

ELTH352

DIGITAL TEMPERATURE CONTROLLER



OPERATING INSTRUCTIONS

Vr. 03 (ENG) - cod.: ISTR ELTH352 EN-03-05-A

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FOREWORD

This manual contains the information necessary for the product to be installed correctly and also instructions for its maintenance and use; we therefore recommend that the utmost attention is paid to the following instructions.

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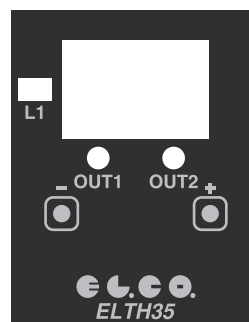
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1 - INSTRUMENT DESCRIPTION

1.1 - GENERAL DESCRIPTION

ELTH352 is a digital temperature controller with ON/OFF control mode. The device envisages 2 outputs that can either be both relay or one relay (OUT1) and one 0-10V(OUT2). It envisages 2 inputs for NTC probes and on request the second input can be 4-20mA. The instrument is equipped with 2 programme keys, a 2-digit display.

1.2 - FRONT PANEL DESCRIPTION



1 - Key “+” : It's used for output 2 set point programming, to see the value of the temperature measured by the NTC 2 probe if required, to see the value of the input signal 4-20mA, if required, (The device shows the value between the parameter "I" and the parameter "J"), for parameters' selection and for changing the value to set.

2 - Key “-” : It's used for output 1 set point programming, for enter the programming and to save the working parameters.

3 - Led L1 : It indicates the negative temperature value.

4 - Led OUT1 : It indicates input in the parameters' modification modality, and more other it indicates output 1 state: on, off. It lights up simultaneously to the flashing display during modification of set-point 1.

5 - Led OUT2 : Indicates the status of output 2: on -off with relay output. It switches on simultaneously with the flashing display during modification of set-point 2 or flashes simultaneously with the display turned on to see the temperature measured by NTC2 if required or to see the value of 4-20 input signal if required. Instead, when the output is at 0-10V it remains on when the range measured is within the limits set on parameters "E" (value to 0V)

and "F" (value to 10V), while it flashes if the detected value falls outside the "E" and "F" set parameters.

2 - PROGRAMMING

2.1 - PROGRAMMING OF THE SET POINT

Press the “ - “ button for setting output 1 set point then release it, the flashing display will visualize the programmed value and “ **out1** ” led will light up simultaneously to indicate that we are programming set point 1.

To modify it, use the button “ + “ to increase or “ - “ to decrease the value .

Press the “ + “ button to programme output 2 set point then release it, the flashing display will visualize the set value and “ **out2** ” led will light up simultaneously to indicate that it's programming set point 2. To modify it, use the button “ + “ to increase or “ - “ to decrease the value .

If the device be equipped with the second NTC probe to be used for the setting of the OUT2 output's set point, proceed as follows: press button “ + “ and the device will show the value measured by the second NTC probe for 3 seconds if during this time the button gets pressed again, the setting of the relative set point as described above will be possible, otherwise the device will resume display of the temperature measured by the NTC 1 probe.

If, the instrument instead of the second NTC probe 2 is equipped of the second input of 4-20mA to be used for the setting of the OUT2 output's set point, proceed as follows: press button “ + “ and the device will show the value of the 4-20mA input for 3 seconds (The device shows the value between the parameter "I" and the parameter "J"), if during this time the button gets pressed again, the setting of the relative set point as described above will be possible, otherwise the device will resume display of the temperature measured by the NTC 1 probe.

These buttons work with one digit steps but if you keep them pressed more than one second the value increases or decreases in a quick way. Exit from the Set mode happens automatically without pressing any button for about 5 seconds, then the display will go back to the normal mode of operation.

The maximum value of set point that we can code, depends if we use instrument's or external probe and on minimum or maximum programmed differential.

Instrument's probe: min.-20°.....max +65°C

External probe: min.-35°....max+98°C

Maximum programmable value=set point + positive differential

Minimum programmable value=set point - negative differential

Example: with 5°C positive differential, the maximum programmable set-point will be of 60°C with probe on instrument and 93°C with external probe.

With 5°C negative differential, the minimum programmable set-point will be of -15°C with probe on instrument and -30°C with external probe. Should the device be equipped with the second input (4-20mA), which will always work at the second output OUT2, the value of the relay OUT2 output's set point will fall between the values set on parameters "I" (input value at 4mA) and "J" (input value at 20mA).

