

**MCK-301-61
CONTROLLER FOR
TEMPERATURE
DEVICE CONTROL**



DATA-SHEET/ USERS MANUAL

1. APPLICATIONS

The MCK-301-61 controller for temperature devices control is designed for:

- indoor temperature monitoring;
- climate devices control according to measurement data;
- alarm signaling with a corresponding indication about user- specified maximum indoor temperature exceeding;
- change of status between main and stand-by air conditioners after user-set time delay has expired;
- switching to an operational air conditioner and signaling about a fault when one of the air conditioners is faulty;
- all temperature devices are cut-out when there is a fire alarm signal;
- the average indoor temperature indication;
- indication of the climate device that is cut-in in the moment.

2. TECHNICAL BRIEF

2.1. Analog inputs: there are 2 inputs for PTC sensors with reinforced electric insulation for temperature monitoring;

2.2. A digital fire alarm input (the decision is made according to «closed/open» state, closed state corresponds to the running order, open state corresponds to the fire alarm signaling);

2.3. Two digital inputs for air conditioner fault sensors (if closed the air conditioner is faulty);

2.4. Main outputs:

- two-way break-before-make relay output for the 1st air conditioner control – 8A 250V at $\cos\phi=1$;

-- a normally open relay output for the 2nd air conditioner control – 8A 250V at $\cos\phi=1$;

-- a normally open relay output for the electric heater control -- 8A 250V at $\cos\phi=1$;

-- an opto-relay output to start the alarm signaling – 100 mA ~AC or =DC;

2.5. Temperature resolution – 0.1°C;

2.6. Nominal supply voltage: one-phase voltage is 240V/ 50Hz or three-phase voltage is 415V/ 50Hz;

2.7. Operating voltage at single-phase power supply: 160V – 330V;

2.8. Power consumption is no more than 5Wt;

2.9. Enclosure: IP40;

2.10 Terminal block enclosure: IP20;

2.11 Operating temperature: from –10 to +55 °C;

2.12. Storage temperature: from –45 to +75 °C;

2.13. Weight is no more than 0.3kg;

2.14. Mounted on the standard 35 mm DIN-rail;

2.15. Mounting position is arbitrary.

2.16. Operating controls and the dimensions of the device are shown on fig.1.

3. PRE-STARTING PROCEDURE

3.1. Connect 1st air conditioner, 2nd air conditioner, electric heater, fire alarm sensor, alarm signaling and temperature sensors according to fig.2.

3.2. Plug-in the MCK-301-61.

3.3. Power ON and set required operation modes according to the table 2.

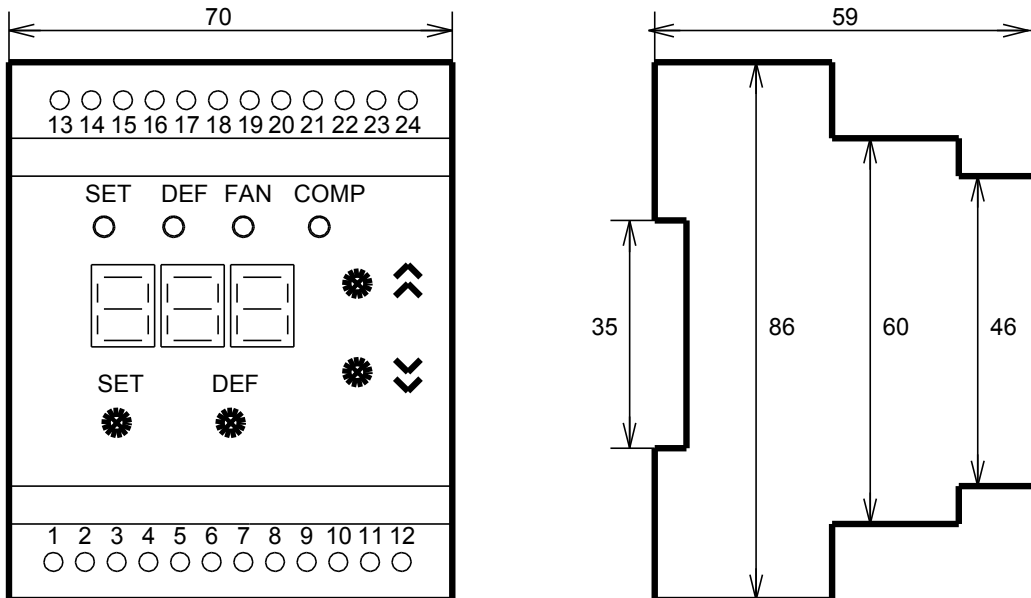
ATTENTION! All connections must be performed on the dead device.

