11. WIRING DIAGRAM.

DC-20D

Attention:
If you don't use T2 temperature sensor, cause it is unnecessary in your control system, connect the resistor in place of the T2 sensor (2-3 terminals) and set the parameter F83=1.
Otherwise the controller will signal the sensor failure alarm Alt2.

T1,T2: NTC 5k   D1: digital input
OUT1: 20A-AC1 (8A-AC3) 250VAC
OUT2: 8A-AC1 (2A-AC3) 250VAC
POWER: 230VAC

Make sure that the electrical parameters of the device correspond to the parameters of the controller (maximum voltage, current rating, power). If the power of receiver is bigger than output load-carrying capacity you should use an additional actuactor: contactor and SSR relay.
Connection diagram of the heating device (for example, boiler, heater) and cooling device (fan, circulation pump).
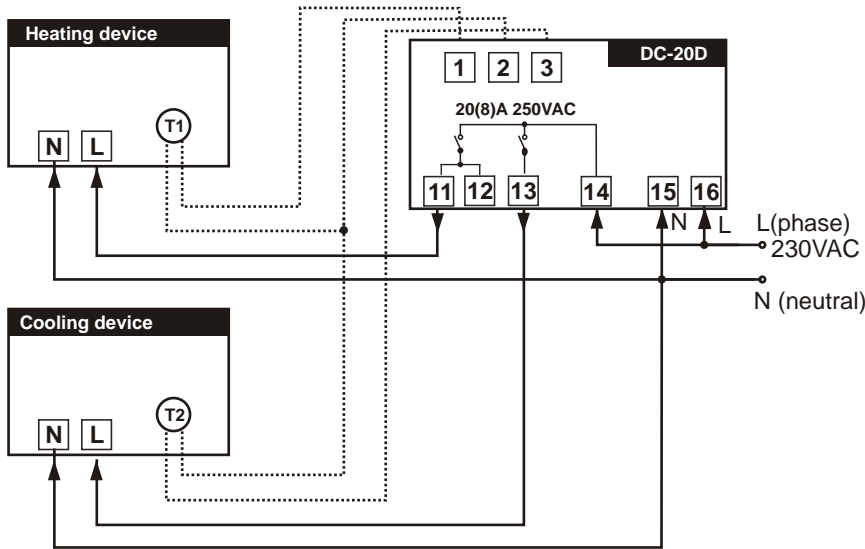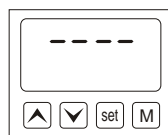

11. FACTORY SETTINGS.

If you forgot you password to the configuration menu or the controller after a power failure or a short circuit displays **memory error** ⬛E01 you can restore default parameter settings:

①
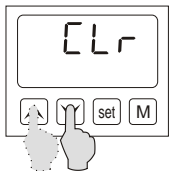
Turn off the controller. Then press buttons ⟨⟩, ⟨⟩ at one time and switch the power supply on while holding the buttons. Command: ⬛CLr Displays.

②

Command disappears after 5 seconds and four horizontal pointers display. Then release the buttons and the controller restores factory settings and goes into normal operation mode.

ESCO™

DC-20D
## DUAL TEMPERATURE CONTROLLER

Version 2.0

USER MANUAL / WARRANTY

1. DESCRIPTION.

DC-20 there are de facto two temperature CONTROLLERS placed in one casing with possibility of optional input-output configuration and connecting both controllers. Device has 2 control input and 2 control output, which can work in HEATING and COOLING mode and the measurement is registered from the T1 or T2 sensor or both sensors at the same time in separate, differential or medium mode. The following block diagram illustrates the structure:
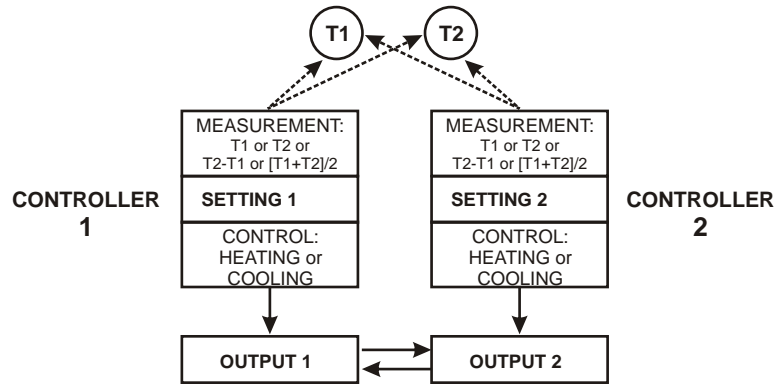
Controller is able to operate both in simple, single or double heating or cooling system as well as in more complicated applicatioms, for example.

