

ESCO™



ES-10D
TEMPERATURE CONTROLLER

Version 3.0

USER MANUAL / WARRANTY

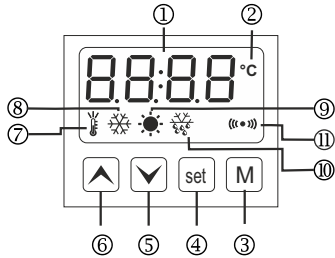
1. SPECIFICATIONS.

Input:	Temperature sensor: NTC 5kΩ by 25°C bistate input (normally opened or normally closed)
Measuring range:	-50...+150°C
Measuring accuracy:	±0,5%
Sampling period:	330 ms
Display resolution:	0,1°C in whole range
Setting resolution:	0,1°C in whole range
Display:	LED, 4 digits, 11mm height with graphic icons
Control form:	ON-OFF with hysteresis
Protection class:	Ip20 / II
Power supply:	230V~ ±15% lub 12V=~/~, max 3VA
Operation conditions:	-5...60°C; 0...85%RH (non-condensing)
Storage conditions:	-40...85°C; 0...85%RH (non-condensing)

2. OBCIĄŻALNOŚĆ WYJŚĆ

Output:	Relay:	Maximum resistive charge (e.g. Heater):	Maximum inductive charge (e.g. Engine):
	30A 250V~ 10 ⁵ cykli	20A, 4500W	8A, 1500W, 2HP(2KM)

3. FRONT PANEL.

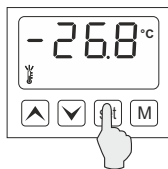


- ① temperature display
- ② temperature unit indicator
- ③ entry to the parameters menu
- ④ temperature setting button
- ⑤ value increasing button
- ⑥ value decreasing button
pressing for more than 5 sec. forces defrosting cycle
- ⑦ temperature setting signalling
- ⑧ cooling output signalling. LIGHTS: output active; BLINKS: output waits for start-up (see: F21)
- ⑨ heating output signalling. LIGHTS: output active; BLINKS: output waits for start-up (see: F21)
- ⑩ defrosting signalling. LIGHTS: automatic defrosting mode; BLINKS: manual defrosting
- ⑪ emergency states signalling. BLINKS: alarm active

4. CONTROLLER HANDLING.

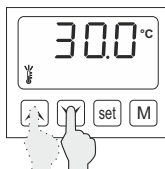
4.1. TEMPERATURE SETTING.

①



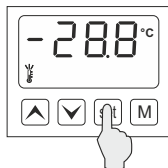
Press **set** button
for 2 seconds
Diode  lights up.

②



Using:  or 
set the desired
temperature.

③



Confirm the set with **set**
Button. 
Diode  goes off.

Remarks:

- press **M** button in any time to cancel the setting
- the setting change can be limited by F13 and F14 parameters

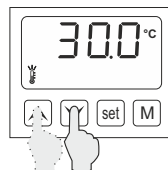
Information:

To improve quick increasing or decreasing the settings values hold the  or  button constantly for at least 1 sec.

4.2. TEMPERATURE SETTING, when the SMART function is active (parameter F84=1)

Smart function allows for rapid temperature change with no need of pushing the SET button.
It is a **very useful** function for users, who often change temperatures.

①



Set the temperature by  or  pointer in any time. Diode  goes off
after 2 sec., and the controller saves the new setting.

Remarks:

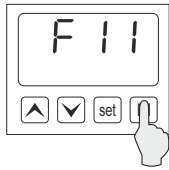
- press **M** in any time to cancel the setting
- the setting change can be limited by F13 and F14 parameters

Information:

To improve quick increasing or decreasing settings values hold  or  button constantly for at least 1 sec.

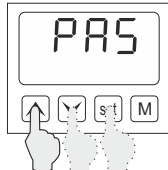
4.3. PARAMETERS PROGRAMMING.

①



Enter the menu pressing **M** button for 5 sec., Until **F11** command displays.

②



If the access to the menu is protected, **PAS** command displays.

