Univesal two channel microprocessor programable controller

MS8112

USER MANUAL

PLOVDIV 2016

CONTENT

ADVANTAGES:

- ✔ **CONSUMER PROGRAMMING**
- ✔ **FAST SWITCHING BETWEEN TWO SET POINTS COMPLEXES**
- ✔ **BUILT-IN TIMER BLOCK OR ALARM (OPTION)**

I. DESIGNATION

MS8112 is designed for measuring and controlling of two process variables, e.g. temperature and temperature, temperature and humidity, etc.

MS8112 is being manufactured in two main modifications (according to output K3) – with a timer block or alarm. The device has two analog inputs and three digital outputs. The outputs can be – two operating, accordingly for channel 1(K1) and 2(K2), and alarm one or to be controlled by the embeded timer block (K3). The regulator can achieve the ON/OFF or P control strategy (program selectable). The outputs are being controlled through the logic (ON/OFF) or by pulse with variable duration (PWM) accordingly.

II. ORDER CODE

MS8112 - x.x.x.x.x.x.x.x.x

Дисплей code

R3 - red

G3 - green

Вход канал 1(C1)

Вход канал 2(C2)

	код C1	код C2	
Pt100	**41**	**51**	0.0÷99.9 °C
	42	**52**	-50÷100 °C
	43	**53**	-19,9÷99,9 °C
	4	**24**	0÷250 °C
	5	**25**	0÷400 °C
	6	**26**	0÷600 °C
	7	**27**	-50÷400 °C
Pt1000	**8**	**28**	-50.0÷50.0 °C
	44	**54**	-50÷100°C
	10	**30**	-50÷200 °C
J	**11**	**31**	0÷600 °C
K	**45**	**55**	0÷999 °C
Transmitter	**15**	**35**	4÷20 mA DC-2W
	16	**36**	0÷20 mA DC-3W
	17	**37**	0÷10 V DC-3W
	9X	**9Y**	other by ordering

A Taken out supply for a transmitter

Code

T0 - not taken out

T1 - 11...14V 150 mA

T2 - 24 VDC 80 mA stable

Power supply **

Code

PA - 220 VAC +10%-15%/50Hz

PF - 24 VAC ±30% isolated

PB - 24 VDC ±30% isolated

PC - 12 VDC ±15% non-isolated

PD - 24 VDC ±15% non-isolated

PX - other

Digital output K1

Digital output K2

Digital output K3

Code

K1	K2	K3	
AA	**BA**	**CA**	- not taken out
AB	**BB**	**CB**	- Relay 5A/250V
AD	**BD**	**---**	- Triac 2A / 250V
AE	**BE**	**CD**	- OC NPN non-isol. U_{CEmax}=65V, I_{Cmax}=100mA
AF	**BF**	**CF**	- OC NPN isolated U_{CEmax}=80V, I_{Cmax}=1A

Digital output K3*- function

Code

N - Alarm

S - Timer

D - not taken out

! It is mandatory to be specified the range: upper and lower limits and decimal point!

* Only when taken out digital output K3

** When option PF,PB,PC,PD for the supply the analog outputs can be only current:
- passive (when ordered)
- active (when ordered and using an external supply)

Options PC and PD for the supply (they are not recommended), demand the supply for the sensor to be the same as the supply for the device.