Stove with two degrees of heaters

Two independent ovens
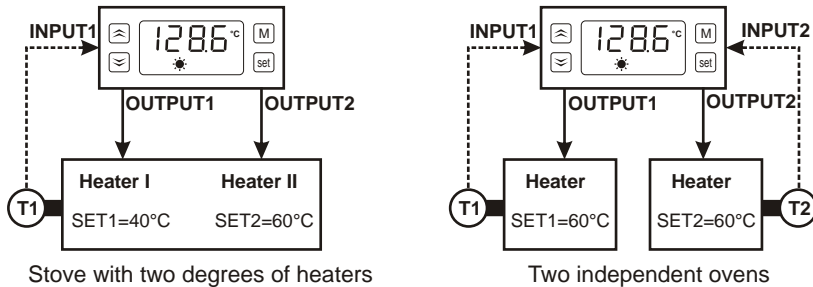
2. SPECIFICATIONS.

Inputs:	2 temperature sensor: NTC 5k Ω by 25°C digital input (normally opened or normally closed)
Measuring range:	-50...+150°C
Measuring accuracy:	±0,5°C
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:	230VAC ±15% or 12VAC/DC or 24AC/DC , max 3VA
Operation conditions:	-5...60°C; 0...85%RH (non-condensing)
Storage conditions:	-40...85°C; 0...85%RH (non-condensing)

7. ALARM MESSAGES.

When alarm activates the indicator ⚠ starts to blink and the sound signaller (beep) activates (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	Output operation
AL.d1	Digital input activation	Outputs active or inactive (see: F53, F54)
AL.t1	Sensor error T1: OPE - open circuit SHr - short circuit	Output inactive
AL.t2	Sensor errorT2: OPE - open circuit SHr - short circuit	Output inactive

8. CONTROLLERS CONNECTION.

It is possible to link 1 and 2 controller in **F52** parameter. This is useful when controllers 1 and 2 control the heating system and one controller acts as collateral. For example, when the 2 controller emergency state alarm occurs, the 1 controller turns on circulating Pump in order to cool down th system or turns off heating device permanently.

| F52	REG1	REG2
0	0	1
1	1	1
2	No connection	
3	0	0
4	1	0

9. 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 by using short connections. We recommend securing the source of controller power supply and temperature sensor input against electrical interference.

10. MOUNTING.

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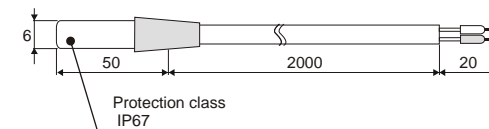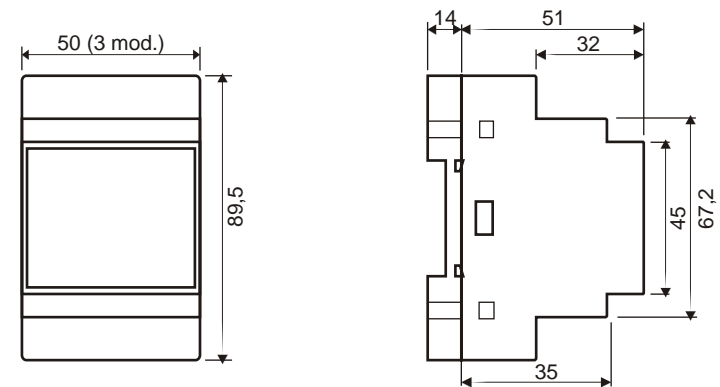
6. GENERAL DESCRIPTION.