4. THE MCK-301-61 CONTROL

4.1. At the initial state the MCK-301-61 indicator displays the current indoor temperature as the average value of the temperature sensor №1 and the temperature sensor №2. On one of the temperature sensors fault the indicator shows the temperature measured by the serviceable sensor and an error code for the faulty temperature sensor.

The controller is provided with three control levels.

The MCK-301-61 supposes work with one of temperature sensor. In this case, the idle sensor should be switched-off, having installed in menu Cd2=0 (Cd1=0).



LED COMP glows when air conditioner №1 is ON;
 LED FAN glows when air conditioner №2 is ON;
 LED DEF glows when electric heater is ON;

Note - Button -- UP in the text, button - DOWN in the text.

Figure 1 - Front panel, indications and buttons diagram. Dimensions diagram.

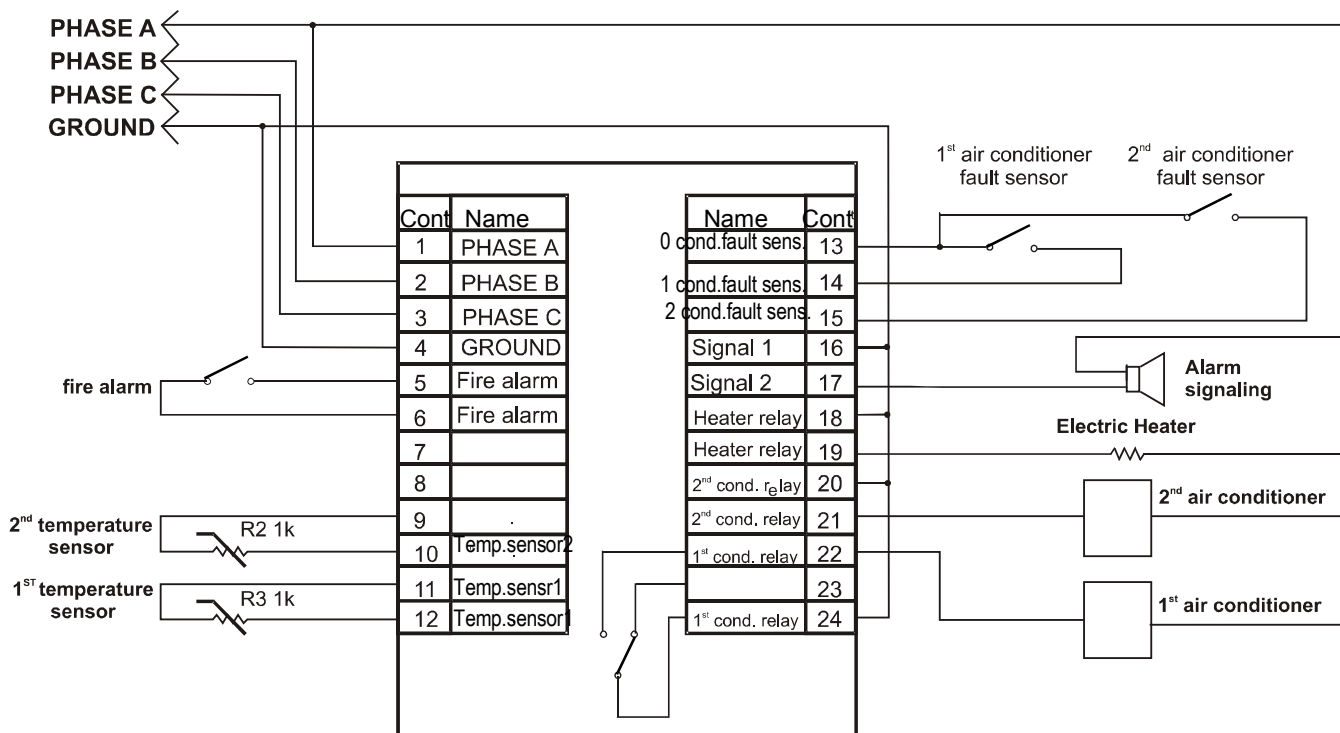


Figure 2 - The MCK-301-61 connections to the three-phase mains supply.

Note 1. For the MCK-301-61 connections to the single-phase mains supply the 1, 2, 3 terminals must be connected in parallel.