Example **MS8112 - R3.42.35.T1.PA.AB.BA.CB.N**

Display - red

Input C1- Pt100 0.0÷200.0 °C

Input C2 - transmitter 4-20mA DC 2W

A taken out supply for the transmitter - 11÷14V 150 mA

Power supply- 220 VAC

Digital output K1 - Relay 5A/250V

Digital output K2 - not taken out

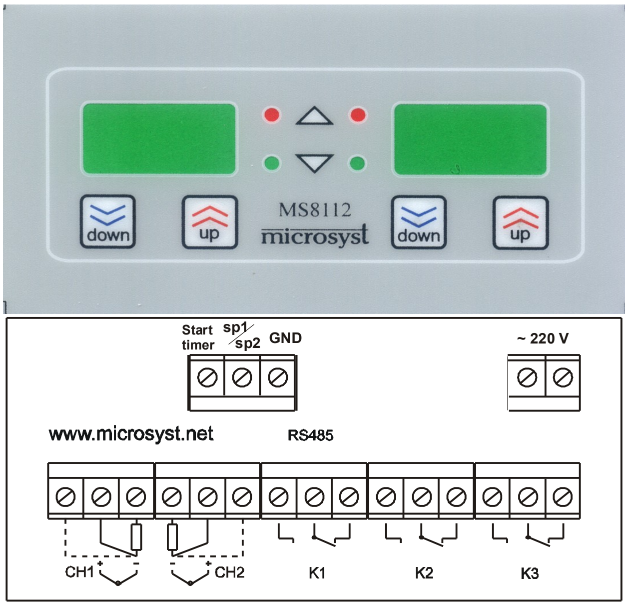
Digital output K3 - Relay 5A/250V

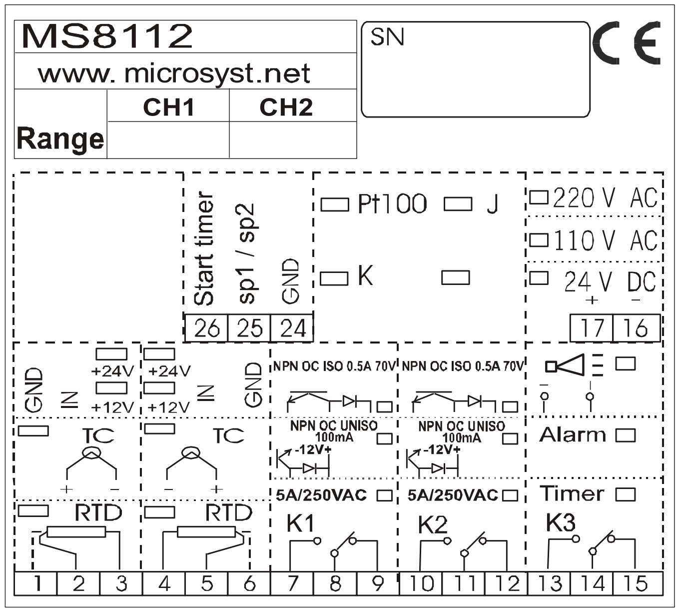
Digital output K3 - Alarm

III. TECHNICAL DATA

Inputs			
Linear current		0 (4) ... 20 mA DC	
Linear voltage		0 … 1 (10) V DC	
Thermoresistor		Pt 100, P1000	EN 60751
Thermocouple		J, K,	EN 60584
Other		by order	
Accuracy of the measurement		± 0.15% of the range	
Outputs			
Digital	K1-ON/OFF or PWM K2-ON/OFF or PWM K3-ON/OFF or PWM К3-Function	**OPTIONS:** Relay 250 V / 5,10 A Triac 250 V / 2 A NPN OC uniso Ucemax=65V,Icemax=100 mA NPN OC iso Ucemax=80V,Icemax=1A	
Function K3		- Alarm - Timer	
Supplying for transmitter with: - current or voltage		12 V DC 150 mA unstabilized 24 V DC 80 mA stabilized	
Indication and keypad			
Display		2x3 digits LED 10 mm	
Range of the display		-99 ÷ 999	
Reading format		XXX, X.XX, XX.X	
Keypad		Полусензорна Semisensor	
Power supply			
Power supply; Frequency		220VAC / max 20mA; 50 Hz (± 1 Hz)	
Other		according to the order code	
Operating conditions:			
temperature		0 … 50 °C	
relative humidity		0 … 80 % RH	
Dimensions			
Overall dimensions(WxHxL)		96 x 48 x 128 mm	
Mounting		Panel Cutout :90 x 44 mm	
Weight		max 400 g	
protection		IP40	
Storage conditions :			
temperature		-10 … 70 °C	
Relative humidity		0 … 95 % RH	

IV. FRONT AND BACK PANNEL AND TERMINALS





V. CONNECTING THE TEMPERATURE SESORS AND TRANSMITTERS

With a view to the well working at all it is important the drills to be situated on an appropiate place in the environment in which the regulating of the temperature will be realized. When mounting them in a perforation it is good to be congested to make the heat exchange better.

1. Connecting resistive sensors (Pt100 or other)

The sensors can be connected by a 2- or 3-wire line. The connecting of 2-wire sensors to a 3-wire line is realized as it is shown on fig. 1 and between the terminals 1 and 2 and terminals 5 and 6 on the controller is mandatory to be mounted wire bridges.

When the distances between a sensor and a regulator are bigger it is recommended to be used a 3-wire line since with it the error when measuring the temperature caused by an aditional resistance of the associateed wires is balanced. The connecting of 3-wire sensors to the controller is realized as it is shown on fig. 2 and to the terminals 1 and 2 and terminals 5 and 6 on the controller they mount the short circuit connected in the sensor wires.

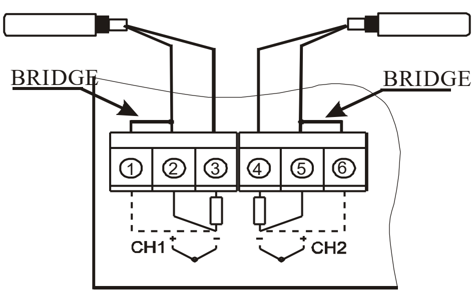


Fig. 1

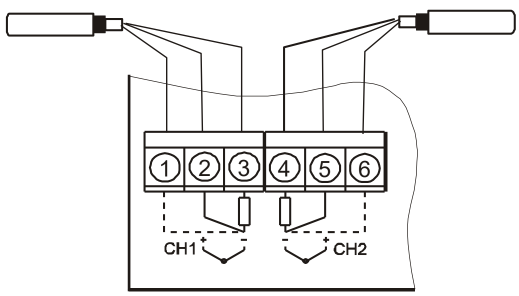


Fig. 2

2. Connecting thermocouples

When connecting a sensor of type thermocouple it should be taken in consideration the polarity of the sensor. When the polarity is reversed the readings will not be correct.

