DATASENSOR

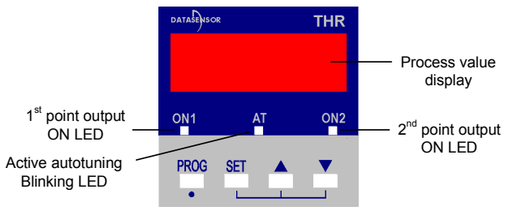
**1/16 DIN MICROPROCESSOR TEMPERATURE CONTROLLER**

# THR SERIES

**- sw release 2.00 -**

# INSTRUCTION MANUAL

## CONTROL PANEL




## TECHNICAL DATA

| | |
|---|---|
| Power supply: | version 10 … 30 Vdc (THR-0x)<br>version 230 Vac ± 10%, 50/60 Hz (THR-1x) |
| Power consumption: | 5VA max. |
| Sensor input: | thermocouples type J, K, E, T, R, S, L; with reference junction compensation; RTD Pt100 Ω/0 °C according to standard DIN43760; with 2 wires connection. |
| Measurement precision *: | RTD ± 0.4% fs, TC ± 0.5% fs, ±1 digit;<br>(tc-R, tc-S ± 1% fs 0 … 200°C)<br>temperature drift 0.02% fs/°C of Tamb. |
| 1st point control action: | automatic direct or reverse, ON/OFF or PID with autotuning. |
| 1st point output: | relay version SPST 250 Vac, 5 A on resistive load; or transistor version with PNP output, 20 mA protected against short circuit. |
| 2nd point control action: | ON/OFF with hysteresis ± 0.2 °C, direct or reverse, dead zone on or off, stand-by option; as alarm or fixed point. |
| 2nd point output: | relay SPST 250 Vac, 5 A on resistive load. |
| Refresh time: | input, output and indications every 500 ms. |
| Data retention: | non volatile memory type EEPROM. |
| Insulation resistance: | 20 MΩ min. with 500 Vdc. |
| Operating temperature: | -10 … +55 °C |
| Storage temperature: | -20 … +65 °C |
| Humidity: | 35 … 85% rH non condensing. |
| Vibration resistance: | 0.35 mm amplitude, 10…55 Hz frequency for every axis (EN60068-2-6) |
| Shock resistance: | 18 ms (approx. 30G) for every axis (EN60068-2-27) |
| Housing: | ABS |
| Mechanical protection: | IP54 front panel, IP20 case and contacts. |
| Connection leads: | screw terminals for cabled up to 2,5 mm². |
| Dimensions: | 1/16 DIN; 48 x 48 x 95 mm. |
| Weight: | 125 g. max. |

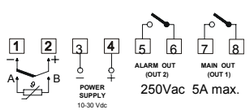
* Radiated, radio-frequency electromagnetic field (see ENV 50140), or conducted disturbances induced by radio-frequency fields (see ENV 50141), can be the cause of process value variations in any case not higher than ± 2 % fs.

## STANDARD CONFIGURATION

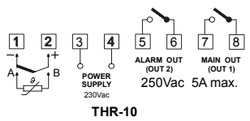
| | |
|---|---|
| Settings: | 1st point.=0 °C; 2nd point.=10 °C. |
| Autotuning: | ATOF = not active. |
| 1 st point action: | automatic Pidd max. action. |
| PID values: | P=20 °C; I=120 sec.; D=30 sec. |
| Cycle time: | 20 s. relay vers.;12 s. transistor vers. |
| Adt function: | Adt0 = not active. |
| 2 st point action.: | AL21 = alarm minimum action. |
| Sensor: | tc-J = thermocouple type J. |
| Scale and unity: | -50 ... +760 °C, without digital filter. |
| Correction: | 0.0 °C. |
| LFA function: | LFA0 = not active. |
| LOCK level: | LOC3 = levels 1 and 2 free, level 3 locked. |