Note 2. To elongate the MCK-301-61 service life it's recommended to connect air conditioners to the circuit with the interposition of pilot relays or starters.

Note 3. If only one air conditioner is connected (parameter nCo=1) it must be connected to the MCK-301-61 22 contact.

Note 4. In the air conditioning control mode of operation the electric heater relay is used as the air-conditioning zone control relay

4.2. Keyboard locking level

Only viewing of the following parameters is available on this level:

- 1) temperature setting, SP;
- 2) temperature of the first temperature sensor, tS1;
- 3) temperature of the second temperature sensor, tS2.

To view parameters one needs to press simultaneously the DOWN and the UP buttons, the parameters scrolling is performed by the DOWN and the UP buttons, to access a parameter it's necessary to press the SET button.

When the keyboard is locked any button pressing (except simultaneous the UP and the DOWN buttons pressing) makes to appear the LOC label on the indicator. To unlock the keyboard the SET button is pressed. The «SET» LED lights up, and label «0» is blinking on the indicator. By the UP and DOWN buttons user enters a password digit from 1 to 9 and presses the DEF button. If the password is correct, the keyboard is unlocked. If after the keyboard unlocked no button is pressed during 15 seconds and the lockage setting is not released by user, the keyboard is relocking.

If the label LOC appears on the indicator, perhaps goes to the adjuster level. Press the SET button during 5 seconds (then key pulsing according to 4.4 item).

4.3. User level with keyboard unlocked

This level allows:

- 4) to change and to view the user level parameters;
- 5) to view the adjuster level parameters.

To view and to change the user level parameters one needs to press the SET button, then «SET» LED will glow. Parameters scrolling is performed by the DOWN and UP buttons, to access a parameter one needs to press the SET button, parameters changing is effected by the DOWN and UP buttons, to set the parameter and go back into the MENU one needs to press the DEF button, going back to the menu without parameter setting is effected by the SET button. If no button is pressed during 15seconds the MCK-301-61 goes into the initial state.

4.4. Adjuster level

To access the adjuster level one needs to press and hold down SET button for 5sec. If the level is protected by a password, the label PAS appears on the indicator. Then press the SET button again. The «SET» LED lights up and the label «000» starts blinking on the indicator. Step-by-step enter three digits (from 1 to 9) of the adjuster password, pressing the DEF button after each digit has been entered. If the password is incorrect, the PAS label lights on (S is blinking), and the MCK-301-6 goes back to the initial state in 15 s, otherwise the first parameter of the adjuster menu appears on the indicator.

Parameters scrolling is performed by the DOWN and UP buttons;

to access a parameter one needs to press the SET button;

parameter changing is effected by the DOWN and UP buttons;

to set a parameter and go back into the menu one needs to press the DEF button;

going back to the menu without parameter setting is effected by the SET button.

If no button is pressed during 15 seconds the MCK-301-61 goes into the initial state.

On the adjuster level the access to any user level parameter can be inhibited or permitted by simultaneous the SET and DOWN buttons pressing. If the access is inhibited a point indication appears on the right digital indicator when one is viewing the parameter value.

4.5 For fast return of factory settings is necessary to switch-on the MCK-301-61 and pressure at simultaneously pressed SET, DOWN and UP buttons. On the indicator should lights up "nAU". To switch off a power. Factory settings are restored.

5. THE MCK-301-61 MODES OF OPERATION

5.1. The controller provides the modes of operation as follows:

- connected electric heater thermostat conditions;
- air conditioning zone control thermostat conditions;
- alarm conditions;
- testing conditions.

5.2. Connected electric heater thermostat conditions (rrt=0)

5.2.1. If two air conditioners are connected to the MCK-301-61 and the parameter nCo=2, the air conditioners are working in such mode of operation as «a main air conditioner – a stand-by air conditioner». The ttC parameter specifies the operating time for each air conditioner. After he time has expired the other air conditioner starts working.

5.2.2. Parameters SP (Set Point – check point), t_H (relative value of lower temperature threshold), tC1 (relative value of the first upper temperature threshold), tC2 (relative value of the second upper temperature threshold) specify the indoor temperature conditions.

If the indoor temperature drops below SP-t_H, the electric heater is ON and it will operate until the indoor temperature exceeds Set Point.

If the indoor temperature exceeds the programmable SP+tC1 parameter, the air conditioner that is the main one at the moment will be ON and it will operate until the indoor temperature drops below Set Point.

If the indoor temperature exceeds SP+tC1+tC2, the stand-by air conditioner is ON.