When working with thermocouples it is necessary to be used an equilibration cable corresponding to the type of the insolated thermocouple (fig. 3).

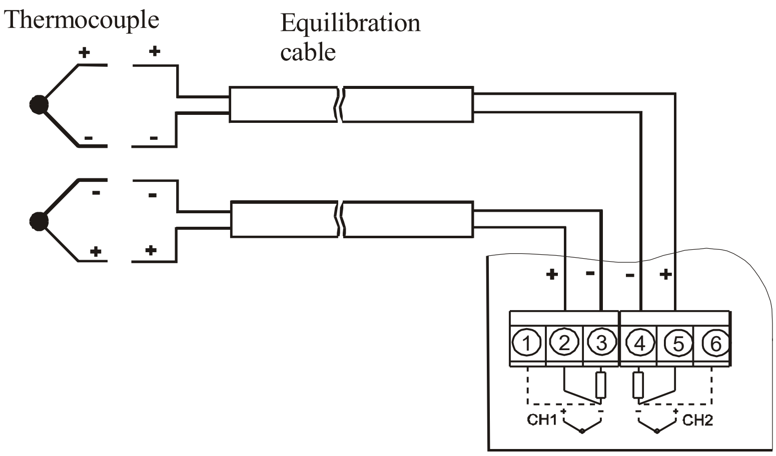


Fig. 3

3.Connecting transmitters

3.1) Transmitters with 2-wire connecting

The supply for the transmitters is provided by the device.