The minimum and maximum settable values of the OUT2 output's set point depends on the values of parameters "I" and "J" and of parameter "L" (4-20mA input offset).

Minimum set point value: set-point - input offset 4-20mA ("L")

Maximum set point value: set-point + input offset 4-20mA ("L")

If the OUT2 output is in the range 0-10V, the setting of the relative set point will not be possible, but output OUT2 will change from 0 to 10V according of the temperature measured by NTC 1 probe or NTC 2 if required, or according to the second 4-20mA input signal and, therefore, according to the values set for parameters "E" (value to 0V) and "F" (value to 10V). With the second 4-20mA input, the values of parameters "E" and "F" will always be in line with parameters "I" (4-20mA minimum value) and "J" (4-20mA maximum value). With the 0-10V output, parameter "L" (4-20mA input offset) will only calibrate the input signal. By pressing the “ + “

button, the value of the 4-20mA input signal will be displayed for 3 seconds(The device shows the value between the parameter "I" and the parameter "J").

2.2 - PARAMETERS PROGRAMMING

To enter the operating parameters of the instrument, we need to press “ + “ and “ - “ buttons simultaneously and to keep them pressed for about 3 seconds, after whom the display will visualize the code which identified the first parameter and with “ + “ button will be possible to select the parameter that we intend to modify.

Once we have selected the wished parameter, press “ - “ button, “ **out1** ” led will light up and the display will visualize parameter code and its programming which could be modified by “ + “ button.

After having programmed the wished value, press “ - “ button : the new value will be saved and the display will show once again the code of the selected parameter and “ **out1** ” led will turn off.

Working on “ + “ button then, it will be possible to select another parameter and modify it as described above.

To exit the programming mode keep “ + “ and “ - “ buttons pressed simultaneously for 3 seconds till to exit the programming mode. During programming of set point (flashing display) it's not possible to enter parameters' setting.

3 - INFORMATION ON INSTALLATION AND USE

3.1 - PERMITTED USE

The instrument CANNOT be used in dangerous environments (flammable or explosive) without adequate protection. The installer must ensure that EMC rules are respected, also after the instrument installation, if necessary using proper filters. Whenever a failure or a malfunction of the device may cause dangerous situations for persons, thing or animals, please remember that the plant has to be equipped with additional devices which will guarantee safety.

3.2 - MECHANICAL MOUNTING

The instrument, in case 1 DIN Modules, is designed for mounting on DIN OMEGA rail.

Avoid placing the instrument in environments with very high humidity levels or dirt that may create condensation or introduction of conductive substances into the instrument.

Ensure adequate ventilation to the instrument and avoid installation in containers that house devices which may overheat or which may cause the instrument to function at a higher temperature than the one permitted and declared.

Connect the instrument as far away as possible from sources of electromagnetic disturbances such as motors, power relays, relays, solenoid valves, etc.

3.3 - ELECTRICAL CONNECTION

Carry out the electrical wiring by connecting only one wire to each terminal, according to the following diagram, checking that the power supply is the same as that indicated on the instrument and that the load current absorption is no higher than the maximum electricity current permitted.

As the instrument is built-in equipment with permanent connection inside housing, it is not equipped with either switches or internal devices to protect against overload of current: the installation will include an overload protection and a two-phase circuit-breaker, placed as near as possible to the instrument, and located in a position that can easily be reached by the user and marked as instrument disconnecting device which interrupts the power supply to the equipment.

It is also recommended that the supply of all the electrical circuits connected to the instrument must be protect properly, using devices (ex. fuses) proportionate to the circulating currents.

It is strongly recommended that cables with proper insulation, according to the working voltages and temperatures, be used.

Furthermore, the input cable of the probe has to be kept separate from line voltage wiring. If the input cable of the probe is screened, it has to be connected to the ground with only one side.

For the power supply it's recommended to use an external transformer TRE, or with equivalent features, and to use only one transformer for each instrument because there is no insulation between supply and input. **For the probe it is recommended to use an isolated NTC.**

We recommend that a check should be made that the parameters are those desired and that the application functions correctly before connecting the outputs to the actuators so as to avoid malfunctioning that may cause irregularities in the plant that could cause damage to people, things or animals.