6.1. ADJUSTMENT .

DC20 maintains SET1 and/or SET2 subject temperature with accuracy(hysteresis), which can be set in F12 and F22 parameter.
Depending on an application 1 and 2 Controller can work in HEATING or COOLING mode.
After choosing measurement form (F10 and F20 parameters) the controller is able to operate in many variants, for example as a single heating controller with two settings or as two separate heating controller or as a differential controller with an additional alarm threshold at the same time.
The most important parameters and temporal courses.
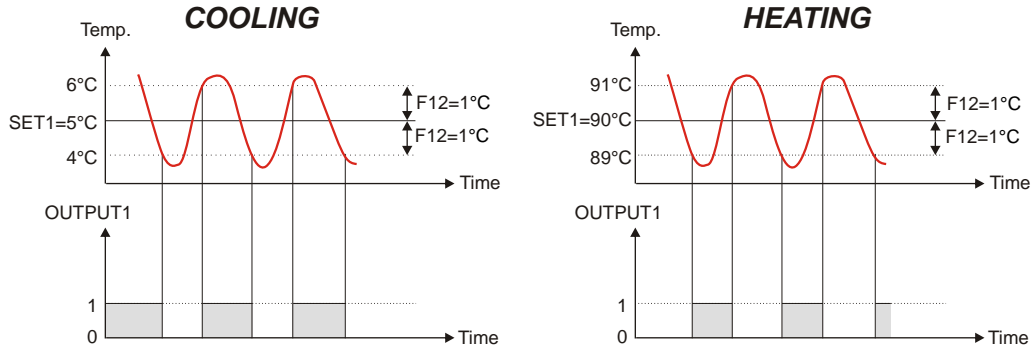
6.2. DIGITAL INPUT.

Controller has D1 digital input, which can be used as an alarm input. Then it can signal emergency states sound signalling, such as system failure, pressure control, safety thermostat STB or safety button activation. Connect additional security system contacts to D1 contacts (4-5 terminals). Contacts type: NO (normally opened) or NC (normally closed) is set in F50 parameter.
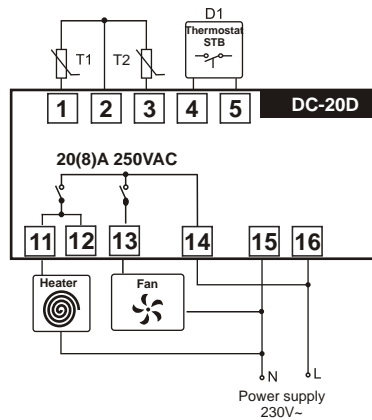

When protection activates, controller switch on/switch off 1 and 2 OUTPUT (F53 and F54 parameters), turns on the sound signal (parameter F53=1) and the display shows AL.d1. code. Failure signalling an be maintained, till the alarm reset using the buttons (set the parameter F50=2 or 4).

3. OUTPUTS CARRYING CAPACITY.

Output:	Relay:	Maximum resistive load (for example. Heater):	Maximum inductive load (for example. engine):
① OUTPUT1	30A 250VAC 10^5 cycles	20A, 4500W	8A, 1500W, 2HP(2KM)
② OUTPUT2	8A 250VAC 10^5 cycles	8A, 1500W	2A, 400W, 0.5HP(0.5KM)

4. FRONT PANEL.

① temperature display

② temperautre sensor number

③ entry to the parameters menu

④ temperature setting button

⑤ value increasing button

⑥ value decreasing button

⑦ temperature setting signalling SET1

⑧ temperature setting signalling SET2

⑨ OUTPUT1 signalling. LIGHTS: output active; BLINKS: output waits for start-up (see: F17)

⑩ OUTPUT2 signalling. LIGHTS: output active; BLINKS: output waits for start-up (see: F27)

⑪ emergency states signalling. BLINKS: alarm active
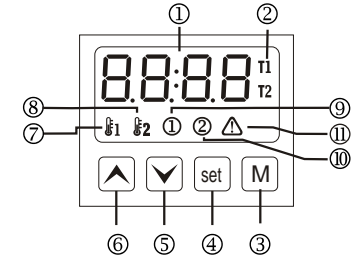
5. CONTROLLER HANDLING.
5.1. TEMPERATURE SETTING.

① Press set button for 2 sec. Diode 1 lights up.

② Using: ⌃ or ⌄ button set the desired temperature value SET1.

③ Confirm the SET 1 by set Button. Diode 2 lights up.

④ Using: ⌃ or ⌄ button set the desired temperature value SET2.

⑤ Confirm the SET2 by set Button. Diode 2 goes off.

Remarks:
–Press M button in any time to cancel the setting
–the setting 1 change can be limited by F13 and F14 parameters
–the setting 2 change can be limited by F23 and F24 parameters

5.2. PARAMETERS PROGRAMMING.

① Enter the menu holding [M] button for 5 sec. Until the first parameter F10 displays.