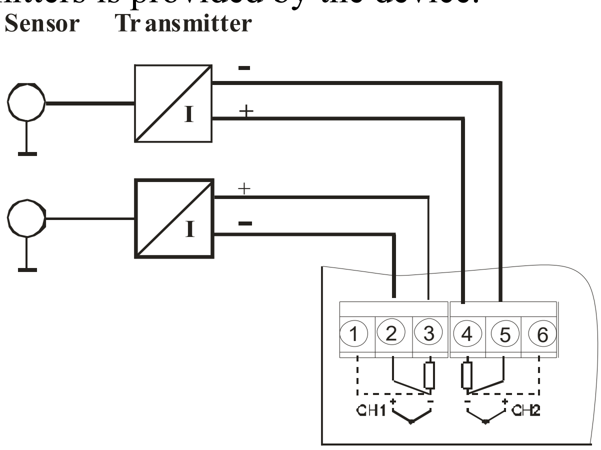


Fig 4

* The device provides unstabilized voltage from 11,5V to 14,5V / max 50mA

3.2) Transmitter with a its own supply

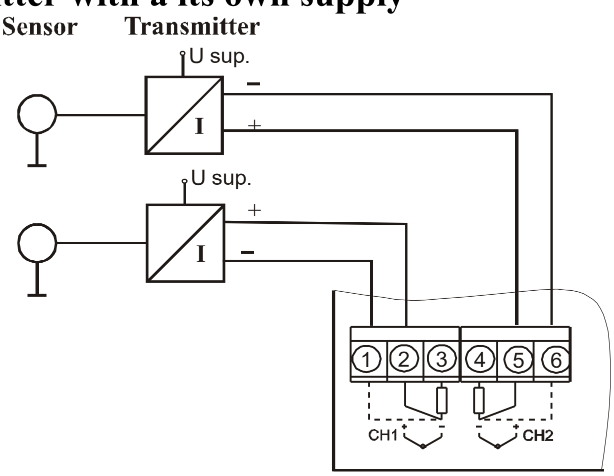


Fig. 5

3.3) Three-wire transmitter supplied by the device

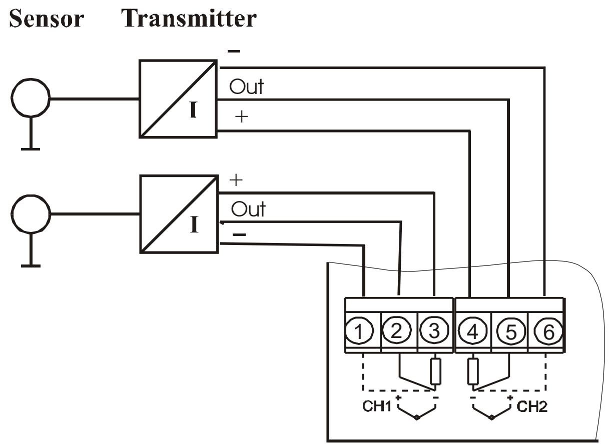


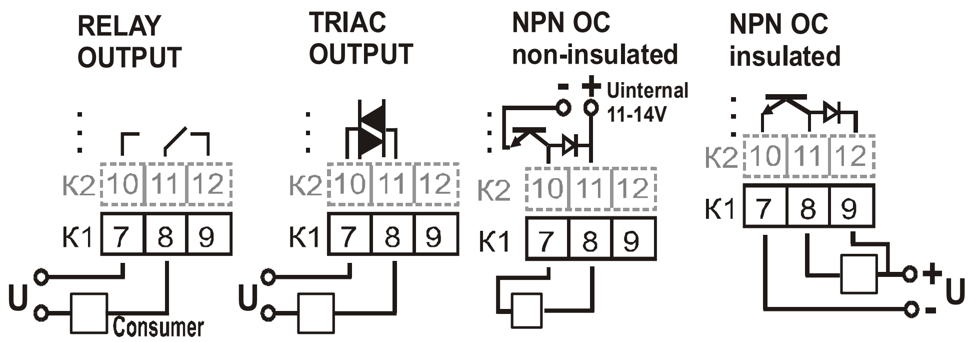
Fig. 6

* The device provides unstabilized voltage from 11,5V to 14,5V / max 50mA

VI. CONNECTING THE OUTPUTS OF THE REGULATOR

When realizing the outputs with relays parallel to the contacts of the relays there is a RC groups for better interference resistance. Through the opened contact of the relay in the AC circuit *runs a minimal current*. This can lead to a scarcely perceptible vibration when off and operating low-powered electromagnets and micromotors.

The connecting of the output of the controller, depending on the choosen in the order code option for an implamentation of the corresponding digital output, to the load is realized as it is shown on fig. 7.



Фиг. 7

VII. OPERATING PRINCIPLE

Basic parameters used in the device:

- SP -regulating the setting
- **ε** -zone of proportionality or histeresis *(when the value of the parameter is positive-logic heating, when negative-logic coolong)*
- PV -process variable
- H - upper limit of the alarm
- L - lower limit of the alarm
- A. и B. - period of the PWM = tи+tп
- tи - time for impulse when PWM regulating
- tп - time for pause when PWM

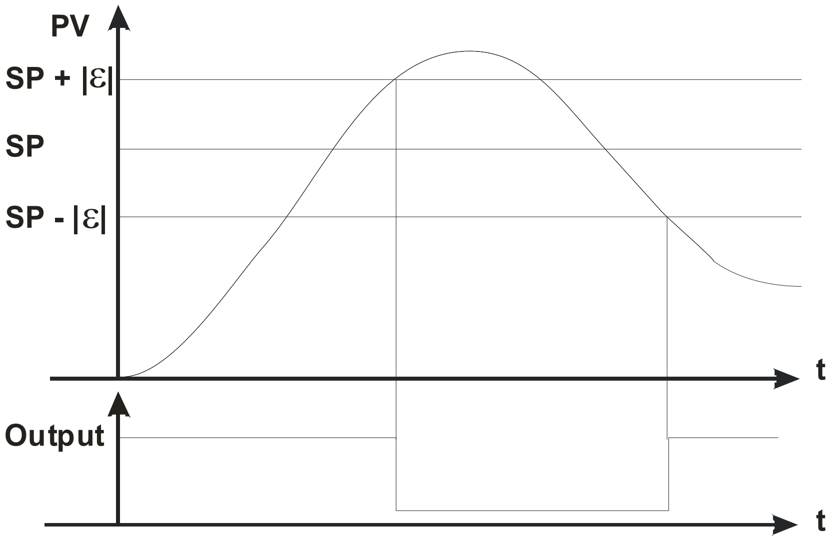


Fig. 8

On fig. 8 is shown the working of 2-positional regulator with output logic “heating”

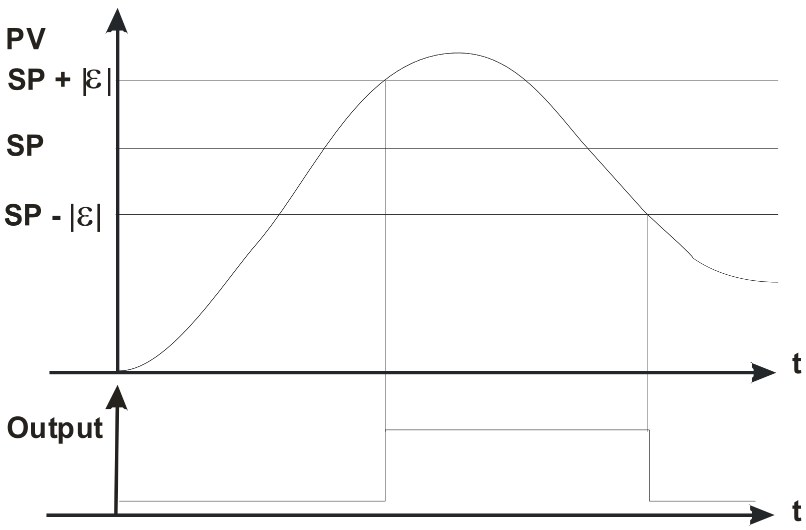


Fig. 9

On fig. 9 is shown the working of 2-positional regulator with output logic “cooling”