## CONNECTIONS

**RELAY OUTPUT**

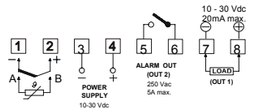



THR-00

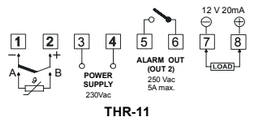



THR-10

**TRANSISTOR OUTPUT**



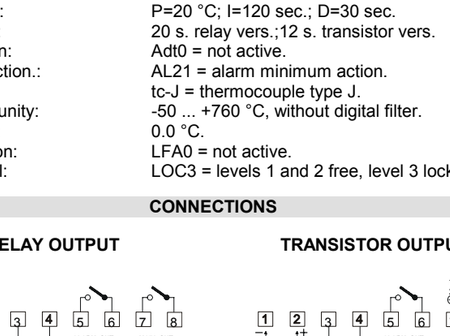

THR-01




THR-11

**Power supply input:**
avoid to supply the temperature controller with loaded lines and avoid installing near electric motors or other sources of electrical disturbance.
**Resistance thermometer input:**
ensure all conductors used to attach the resistance thermometer are alike and with a resistance less than 4 ohm/each.
**Thermocouple input:**
connect the sensor using the correct compensated extension cable for the utilized thermocouple.
**Relay output:**
in case of connected inductive loads, the maximum current permitted through the contacts decreases in relation to the power factor.
**Transistor output:**
when the output is high, LED ON1 lights, the terminals 7 (-) and 8 (+) have a rating of 12 Vdc 20mA (THR-1x) or 10 … 30 Vdc (THR-0x), protected and suitable to drive a Solid State Relay (SSR), recommended in case of high currents or frequent switching.

## DIMENSIONS AND INSTALLATION




Panel cut-out: 45.5 x 45.5 mm.
Panel thickness (suggested): from 1 … 4 mm.

Insert the controller in the panel cut out and mount the fastening spring from the back pushing it to the panel until the dog clutch locks; to remove the fastening spring, unlock the dog clutch using a screwdriver.

**DECLARATION OF CONFORMITY**
We DATASENSOR S.p.A. declare under our sole responsibility that these products are conform to the 89/336 CEE, 73/23 CEE Directives and successive amendments.

**WARRANTY**
DATASENSOR S.p.A. warrants its products to be free from defects.
DATASENSOR S.p.A. will repair or replace, free of charge, any product found to be defective during the warranty period of 36 months from the manufacturing date.
This warranty does not cover damage or liability deriving from the improper application of DATASENSOR products.


DATASENSOR S.p.A. Via Lavino 265
40050 Monte S. Pietro - Bologna - Italy
Tel: +39 051 6765611 Fax: +39 051 6759324
http://www.datasensor.com e-mail: info@datasensor.com



DATASENSOR S.p.A. cares for the environment: 100% recycled paper.
DATASENSOR S.p.A. reserves the right to make modifications and improvements without prior notification.



**826000512 Rev. C**


### VIEWING AND SETTING OF THE 1st SET POINT

**1st configuration level**
To view the set point depress the SET key. To modify the set point act directly on the UP/DOWN keys, the new value is updated automatically when the indication UPDT appears or the SET key is pressed. By keeping the UP and DOWN keys depressed, the value will change at first slowly and then quickly. During the setting operations, the regulation continues with the last stored value. The setting is locked if the option LOC1 is selected.

### VIEWING AND SETTING OF THE 2nd SET POINT

**2nd and 3rd configuration levels (see the diagram on the right)**
To enter the 2nd and 3rd configuration levels, keep the PROG key depressed for more than 2 seconds. To change the values or the selections, use the UP/DOWN keys. To confirm and continue the configuration, depress the PROG key; to confirm and exit, depress the SET key. At the end of each level [End2] or [End3], you can repeat it depressing the PROG key for less than 2 seconds or you can change the level depressing the PROG key for more than 2 seconds. During the program scrolling the regulation continues, but it stops when a modification occurs. The setting exits automatically if no key is depressed within 30 seconds.

**PROGRAMMING NOTES**

A) in case of second point with dead zone, the indication [2 LO] will appear followed by the lower limit value, then [2 HI] followed by the higher limit value; the autotuning selection will appear only in case of PID control action.
B) in case of relay 1st point output, a minimum cycle time of 20 seconds [t 20] is recommended.
C) adaptative function to improve the response to frequent or fast variations of the load, i.e. start and stop process.
D) settings not included in the sensor scale or in the setting limits, are automatically corrected with the nearest threshold limit value.

| CODE alarm | CODE fixed point | 2ND POINT CONTROL ACTION |
|---|---|---|
| AL20 | FP20 | OUTPUT BLOCKED WITH RELAY OFF |
| AL21 | FP21 | MINIMUM ACTION |
| AL22 | FP22 | MAXIMUM ACTION |
| AL23 | FP23 | DEAD ZONE ON |
| AL24 | FP24 | DEAD ZONE OFF |
| AL25 | FP25 | MINIMUM ACTION WITH STAND-BY |
| AL26 | FP26 | MAXIMUM ACTION WITH STAND-BY |
| AL27 | FP27 | DEAD ZONE ON WITH STAND-BY |
| AL28 | FP28 | DEAD ZONE OFF WITH STAND-BY |

In this area the relay contact is closed.
In this area the relay contact is closed when the alarm set-point or fixed point is passed for the second time.

