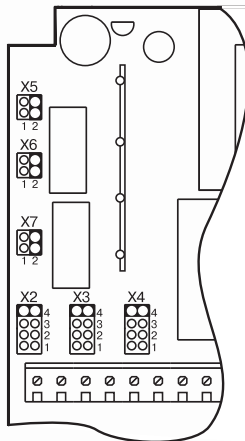
Table 2

Device's sensitivity regulating

Deep into fluid level sensor's resistance*	Commutator's X2, X3, X4 jumpers setting	Examples of fluid
< 1 kOm	"1"	Acids, alkali, melts
< 10 kOm	"2"	Industrial water, milk, foodstuffs
< 100 kOm	"3"	Tap water, lean salt solutions
< 500 kOm	"4"	Treated water

* Resistance value is reference. Deviation of this parameter may be 30%.

Commutators X5, X6, X7 specify mode of output relay's R1 ("Level1"), R2 ("Level2"), R3 ("Level3") behaviour accordingly. Commutator's jumpers should be set according table 3. Commutators arrangement in the device is given in pic. 5.



Pic. 5

Table 3

Relay behaviour depending on jumper's position

Commutator's X5, X6, X7 jumper's position	Output relay's behaviour
"1"	Relay is on when the level sensor isn't in the fluid and relay is off when the level sensor is in the fluid
"2"	Relay is on when the level sensor is in the fluid and relay is off when the level sensor isn't in the fluid

5.3.3. Set up the device and connect it with level sensors, external equipment and power supply unit 220 VAC 50 Hz according app. A after doing works given in p. 5.3.1 and 5.3.2.

6. SETTING UP THE DEVICE

6.1. Setting up the device is fluid level monitoring channels sensitivity adjustment. To set up the device follow given directions.

6.2. Switch on power 220 VAC 50 Hz and make sure that LED POWER on the front panel of the device lights up.

6.3. Fill the reservoir up gradually and check lighting up LEDs LEVEL 3, LEVEL 2 and LEVEL 1 on the front panel of the device as soon as the fluid reaches appropriated electrodes.

If one or more LEDs didn't light up while the reservoir is filling you should increase level monitoring channel's sensitivity.

To change channel sensitivity use commutators X2 (channel "Level 1"), X3 (channel "Level 2") or X4 (channel "Level 3"). Level's sensitivity increases when sequence number of commutator's jumper's position increases and it decreases when sequence number of commutator's jumper's position decreases.

CAUTION! The device's connector block is under tension 220 VAC 50 Hz which is dangerous for human life. Changing commutator's jumpers position is possible only when the device is completely currentless.

6.4. Make gradually emptying of the reservoir and check going out LEDs LEVEL 1, LEVEL 2 and LEVEL 3 on the front panel of the device.

If one or more LEDs don't go out while the reservoir is emptying you should decrease level monitoring channel's sensitivity according p. 6.3.

6.5. To check up sensitivity settings quality make reservoir full and empty again and check if level sensors work well by LEDs LEVEL 1, LEVEL 2 and LEVEL 3.

After doing this work the device is ready to operation.

7. SERVICING

7.1. Servicing of the device should be done according to safety measures given in p. 4.

7.2. Servicing of the device should be done one time in three months, not rare and should include doing the following procedures:

- cleaning device's case and connector blocks from dust, dirt and foreign items;
- checking up device's mounting quality;
- checking up external connections to device's connector blocks.

7.3. Apart from that examination of conductometric sondes using as level sensors should be done routinely. Clean electrode's test portions from particles sedimentation sealing sensors electrodes if needed.

Examination of conductometric sondes periodicity depends on operating fluid solution and if it contains insolubles.

8. MARK AND PACKAGE

8.1. There are the following marks on the device:

- device's name;
- manufacturer's name;
- manufacture date;
- operating supply voltage and power consumption;
- the sign of standard-technical documentation conformity;
- bar-code.