The stand-by air conditioner cut-out moment is specified by the stand-by air conditioner selected conditions. In the 1 conditions (CoC=0) it cuts-out when Set Point temperature is achieved. In the 2 conditions (CoC=1) it cuts-out after SP + tC1 temperature is reached when the programmable time delay Ctt has expired.

EXAMPLE. According to factory settings SP=18, t_H=3, tC1=4, tC2=3:

- lower temperature threshold is SP-t_H=18-3=15 (electric heater ON-temperature is 14, 9 °C);
- the first upper temperature threshold is SP+tC1=18+4=22 (cut-in temperature of the main air conditioner is 22,1 °C);
- the second upper temperature threshold is SP+tC1+tC2=18+4+3=25 (cut-in temperature of stand-by air conditioner is 25,1 °C).

5.3. Air conditioning zone control thermostat conditions

In this mode of operation the air conditioners control complies with 5.2, but the electric heater relay operates as the air conditioning zone control relay. This zone is specified by the lower (LAE parameter) and the upper (HAE parameter) thresholds.

If the room temperature is within air conditioning zone limits (between the lower and the upper thresholds), the relay contacts are closed. If the room temperature is outside the air conditioning zone limits, the relay contacts are open.

5.4. Alarm conditions

5.4.1. If both temperature sensors are faulty both air conditioners are ON, the indicator sequentially shows temperature sensor fault codes, Erd code and alarm will be ON.

5.4.2. In the thermostat conditions the controller performs a room temperature monitoring and is checking whether a room temperature has been outside preset limits (HAL and LAL parameters)

If the indoor temperature exceeds user-preset temperature (HAL parameter) the indicator shows A1 code and the alarm will be ON.

If the indoor temperature drops below user-preset temperature (LAL parameter) the indicator shows A2 code and the alarm will be ON.

To disable premature alarm trippings for temperature tAO and PAO parameters are used. tAO is alarm tripping time delay for temperature (in minutes) and PAO is alarm tripping time delay for temperature after power has been applied (in hours).

When MCK-301-61 setting in mode air conditioning zone control thermostat conditions and if the room temperature is outside the air conditioning zone limits, on the indicator fault code A3 should be lights up.

5.4.3. If air conditioner safe operation control is allowed (dAc=1) the faulty air conditioner is OFF and the stand-by air conditioner is ON. On return the faulty air conditioner to normal operating conditions the MCK-301-61 reverses the air conditioners.

5.4.4. If fire alarm sensor analysis is allowed (dAc=1) the fire alarm cuts-in (the 5, 6 contacts open), all climate devices cut-out and the Fir code is displayed on the indicator.

5.4.5. All fault state codes are displayed on the digital indicator according to the Table 1.

Fault codes

Table 1

Fault signals on the indicator		Alarm signals on the indicator	
Fault in controller	Er1	Temperature is higher than the maximum temperature threshold	A1
Sensor 1 is disconnected	Er2	Temperature is lower than the minimum temperature threshold	A2
Short-circuited sensor 1	Er3	If the room temperature is outside the air conditioning zone limits	A3
Sensor 2 is disconnected	Er4	Fire alarm sensor cuts-in	Fir

Short-circuited sensor 2	Er5	Faulty air conditioner 1	CO1
Both temperature sensors are faulty	Erd	Faulty air conditioner 2	CO2

NOTE - If several faults take place simultaneously the fault codes are displayed on the MCK-301-61 indicator sequentially one after another.

5.4.6. If any of faults referred to above occur the controller triggers alarm system (the 16,17 contacts open).

5.5. Testing conditions

To go to the testing conditions the SET and the DOWN buttons should be pressed for 2 seconds. Then the indicator displays tES code and both compressor relays are energized and the alarm relay is de-energized. The electric heater relay is energized if the MCK-301-6 is in the connected electric heater thermostat conditions. If the MCK-301-61 is in the air conditioning zone control thermostat conditions then the electric heater relay is de-energized. The testing mode of operation is off when 10-sec delay after the buttons were released has expired.

6. PROGRAMMABLE AND USED PARAMETERS

Programmable and used parameters are given in table 2.