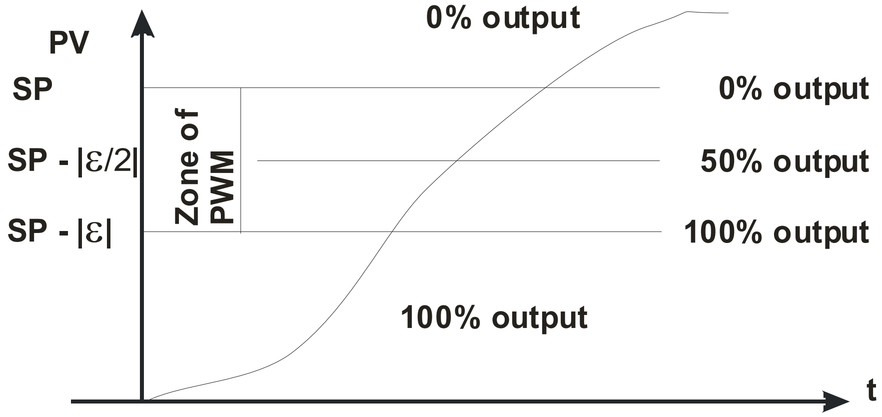


Fig. 10

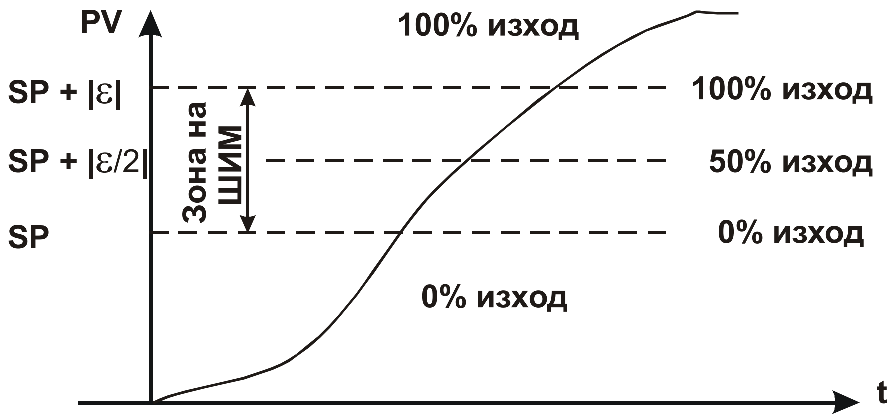


Fig. 11

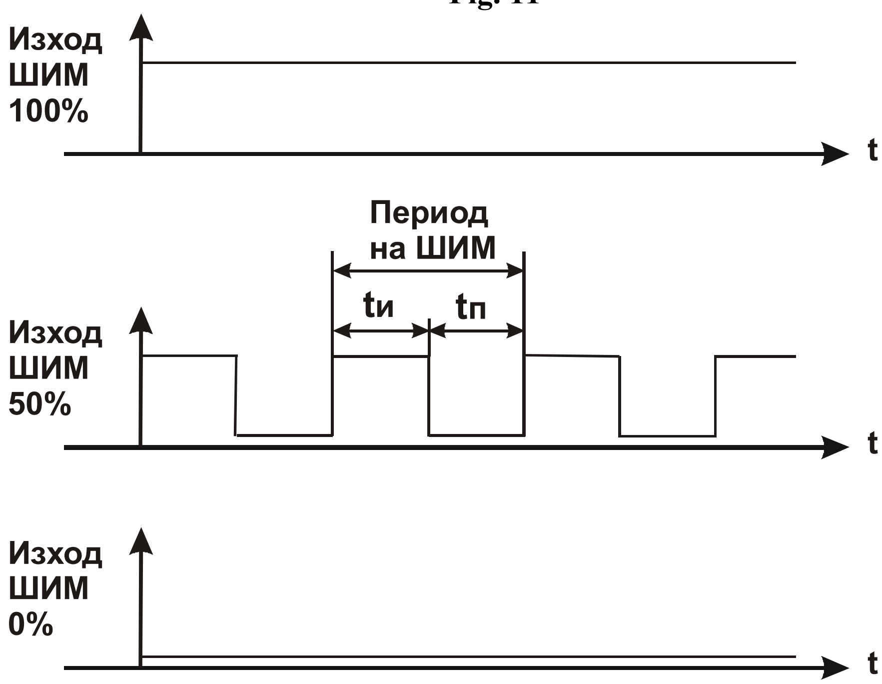


Fig. 12

On fig. 10 is shown the working of a regulator with PWM output with logic “heating” (ε>0) and on fig. 11 – the working of a regulator with PWM output with logic “cooling” (ε<0). On fig. 12 is shown the working of a PWM output. When 50% PWM output tи = tп.