8.2. The device is packed into corrugated board box.

9. TRANSPORTATION AND STORING RULES

9.1. The device should be transported in the package, at a temperature from -25°C to $+55^{\circ}\text{C}$ and relative air humidity not more than 95% (at a temperature 35°C).

9.2. Transportation is possible by all closed modes of transport.

9.3. Transportation by plain should be done in heated pressurized compartments.

9.4. The device should be stored in the package in closed storage rooms at a temperature from 0°C to $+60^{\circ}\text{C}$ and relative air humidity not more than 95% (at a temperature 35°C). Storage room's air should not contain vapour and gas corrosive to the device.

10. DELIVERY SET

SAU-M6 device	1
Mounting H-type tools set	1
Passport and user manual	1
Warranty coupon	1

Note. There aren't level sensors in the delivery set. Level sensors should be ordered separately.

11. WARRANTY

11.1. Manufacturer guarantees device's accordance to technical conditions if user met conditions of transportation, storage, mounting and operation.

11.2. Warranty lifetime of the device is 24 months from selling day.

11.3. Manufacturer engages to repair failure device free during warranty lifetime if user met conditions of transportation, storage, mounting, operation and filled in the Repair form.

To send the device for repair you should:

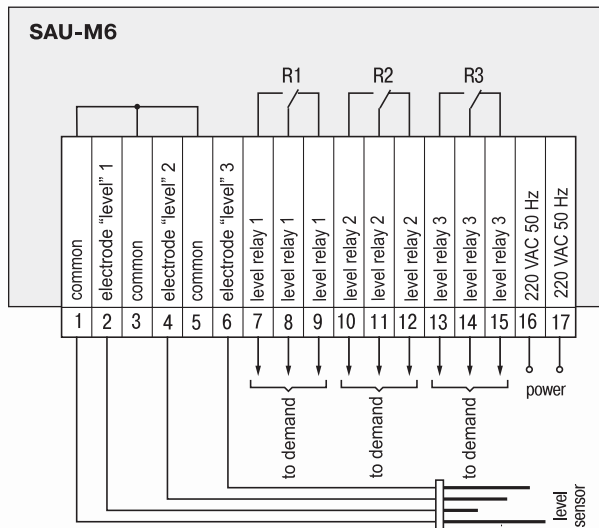
- fill in the Repair form in the Warranty coupon;
- put the device and filled in the Repair form in the box;
- send the box by post or bring to the following address:

1st Veshnyakovskiy pr., 2, Moscow, Russia 109456.

Phone: (495) 742-48-45, e-mail: rem@owen.ru

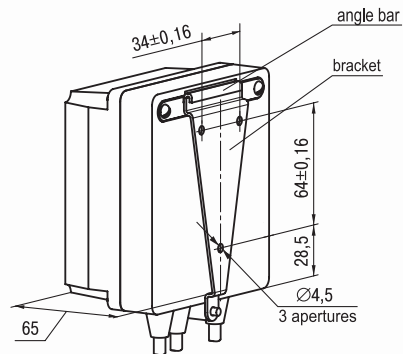
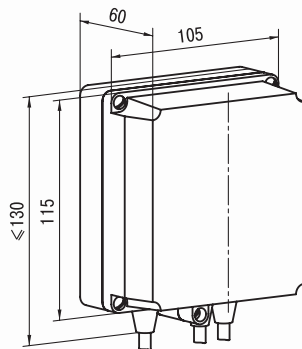
- CAUTION!**
1. Warranty coupon is invalid without selling day and manufacturer's stamp.
 2. It is needn't to put fasts into the box.

Appendix A CONNECTION DIAGRAM



Appendix B

DIMENSIONS



THE ACCEPTANCE AND SELLING CERTIFICATE

SAU-M6 device, serial number

conforms to published data and is valid for operating

Manufactory date _____

Quality control department stamp _____

Selling date _____