Using **↑**, **↓** and **set** buttons enter the password and confirm with **set**

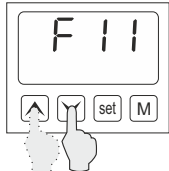
Remarks:

- press **M** button to cancel the parameter setting

Information:

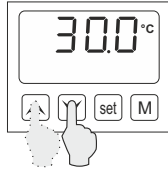
Hold **↑** or **↓** button for at least 1 sec. to improve quick increasing and decreasing of setting values.

③



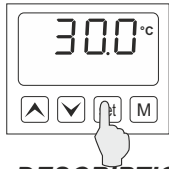
Using **↑** or **↓** button choose the parameter you want to change and enter with **set** key.

④



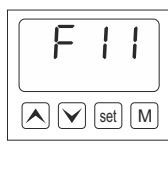
Using **↑** or **↓** button set the desired parameter value.

⑤



Using **set** key confirm the new parameter value and return to the parameter list.

⑥



Finish programming pressing **M** button or enter the "End" command and press the **set** key or wait 30 sec. without pressing any button.

4.3. DESCRIPTION OF THE PARAMETERS.

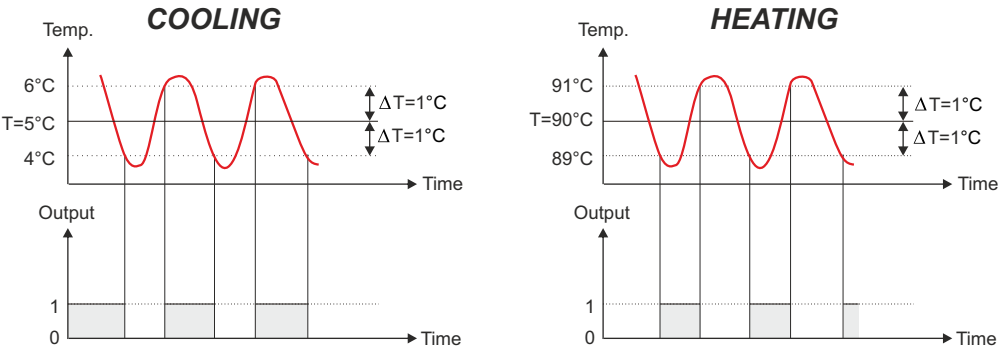
Group:	Code:	Description:	Range:	Default:	Units:
Adjustment:	F11	Temperature setting value. Range of changes is limited by the F14 and F13 parameters.	F14...F13	0.0	°C
	F12	Hysteresis (temperature control accuracy).	0.1...20.0	1.0	°C
	F13	Maximum temperature value possible to set by the user.	-50.0...150.0	150.0	°C
	F14	Minimum temperature value possible to set by the user.	-50.0...150.0	-50.0	°C
	F15	High temperature alarm. F15=OFF – alarm off	-50.0...150.0	OFF	°C
	F16	Low temperature alarm. F16=OFF – alarm off	-50.0...150.0	OFF	°C
	F17	High and low temperature switching delay..	0.1...99.9	15	Minutes
Output:	F19	Temperature sensor calibration. This is the value of rescaling the temperature sensor in relation to actually measured temperature.	-20.0...+20.0	0.0	°C
	F21	Main output minimal down time. It also means the delay time of switching the output on after giving power supply. Parameter protects devices, e.g. engine against too frequent switching in case of power failure. The recommended setting is 3 minutes in cooling system with compressor.	0.0...10.0	0.0	Minutes
	F29	Control output work mode: COOLING/HEATING	COOL/HEAT	HEAT	-
Cooling applications:	F31 - F37	parameters for cooling applications:			
	F31	Interval between defrosting cycles.	0.1...99.9	12.0	Hours
	F33	Maximum defrosting cycle length.	1...99	30	Minutes
	F34	Dripping time of the evaporator after defrosting cycle. It is also the delay time of switching the compressor on after defrosting.	0...99	5	Minutes
	F35	Defrosting cycles control method. OFF - defrosting off, 1 - automatically, from time to time equals to F31, 2 - automatically, if the total time of compressor operation reaches the value equal to F31	OFF, 1, 2	OFF	-
D1 input	F37	Compressor turned on during the defrosting cycle: 0 - NO, 1 - YES	0, 1	0	-
	F50	Digital input D1: 0 - unused; 1 - alarm when short-circuit; 2 - alarm when short-circuit with maintenance of alarm signalling; 3 - alarm when opened; 4 - alarm when opened with maintenance of alarm signalling	0...4	0	-
Others:	F80	Password to access the configuration menu. OFF - password protection inactive. F80 = 0000 - no password	0000...9999	OFF	-
	F82	Display resolution: 0=0,1°C; 1=1°C	0, 1	0	-
	F83	Sound signalling when an alarm: 0 - buzzer muted; 1 - buzzer active	0, 1	1	-
	F84	SMART function: 0 - active; 1 - inactive You can change temperature quickly using the pointers.	0, 1	0	-
	F98	Reserved.	-	-	-
	F99	Controller test. Disconnect output device to make the test! Otherwise the system can crash	-	-	-
	End	Exit the menu.	-	-	-