Table 2

Settings and read-off parameters	Code parameters	Minim values	Maximum values	Factory setting	Operation
Temperature control Temperature SP	SP	0 °C	35 °C	18 °C	Setting (user-specified room temperature)
Thermostat conditions	rrt	0	1	1	0 – connected electric heater thermostat conditions; 1 -- air conditioning zone control thermostat conditions
Stand-by air conditioner	CoC	0	1	1	0 –standby air conditioner cuts-out when SP temperature has been reached; 1 – standby air conditioner cuts-out when after Ctt time from the moment when (SP + tC1) temperature is reached has expired
Programmable time delay for standby air conditioner cut-out	Ctt	0 min	60 min	15 min	
Lower temperature threshold	t_H	1 °C	20 °C	3 °C	
First upper temperature threshold	tC1	1 °C	20 °C	4 °C	
Second upper temperature threshold	tC2	1 °C	20°C	3 °C	
1 st temperature sensor calibration	CA1	-9.9 °C	9.9°C	0 °C	CA1 scale shift from temperature read by 1 st sensor
2 st temperature sensor calibration	CA2	-9.9 °C	9.9°C	0 °C	CA2 scale shift from temperature read by 2 nd sensor
Upper fault temperature	HAL	LAL+1	45°C	35°C	The maximum temperature. If exceeded the alarm signaling for temperature is ON.
Lower fault temperature	LAL	-10°C	HAL-1	0°C	The minimum temperature. Below this temperature the alarm signaling for temperature is ON.
Lower fault	rLA	0	1	1	0 – forbidden;

Settings and read-off parameters	Code parameters	Minim values	Maximum values	Factory setting	Operation
temperature control					1—permitted
Upper air conditioning zone threshold	HAE	LAE+1	50°C	25°C	
Lower air conditioning zone threshold	LAE	0°C	HAE-1	10°C	
Fault delay for temperature	tAO	0 1	90 min	0 min	
Fault delay for temperature after power up	PAO	0	48 hours	0	
Minimum air conditioner cut-in delay	c01	1 min	15 min	1 min	Air conditioner protection from frequent cuts-in
Minimum air conditioner cut-out delay	c02	1 min	15 min	1 min	Air conditioner protection from frequent cuts-in
Minimum electric heater cut-in delay	n01	1 min	15 min	1 min	Electric heater protection from frequent cuts-in
Minimum electric heater cut-out delay	n02	1 min	15 min	1 min	Electric heater protection from frequent cuts-in
Delay between air conditioner cut-out and electric heater cut-in or between electric heater cut-out and air conditioner cut-in	cnt	0 min	30 min	5 min	Heat oscillatory process prevention
Analysis of air conditioner safe operation sensors status	dAc	0	1	0	0 – air conditioner safe operation sensors are off; 1-- air conditioner safe operation sensors are on.
Fire alarm sensor status analysis	dAF	0	1	0	0 – fire alarm sensor is off; 1 – fire alarm sensor is on.
Number of connected air conditioners	nCo	0	2	2	
Temperature sensor 1 cut-out	Cd1	0	1	1	0 – temperature sensor is off; 1 – temperature sensor is on.
Temperature sensor 2 cut-out	Cd2	0	1	1	0 – temperature sensor is off; 1 – temperature sensor is on.
One air conditioner ON-time.	ttC	24 hours	72 hours	24 hours	
User access code	LOC	0	9	0	0 – keyboard is unlocked 1-9 – user password
Adjuster access code	PAS	000	999	123	000 -- access to adjuster level is allowed; 000-999 – adjuster password.
Temperature sensor type	tPd	0	1	0	0 – NTC, 1 – PTC
Air conditioner fault sensor type	tPC	0	1	1	0 – “no fault” signal: sensor contacts are open; 1 – “no fault” signal: sensor contacts are closed.

Settings and read-off parameters	Code parameters	Minim values	Maximum values	Factory setting	Operation
Controller version	rEL			61	

7. STORAGE AND SHIPPING CONDITIONS

The unit in manufacturer package should be stored in enclosed rooms at -45 to +70 °C and exposed to no more than 80% of relative humidity when there are no fumes in the air that exert a deleterious effect on package and the unit material. The Buyer must provide the protection of the unit against mechanical damages in transit.

8. WARRANTY

Novatek company warrants a trouble-free operation of the MCK-301-61 unit manufactured by it within 36 months from the date of sale, provided:

- the proper installation;
- the safety of the inspection quality control department seal;
- the integrity of the case, no traces of an opening, cracks, spalls etc.

Production date _____

Serial No _____

Quality control department seal _____

Sale date _____

Contacts:

NOVATEK ELECTRO INDIA PVT. LTD.

C-30, Patparganj Industrial Area,

Delhi - 110092, INDIA

Tel: 011 42143253

Fax: 011 43010600

www.novatek-electro.in