For changing the working logic of the regulator to logic “cooling” is necessery to make the parametersε_1 and ε_2 negative.

VIII. OPERATING MODE

INCOMING VARIABLE		OUTPUTS		
INDICATION	**MODE**	**K1**	**K2**	**K3***
	OPERATING MODE:			
LEFT DISPLAY	*Gives an account the value of the variable of **Channel 1***	Output K1 active - left red LED lights up	-------	-------
RIGHT DISPLAY	*Gives an account the value of the variable of **Channel 2***	-------	Output K2 active - left red LED lights up	
	ALARM MODE:			
LEFT& RIGHT DISPLAY	***When the value of the incoming variable of a concrete channel is over or below the settled upper correspondingly lower limit of the alarm the latter activates and on the corresponding for the channel display begin to show up a message "ALL".***	-------	-------	The alarm output K3 is common to both channels
	TIMER MODE:			
Bottom left LED	***The LED blinks when the timer is started***	-------	-------	***MODE 1:***** ***MODE 2:******

* Output K3 is in Alarm or Timer mode, depending on the device configuration (see point IX. 3.2).

The alarm output is common for the two channels and it works independantly of that which of the channels went into an alarm situation like on the screen "ALL" and the measured value take turns.

The timer selection works independently of the rest part of the regulator according to the chosen operating mode. (see IX. 3.2)

*****MODE1:*** The timer starts by pressing an external button by which the timer output activates and the settled time begins to elapse. The output of the timer is active until elapsing all of the time or until a secondary pressing the external button. The donwer left light emmiting diode blinks when the timer has been started.

******MODE 2:*** The timer starts by pressing an external button, the downer left diode blinks. The output activates after elapsing the settled time, the diode is on constantly. The output stops by the external button, the diode goes out.

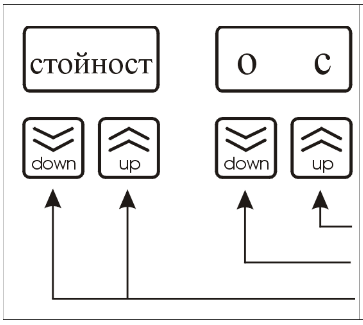
By switching an external key it may be choosen one of the two possible sets of regulating assignments (**SP1** and **SP2**).

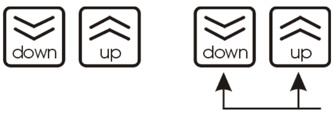
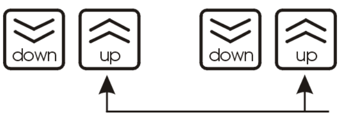
IX. LEVELS OF PROGRAMMING

Keyboard operation :

When on the display there is a symbol (parameter) the button below the symbol chooses its redaction.

Wnen on the display is written the number by the buttons below it the value can be changed and by the buttons below the symbols **“o” - Ok** and **“c” - Cancel** this value can be confirmed or canceled.

	Display Buttons Turning back without confirmation the changes Confirmation (OK) Changing the value of the parameter

<table>
<tr><th colspan="2">1. User level</th></tr>
<tr><td>
</td><td>Display SP1 and SP2
The left display shows up Assignment 1 (SP1) and the right one – Assignment 2 (SP2). After releasing the button the device turns into normal state where the display shows the read in this instant moment variable.</td></tr>
<tr><td>
</td><td>Setting the SP1
By pressing the buttons simultaneously on the left display shows up and starts blinking SP1. By the same buttons the value of SP1 can be changed and the display stops blinking. If until 5 seconds while on the dislay blinks or is already setted a new value any button is pressed it comes back into an operating mode (-199 ÷ 999)*</td></tr>
<tr><td>
</td><td>Setting the SP2
By pressing the buttons simultaneously on the right display shows up and starts blinking SP2. By the same buttons the value of SP2 can be changed and the display stops blinking. If until 5 seconds while on the display blinks or is already setted a new value any button is pressed it comes back into an operating mode (-199 ÷ 999)*</td></tr>
<tr><td>
</td><td>Timer display
On the left display the assignment of the timer or the resting time if the timer has been started shows up and on the right one an inscription “– t –“. 5 seconds after releasing the button the device goes back to normal state.**</td></tr>
<tr><td>
</td><td>Setting the timer
By pressing the buttons simultaneously on the right display the settled time of the timer shows up and starts blinking. By the two left buttons the value of the assignment can be changed while the display stops blinking. If until 5 seconds while on the display blinks or is already setted a new value any button is pressed it goes back to operating mode. (1 ÷ 999мин. или сек.)**</td></tr>
</table>

* A dimension according to the measured variable.

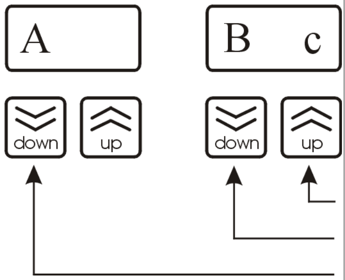
** Those buttons are active only if it is activated a timer block. The form of the timer is indicated by the most right decimal point of the left display. The existing of a decimal point means – format seconds, and the absence – format minutes.