5. GENERAL DESCRIPTION.

5.1. ADJUSTMENT.

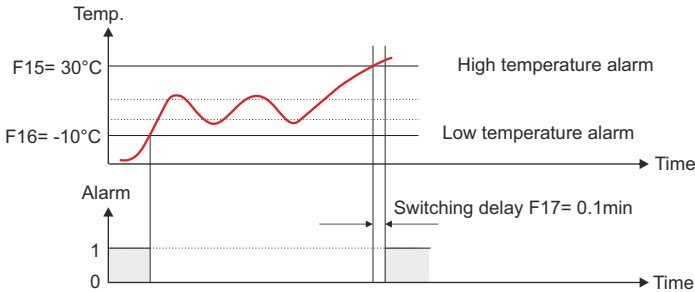
Controller is used to maintain T temperature with desired hysteresis T in cooling or heating devices. Actuator control is in progress by the relay output and the temperature measurement is made by the temperature sensor.

The principle of operation of the temperature control when cooling and heating:



5.2. TEMPERATURE ALARM.

You can set upper and lower alarm threshold in controller parameters (F15 and F16 parameters), after exceeding which the high or low temperature alarm turns on.



The alarm is turned on after the delay time (F17 parameter). Recommended time setting is 15 minutes, so that the alarm does not turn on too often in case of rapid temperature jumps.

The delay can be reduced to the minimum, i.e. 6 seconds (0,1min.), if the temperature does not change abruptly. The alarm is signalled by internal buzzer or commands on the display:

- high temperature alarm **ALH**

- low temperature alarm **ALL**

Buzzer can be muted by pushing any button lub turned off permanently in F83 parameter.

5.3. DIGITAL INPUT.

Controller has digital input D1 for emergency states signalling, for example system failure, pressure control or safety thermostat activation, etc. Input type (normally opened, normally closed) is programmed by F50 parameter. After input activation, the controller turns off the outputs, turns on the beeper and the display indicates AL.d1. code. Emergency state sound signalling can be maintained, until the alarm reset by using the buttons (F50=2 or 4).

5.4. DEFROSTING (for cooling applications).

Defrosting cycle is performed by the stoppage of the compressor. Cycles control is performed automatically and run:

- periodically, from time to time (F35=1)
- according to the total compressor run time (F35=2). (The lower load of the cooling system, the less often defrosting cycles occur).

The end of the defrosting cycle comes after passing F33 time. .

In difficult working conditions, if there is a need of an additional evaporar defrosting, Process can be started manually pressing button for 5 sec. "Defrosting" diode blinks during the manual defrosting cycle.