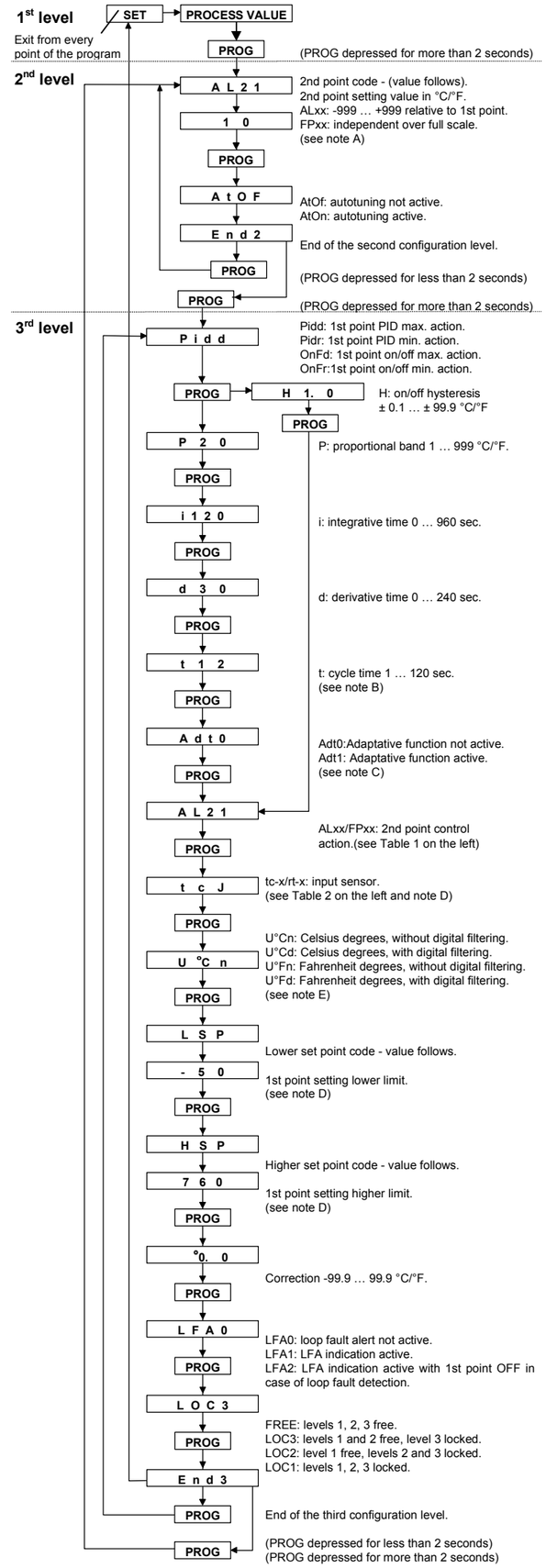
**Table 1**

| CODE | SENSOR | | °C SCALE | °F SCALE |
|---|---|---|---|---|
| r t l | RTD Pt100 ohm/0°C | int. | -150 ... 450 | -200 ... 850 |
| r t d | RTD Pt100 ohm/0°C | dec. | -99.9 ... 450.0 | -99.9 ... 850.0 |
| t c S | TC Pt10%Rh-Pt, | tipo S | 0 ... 1700 | 30 ... 3000 |
| t c r | TC Pt13%Rh-Pt, | tipo R | 0 ... 1700 | 30 ... 3000 |
| t c t | TC Cu-CuNi, | tipo T | 100 ... 400 | -150 ... 750 |
| t c E | TC NiCr-CuNi, | tipo E | 0 ... 600 | 0 ... 1100 |
| t c C | TC NiCr-NiAl, | tipo K | -100 ... 1250 | -150 ... 2300 |
| t c J | TC Fe-Cuni, | tipo J | -50 ... 760 | -50 ... 1400 |
| t c L | TC Fe-Cuni, | tipo L | -50 ... 760 | -50 ... 1400 |

**Table 2**

## ERROR AND MESSAGGES

| | |
|---|---|
| U n F L | Underflow, indication below the sensor range. Short circuit of the sensor RTD PT100. |
| O v F L | Overflow, indication over the sensor range. Breaking of the sensor TC or RTD PT100 or interruption of the connection. |
| 8 8 8 8 | Au...-test, if the message remains fixed the controller must be repaired. |
| F A I L | General failure; the controller must be repaired. |
| L F A 1<br>L F A 2 | LFA: DETECTION OF FAULTS IN THE REGULATION LOOP<br>Loop Fault Alert: with the 1st point output 100% ON state the measured temperature is not changed according ... the control action within the s...red integral time; a fault in the regulation loop is possible: wrong configuration, lack of power or breaking of the heater or the cooler, thermocouple in short circuit or with reversed polarity, etc. ... reset the LFA function, please modify the configuration or the set-point, or switch off and then on again the temperature controller. |

The function LFA is not active in the following cases: with output lower than 100% ON, with integral time at zero, during the au...tuning, in manual position.

NOTE: In case of OvFL, UnFL, 8888, FAIL, LFA2, the first point output is turned off.