EL.CO. S.r.l. and its legal representatives do not assume any responsibility for any damage to people, things or animals deriving from violation, wrong or improper use or in any case not in compliance with the instrument's features.

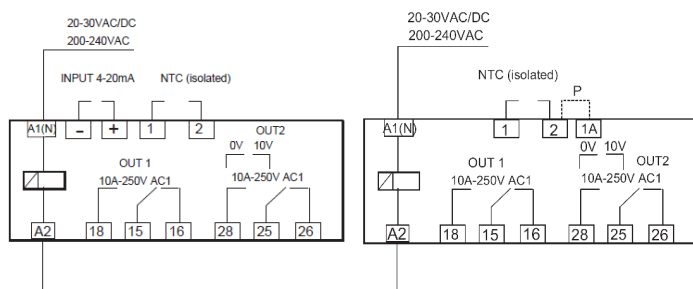
3.4 - ELECTRICAL WIRING DIAGRAM

PS. The neutral must always be connected to terminal A1

With second input 4-20mA

Without second input

4-20mA



The neutral must always be connected to terminal A1.

P (Without second input 4-20mA) :

The ELTH352, without the second input 4-20mA, is factory equipped with an integrated NTC on the thermostat (terminals 1-2) and a bridge between terminals "2" and "1A".

In this configuration the two set points of outputs OUT1 and OUT2 will refer to the temperature measured by the integrated NTC probe. Replacing the bridge between terminals "2" and "1A" with a second NTC probe, output OUT1 will be controlled by the temperature measured at NTC probe 1 (on the thermostat), output OUT2 will be controlled by the temperature measured at NTC probe 2 (terminals "2" and "1A").

P:

Note: With bridge removed and no NTC probe connected between terminals 2 and " 1A", ELTH352 will go in alarm.

4 - FUNCTIONS

4.1 - MEASURING AND VISUALIZATION

The instrument works with 1 or 2 NTC probes (10K 25°C) and on request the second input can be 4-20mA.

In case it is connected only one NTC through "A" par. it's possible to choice whether working with probe on the instrument or with an external probe (**AI** : instrument one— **AE** : external one). If both probes are connected the parameter "A" will be relative to the probe 1 while the probe 2 is in each case as external probe

If during the setting of parameters we switch from external probe "**AE**" to the instrument's one "**AI**", it's necessary to programme the set point once again, seeing that operating temperature range changes depending on the way of using the probe.

The instrument allows the measures's calibration, which can be used to recalibrate the instrument according to application needs, using the parameters "H" and "L".

Should the device have been ordered with the second 4-20mA input, through parameter "I" it will be necessary to set the relevant value in the position of the beginning of scale (4mA) and with parameter "J" the value in the position of full scale (20mA). The 4-20mA analog signal may come from any equipment that would envisage this output, so it could be referred to a temperature, a humidity signal etc.

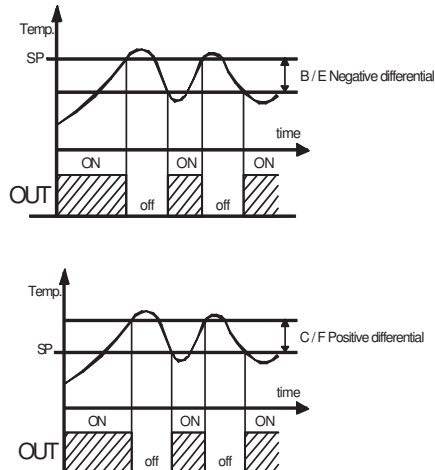
The second 4-20mA input will always and only work in line with output OUT2, while output OUT1 will always work in line with the NTC probe. The device allows calibration of the input signal (4-20mA) measurement according to the application's requirements, by means of parameter "L".

PS. Wait 3 minutes before checking the correct measurement of temperature.

4.2 - TEMPERATURE CONTROL

a) OUT1 and OUT2 relays operation

The regulating mode of instrument is ON/OFF type. It works on OUT1 and OUT2 output depending on probe's measure, on programmed Set Point 1 and Set Point 2 and on negative " B " or positive " C " operating differential for OUT1 and negative " E " or positive " F " for OUT2.



When it occurs an error for short circuit or for interruption of the probe, the device is going to deactivate the output and the display will flash visualizing two dashes " - - ".