6. ALARM MESSAGES.

When alarm activates the indicator «» starts blinking and the sound signaller (beep) will be activated (when F83=1). According to the occurence controller turns on/off output and the front panel displays one of the following alarm messages:

Statement	Occurence	Control output operation
ALd1	Bistate input activation	Output inactive
ALt1	Chamber sensor error: OPE - open circuit SHr - short circuit	Output inactive
ALH1	High temperature alarm	No influence
ALLo	Low temperature alarm	No influence

7. INSTALLATION.

Be aware of the conditions where the controller operates. Install in a place, where there is not too high temperature and humidity and no condensation. Should be ventilated in order to remove the heat.

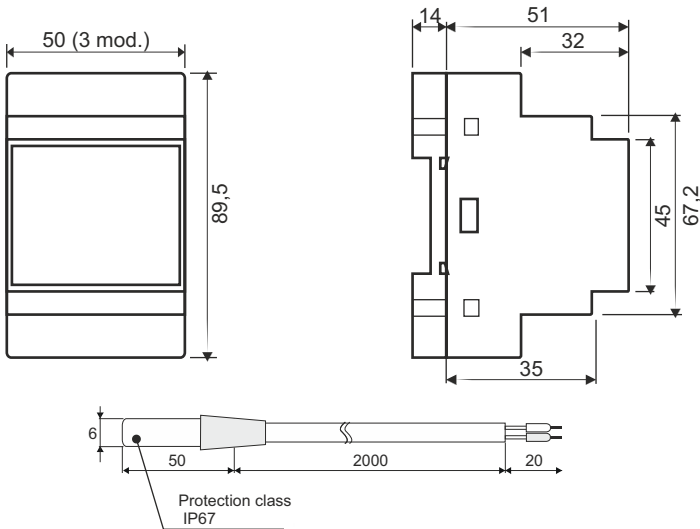
ATTENTION!

It is not allowed to work with electric cables when the device is energized.

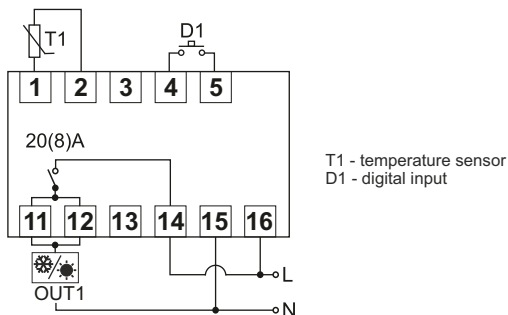
You should avoid crossing wires using short connections. We recommend securing the source of controller power supply and temperature sensor input against electrical interference

8. MOUNTING.

Mounting on a DIN rail (TS35), 50 cm width (3 modules).

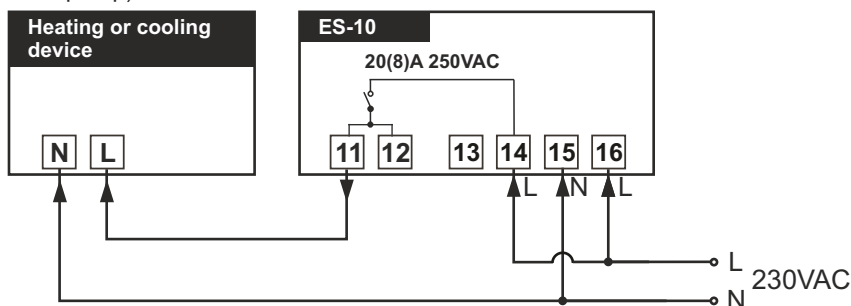


9. WIRING DIAGRAM.



Make sure that the electrical parameters of the device correspond to the parameters of the controller (maximum voltage and current rating).

Connection diagram of the heating device (for example boiler, heater) or cooling device (fan, circulation pump):



10. ADMISSIONS.

Controller meets the requirements for immunity to electromagnetic interference in an industrial environment according to the following standards:

Electromagnetic compatibility (EMC):

- EN-61000 part 6-4 – requirements for emissivity in an industrial environment
- EN-61000 part 6-2 – requirements for immunity in an industrial environment

It also meets the safety requirements according to standard:

- EN-61000 part 1 – safety requirements for electrical devices

Controller meets the requirements of EU directives No. 72/23/EEC; 93/68/EEC; 89/336EEC.