② If the access to the menu is protected, command: [PAS] displays. Using [∧], [∨] and [set] buttons enter the password and confirm with [set] key.

③ Using: [∧] or [∨] choose the parameter you want to change and enter with [set] key.

④ Using: [∧] or [∨] Set the desired parameter value and confirm with [set] key. Return to the parameters list. To exit the menu press [M] key or wait 30 sec without pressing any button.

Remarks:
- press [M] button to cancel the parameter setting

5.3. DESCRIPTION OF THE PARAMETERS..

Group:	Code:	Description:	Range:	Default:	Units:
Controller 1	F10	CONTROLLER 1 configuration (measurement form): 1 - measurement from T1 temperature sensor 2 - measurement from T2 temperature sensor 3 - differential measurement (measurements difference from temperature sensors T2-T1) 4 - average measurement (measurements average from two sensors [T1+T2]/2)	1...4	1	-
	F11	Temperature setting value SET1. Range of changes is limited by the F14 and F13 parameters.	F14...F13	50.0	°C
	F12	Controller 1 hysteresis (temperature control accuracy).	0.1...20.0	1.0	°C
	F13	Maximum value possible to set by the user.	-50.0...150.0	150.0	°C
	F14	Minimum value possible to set by the user.	-50.0...150.0	-50.0	°C
	F17	OUTPUT1 minimal down time. It also means the delay time of switching the output after giving power supply. Parameter protects devices, for example engine against too frequent switching in case of power failure.	0.0...99.9	0.0	Minutes
	F18	OUTPUT 1 work mode: COOLING/HEATING	COOL/HEAT	HEAT	Minutes
	F19	T1 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
Controller 2	F20	CONTROLLER 2 configuration (measurement form): 1 - measurement from T1 temperature sensor 2 - measurement from T2 temperature sensor 3 - differential measurement (measurements difference from temperature sensors T2-T1) 4 - average measurement (measurements average from two sensors [T1+T2]/2)	1...4	1	-
	F21	Temperature setting value SET1. Range of changes is limited by the F24 and F23 parameters.	F24...F23	0.0	°C
	F22	Controller 2 hysteresis (temperature control accuracy).	0.1...20.0	1.0	°C
	F23	Maximum value possible to set by the user.	-50.0...150.0	150.0	°C
	F24	Minimum value possible to set by the user.	-50.0...150.0	-50.0	°C
	F27	OUTPUT2 minimal down time. It also means the delay time of switching the output after giving power supply. Parameter protects devices, for example engine against too frequent switching in case of power failure.	0.0...99.9	0.0	Minutes
	F28	OUTPUT 2 work mode: COOLING/HEATING	COOL/HEAT	COOL	Minutes
	F29	T1 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
Controllers connections and digital input configuration	F50	Alarm digital input D1: 0 – unused; 1 – alarm when closed; 2 – alarm when closed with maintaince of alarm signalling, 3 – alarm when opened, 4 – alarm when opened with maintance of alarm signalling	0...4	0	-
	F51	Sound signalling: 0 – buzzer muted; 1 – buzzer on, when OUTPUT1 active; 2 – buzzer on, when OUTPUT2 active; 3 - buzzer on, when both OUTPUT active and when D1 input active	0...3	0	-
	F52	Connection method of 1 and 2 CONTROLLER : 0 - OUTPUT 1 off, when OUTPUT 2 on; 1 - OUTPUT 1 on, when OUTPUT 2 on; 2 - no connection, 3 - OUTPUT 1 off, when OUTPUT 2 off, 4 - OUTPUT 1 on, when OUTPUT 2 off	0...2	2	-
	F53	Connection method of OUTPUT1 to digital input D1 : 0 - OUTPUT 1 off, when D1 input activated; 1 - OUTPUT 1 on, when D1 input activated; 2 - no connection	0, 1	0	-
	F54	Connection method of OUTPUT2 to digital input D1 : 0 - OUTPUT 2 off, when D1 input activated; 1 - OUTPUT 2 on, when D1 input activated; 2 - no connection	0, 1	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	Display mode: 0 - measurement from two sensors displayed alternately every 3 seconds; 1 - measurement from T1 temp sensor; 2 - measurement from T2 temp sensor	0...2	0	-
	F98	Reserved.	-	-	-
	F99	Controller test. Disconnect output device to make the test! Otherwise the system can crash.	-	-	-
	End	Exit.	-	-	-