Through " **D** " parameter we can regulate operating mode of output 1 relay till reaching the set point: : OFF " **D1** " or ON " **D2** ". Through " **G** " parameter we can regulate operating mode of output 2 relay till reaching the set point: : OFF " **G1** " or ON " **G2** " .

b) Operation with OUT1 relay and OUT2 at 0-10V(NOT ISOLATED)

Only output OUT2 could be at 0-10V, while output OUT1 will always be at relay.

For the operation of output OUT1, please refer to point a) above. Output OUT2 will vary from 0 to 10V according to the measurement of the temperature probe (NTC 1 or NTC 2) or to the second input signal from 4-20mA and of the values set in parameters "E" (value to 0V) and "F" (value to 10V).

Example: if in parameter "E" we set a value of 20°C, and in parameter "F" we set value 60°C, output OUT2 will vary from 0 to 10V in line with the temperature detected of 20°C and 60°C. Led OUT2 will always remain on until the temperature detected falls between the values set for parameters "E" and "F". Should the temperature detected by the probe be lower than the value set in parameter "E", output OUT2 will remain stable at 0V, while LED OUT2 will flash. Should the temperature detected by the probe be higher than the value set in parameter "F", output OUT2 will remain stable at 10V, while LED OUT2 will flash.

Through parameter "G" it will be possible to adjust the operating mode of output 0-10V(G1 = direct 0-10V / G2 = inverse 10-0V).

c) Operation with second 4-20mA input.(NOT ISOLATED)

The second 4-20mA input will always and only work in line with output OUT2, while output OUT1 will always work in line with the NTC 1 probe.

For the operation of output OUT1, please refer to point a) above. For the second 4-20mA input, its value needs to be set through parameter "I" in line with the beginning of scale (4mA) and with parameter "J", its value should be set in the full scale position (20mA). If the OUT2 output is designed as relay the setting of the set point must be carried out within the values set for parameters

"I" and "J". To set the OUT2 output's set point, see 2.1. The mode used to adjust output OUT2 is of the ON/OFF type. Through parameters "E" and "F" the negative and positive differential will be set, while with parameter "G", the operating mode of relay output OUT2 will likewise be set. When the value of the input signal 4-20mA reaches the set value of the OUT2 output's set point, the output itself will change status.

If output OUT2 is designed in the 0-10V range, it will vary in a linear way according to the 4-20mA input. Output OUT2 will vary from 0 to 10V according to the 4-20mA input and to the values set in parameters "E" (value to 0V) and "F" (value to 10V). The minimum value settable in parameter "E" may not, in any case, differ from that set in parameter "I" (4mA beginning of scale value). The maximum value settable in parameter "F" may not, in any case, differ from that set in parameter "J" (20mA full scale value).

Through parameter "G" it will be possible to adjust the operating mode of output 0-10V (G1 = direct 0-10V / G2 = inverse 0-10V).

7	G	Output relay operation (OUT2) G1=OFF / G2=ON	G1 G2	G1	
		Output 0-10V operation (OUT2) G1= 0-10V / G2=10-0V	G1 G2	G1	
8	H	Probe offset NTC 1	-5.....+5°C	0°C	
9	I	Input 4mA minimum value (second Input)	----	0	
10	J	Input 20mA maximum value (Second input)	----	50	
11	L	Probe offset NTC 2 or Input offset 4-20mA	-5.....+5	0	

5 - PROGRAMMABLE PARAMETERS TABLE

Here below is a description of all the parameters available on the instrument.

Par.	Descrizione	Range	Def.	Note
1	A Probe range I : On the instrument E : Outside	-20....+65°C -35....+98°C	I	
2	B negative differential (OUT1)	0 – 9 °C	0°C	
3	C positive differential (OUT1)	0 – 9 °C	0°C	
4	D Output relay operation (OUT1) D1=OFF / D2=ON	D1 D2	D1	
5	E NTC Input	negative differential (OUT2)	0 – 9 °C	0°C
		Temperature value corresponding to 0V (OUT2 0-10V)	NTC Inside -20....+65°C NTC Outside -35....+98°C	+20°C
	4-20mA Input	negative differential (OUT2)	0 – 9 °C	0°C
		Minimum value OUT 2 0-10V corresponding to the minimum value of 4-20mA input (I)	---	0
6	F NTC Input	positive differential (OUT2)	0 – 9 °C	0°C
		Temperature value corresponding to 10V (OUT2 0-10V)	NTC Inside -20....+65°C NTC Outside -35....+98°C	+50°C
	4-20mA Input	positive differential (OUT2)	0 – 9 °C	0°C
		Maximum value OUT 2 0-10V corresponding to the maximum input 4-20mA (J)	---	0