2. “System parameters“ level

Going into a mode – setting system aprameters

The buttons should be held for 3 seconds after that on the two displays shows up the main programming menu.

2.1) Main menu



Display

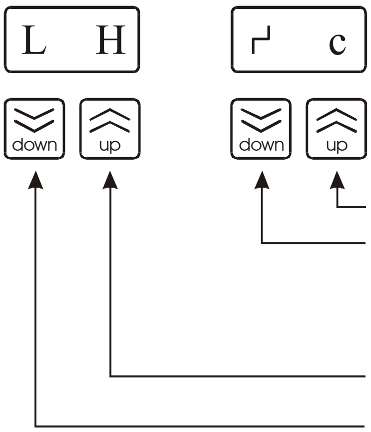
Buttons

Going back to operating mode

Parameters of channel 1

Parameters of channel 2

2.2) Submenu for choosing parameters



Display

Buttons

Going back to main menu

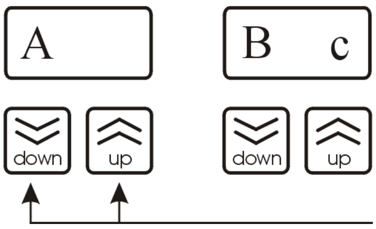
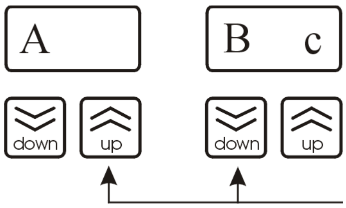
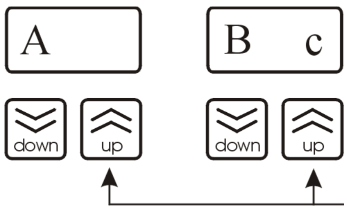
ε - a zone of proportionality or hysteresis when ε>0 logic “heating”, ε<0 logic “cooling” (-199 ÷ 999)*

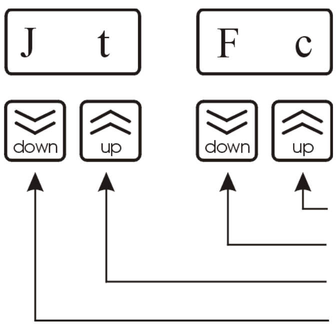
Upper limit of an alarm (-199 ÷ 999)*

Downer limit of an alarm (-199 ÷ 999)*

* A dimension according to the measured variable

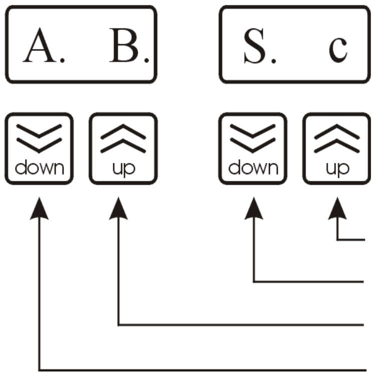
⚠	***To be changed extremely carefully,*** ***because its change can lead to incorrect work of the device!***

3.“Service parameters“ level	
	Display Buttons Setting the parameters of the filter of channel 1
	Display Buttons Setting the parameters of the filter of channel 2
	Display Buttons Setting the period of PWM for the outputs of channel 1 and channel 2 and timer block.

3.1) Submenu for choosing parameters	
	Display Buttons Going back to main menu A coefficient of the filter (1 ÷ 128) * Filter rebound time (1 ÷ 25 sec) Rebound of the filter (1 ÷ 255)**

*** The lower value of the coefficient, the heavier filter**
**** A dimension according to the measured variable**

3.2) Submenu for choosing parameters for period of the PWM for the outputs and timer block



Display

Buttons

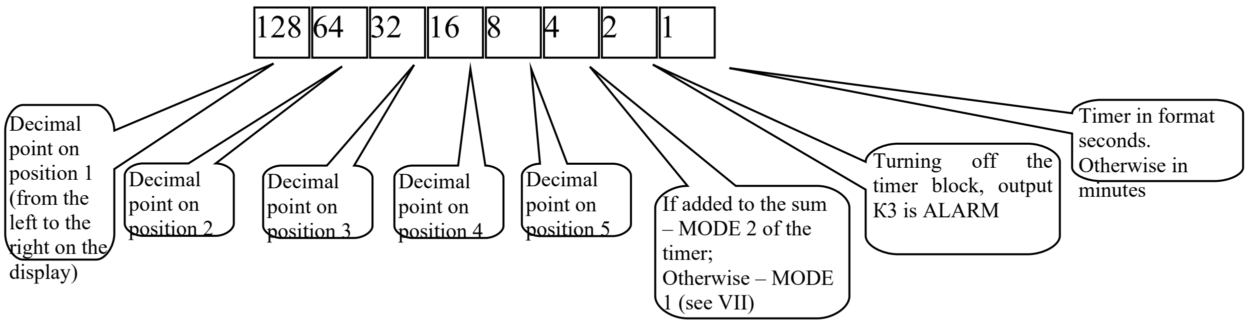
Going back to main menu

Setting the timer block*
Period of PWM for channel 1 (1 ÷ 255 *0,5сек.)**
Period of PWM for channel 2 (1 ÷ 255 *0,5сек.)**