6 - PROBLEMS, MAINTENANCE AND GUARANTEE

6.1 - SIGNALLING

Error Signalling:

Error	Reason	Action
---	The probe may be interrupted or in short circuit, or may measure a value outside the range allowed	Check the correct connection of the probe with the instrument and check the probe works correctly

In probe error status, the outputs OUT1 and OUT2 will be off.

6.2 - CLEANING

We recommend cleaning of the instrument with a slightly wet cloth using water and not abrasive cleaners or solvents which may damage the instrument.

6.3 - GUARANTEE AND REPAIRS

The instrument is under warranty against manufacturing flaws or faulty material, that are found within 12 months from delivery date. The guarantee is limited to repairs or to the replacement of the instrument.

The eventual opening of the housing, the violation of the instrument or the improper use and installation of the product will bring about the immediate withdrawal of the warranty's effects.

In the event of a faulty instrument, either within the period of warranty, or further to its expiry, please contact our sales department to obtain authorisation for sending the instrument to our company.

The faulty product must be shipped to EL.CO. with a detailed description of the faults found, without any fees or charge for EL.CO., except in the event of alternative agreements.

7 - TECHNICAL DATA

7.1 - ELECTRICAL DATA

Power supply: 24 VAC/VDC, 200..240VAC +/- 10%

Frequency AC: 50/60 Hz

Input/s:

1 input for isolated temperature probe NTC (103AT-2, 10KΩ @ 25 °C)

2 input for isolated temperature probe NTC (103AT-2, 10K□ @ 25 °C) or 4-20mA input / impedance 10 K (NOT ISOLATED)

Output/s:

relay output SPDT 10A-AC1 (10A max. current switching), 2A – AC15 25°C

Electrical life for relay outputs: 100.000 op. (AC1 nominal load).

0-10V Output (NOT ISOLATED)

7.2 - MECHANICAL DATA

Housing: Self-extinguishing plastic V0

Dimensions: 2 Din module, depth 64mm

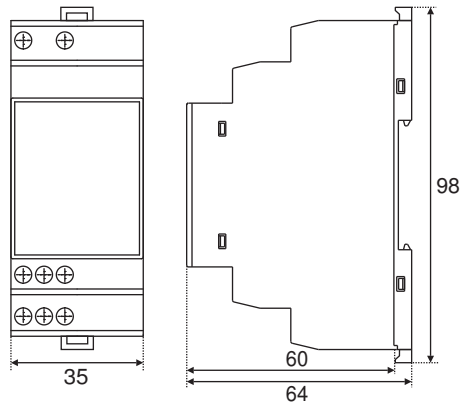
Mounting: Enclosure on DIN OMEGA rail

Connections: 2,5 mm² screw terminals block

Degree of front panel protection : IP 20

Operating temperature: -20 ... +65°C
Operating humidity: 30 ... 95 RH% without condensation
Storage temperature: -30 ... +70°C

7.3 – MECHANICAL DIMENSIONS, PANEL CUT-OUT AND MOUNTING [mm]



7.4 - FUNCTIONAL FEATURES

Temperature Control: ON/OFF mode

Measurement range NTC probe : -20....+65°C probe on the instrument / -35....+99°C outside probe

Display resolution: 1 ° C

Overall accuracy: +/- 0,5 % fs

Sampling rate: 12 samples per second

Display: 2Digit Red h 12 mm

Compliance: ECC directive EMC 89/336 (EN 61326), ECC directive LV 73/23 and 93/68 (EN 61010-1)

7.5 - INSTRUMENT ORDERING CODE

ELTH352 a b c d e

a : POWER SUPPLY

240 = 200..240 VAC

24 = 24 VAC/VDC

b : OUTPUT OUT 1

R = Relay SPDT 8A-AC1

c : OUTPUT OUT 2

2R = Relay SPDT 8A-AC1

V = 0-10V

d : SECOND INPUT

I = 4-20mA

e : SPECIAL VERSIONS