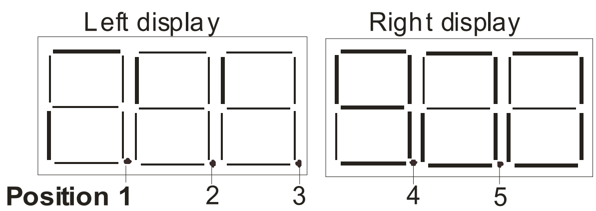
*This parameter is valid only if the timer block is permitted and there are the following valid values:

0 – timer in a format minutes
1 – timer in a format seconds

If mode "**Setting parameters**" is activated by pressing the most right button and the supply is on by means of the parameter **S.** the mode of the timer and the situation of the decimal points can be setted. A concrete value comes out as a sum of the shown below coefficients. If we want to activate the corresponding possibility we add its coefficient in the sum otherwise we miss it.



Decimal point positions:

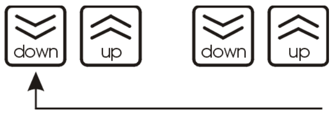


The device does not scale the measuring range by changing the decimal point. Therefore, the user should not change!

** When setting a value "0" the corresponding channel turn into a positional law of regulating and the parameter ε matters a hysteresis. In the rest of the cases ε matters a zone of proportionality.

X. USER OFFSET ADJUSTMENT OF CHANNEL 1 AND CHANNEL 2

In this mode the user can enter a free programmable coefficient which will add automatically when reading the channels(the so called “offset”). This mode is used when noticed an inaccuracy between the displaied by the device value and the read by other standart device.

	„Offset“ mode Entering in this mode realizes by pressing the button when turning on the supply of the device. While the button is being held on the display shows up “**OFFSEt”.** After releasing the button the regulator turns into a normal work mode.

Setting every single offset happens by the way for setting the assignment for regulating (SP) every channel in normal mode (see IX.1). The setted value is one number more accurate than the read variable. **When redacting the value at first is always 0, i.e. the current displayed value of the channel is taken as basis.**

EXAMPLES OF USER ADJUSTMENTS

1. Reading on the display: 129
2. Entered coeficient: 3.4
3. New reading on the display: 132
4. Entered coeficient: 0.6
5. New reding on the display: 133
6. Entered coeficient: -1.0
7. New reding on the display: 132

	**Caution - the appliance does not bring up the previously entered corrections!** **Changing with extreme caution, incorrectly entered value can cause incorrect operation of the appliance!** **The offset change changes the factory setting without preserving the previous value.** **Offset mode is valid until subsequent power off.**

XI. RECOMMENDATION AGAINST EMI (Electromagnetic Interference)

● Recommendations for use of connecting wires

- Wires that carry a similar type of signals can be packed together, but if the signals are different, the wires must be separated to prevent electromagnetic interaction.

- When there have to be crossed wires with different signal types this must be done at an angle of 90 degrees and a long distance.

– Wires, which carry weak signals and wires connecting the sensors to the controller must not be near contactors, motors, generators, radios and wires, which carry large currents.

● Noise suppression using the built-in in the controller filter

- If the input variable fluctuates and is not stable it is necessary to reduce the filter coefficient **F.** As lower the value, the heavier the filter and slowly change the input parameter.

– If the process variable on the display jumps periodically for short intervals, it is necessary to increase the parameter **t**. When increasing this parameter, the device reacts slower at an unexpected "jump'' in the input, but ignores the short-term interference

WARRANTY CARD

Warranty card №:..

Warranty term:.. months

Factory number:..

The items were purchased from :..

Invoice number:............................../............ 20........ year .

GUARANTEE CONDITIONS

The guaranty consists in free repairs of all the factory defects which can occur during the guarantee period. **The repair is performed as in the repair base is being presented the current guarantee card with which the device is bought.** The warranty does notrefer to issue caused by a bad transport, bad conservation, wrong exploitation, naturedisasters, not following the instructions and the cases when there is an attempt to fix anydefects by other people. In those cases the issue is being fixed only against payment.

The maintenance during the guarantee period and doing the claims happens according to the valid legislation.

PERFORMED REPAIRS IN THE SERVICE

Service	Date of receipt	Order number	Type of repairs done	Date of transmiss ion	Carried out the repair

Seller:.................. **Buyer:.................**

4, Murgash str., Plovdiv city, Bulgaria, 4000

Тел.: (+359 32) 642 519, 640 446 факс: (+359 32) 640 446

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