



T140-MK2

Portable Temperature Calibrator

User's Manual

Rev 0.2 11-2014
Valid from s/n M46214



INDEX

1 - INTRODUCTION	- 4 -
1.1 - Purpose and summary of instructions	- 4 -
1.2- Warranty	- 4 -
2 - SCOPE OF SUPPLY	- 5 -
2.1 - Name:	- 5 -
2.2 - Technical data:	- 5 -
2.3 - Service (function):	- 6 -
2.4 - Quantity:	- 6 -
2.5 - Constructor:	- 6 -
2.6 - N° of correspondent catalogue sheet:	- 6 -
2.7 - List of first equipment accessories:	- 6 -
3 - GENERAL RECOMMENDATIONS	- 6 -
3.1 - Notes for the probes positioning	- 7 -
4 - SAFETY INSTRUCTIONS	- 9 -
5 - PREPARATION OF OPERATION	- 10 -
5.1 - Installation	- 10 -
5.1.1 - Removal of packaging	- 10 -
5.1.2 - Positioning the calibrator	- 10 -
5.1.3 - Power supply: 100 ÷ 230V	- 10 -
6 - OPERATION PROCEDURE	- 12 -
6.1 - Operation description	- 12 -
6.2 - Description of instrument	- 12 -
6.2.1 - Thermo regulator	- 12 -
6.2.2 - Main switch	- 12 -
6.2.3 - Equalising block	- 12 -
6.2.4 - Temperature sensors	- 12 -
6.2.5 - Fan	- 13 -
6.3 - Start-up instructions	- 13 -
6.4 - Use of the function	- 14 -
6.4.1 - Serial communication	- 15 -
7 - MAINTENANCE INSTRUCTIONS	- 15 -
7.1 - Routine inspections instructions	- 15 -
8 - SEQUENCE OF MAINTENANCE	- 15 -
9 - TYPICAL FAULTS	- 16 -
10 - APPENDICES	- 17 -
10.1 -Thermoregulator	- 17 -
10.2 - Microprocessor regulator: control description	- 22 -
10.3 - Communication Protocol Rs232/C	- 23 -
10.4 - Spare parts list T140M-MK2	- 26 -
10.5 - Declaration of conformity and check report	- 26 -
10.6 - Drawing and wiring diagram	- 26 -



WARNING

Hazardous voltages are present in this electrical equipment during operation. Non-observance of the safety instruction can result in severe personal injury or property damage.

Only qualified personnel should work on or around this equipment after becoming familiar with all warnings, safety notices, and maintenance procedures contained herein.

Only qualified personnel or our personnel should work on this equipment for maintenance operation.

The successful and safe operation of this equipment is dependent on proper handling, operation and maintenance.



Electrical and electronic equipment with this symbol cannot be thrown away in public dump sites. According to the EU directive 2002/96/EC, the European users of electrical and electronic equipment have the opportunity to return to the distributor or manufacturer used equipment purchasing a new equipment. The illegal disposal of electrical and electronic equipment is punished by pecuniary administrative sanction.

SYMBOLS BEING USED IN THIS MANUAL OR ON THE INSTRUMENT



CAUTION: HOT SURFACE OR PART



CAUTION: REFER TO ACCOMPANING DOCUMENTS



CAUTIONS: RISK OF ELECTRIC SHOCK

N.B:

In this manual: where not specified, the numbers in parentheses make reference to the annexed drawing.

1 - INTRODUCTION

1.1 - Purpose and summary of instructions

This manual contains the use and maintenance instructions valid for the following equipment:

Portable Temperature Calibrator models: **T140M-MK2**

The instructions reported in this manual, for the above-mentioned equipment, are those relevant to:

- Start-up preparation
- Operation description
- Using of the equipment
- Re-calibration procedure
- Preventive maintenance
- Typical faults and their remedies

Users must observe all the usual safety rules out in this manual for own security and to avoid equipment failure.

1.2 WARRANTY (Limited Warranty and limitation of liability)

This product is free from defects in material and workmanship for 1 year from the date of purchase. This warranty does not cover fuses, damage from accident, misuse or abnormal conditions of operation or operation. Resellers/Distributors are not authorized to extend any other warranty on our behalf.

To obtain service during the warranty period, please contact EiUK at the number above with a description of the problem to obtain an MRA number.

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. EiUK (Eurotron Instruments UK ltd) IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY.

2 - SCOPE OF SUPPLY

2.1 - Name:

Portable Temperature Calibrator **T140M-MK2** complete of accessories as listed (reference to paragraph 2.7).

2.2 - Technical data:

Environmental range: temperature $+5 \div +45^{\circ}\text{C}$, R.H. max. 95%., pollution degree 2

- Operative range : $-24 \div +140^{\circ}\text{C}$ with ambient temperature of 22°C
- Stability : $\pm 0,1^{\circ}\text{C}$ full range
- Display resolution : $0,1^{\circ}\text{C}$
- Reading accuracy : $\pm 0,25^{\circ}\text{C} \pm 1$ digit at 100°C .
- Probe : Pt100
- Maximum ascent rate : 20 minutes from ambient to 120°C (included stabilization)
- Maximum descent rate : 17minutes from ambient to -20°C (included stabilization)
- Axial uniformity at 40mm : $\pm 0,05^{\circ}\text{C}$ a -20°C , $\pm 0,04^{\circ}\text{C}$ a 0°C , $\pm 0,1^{\circ}\text{C}$ a 100°C
- Axial uniformity at 60mm : $\pm 0,15^{\circ}\text{C}$ a -20°C , $\pm 0,08^{\circ}\text{C}$ a 0°C , $\pm 0,2^{\circ}\text{C}$ a 100°C
- Well- to-well uniformity at 40mm : $\pm 0,02^{\circ}\text{C}$ a -20°C , $\pm 0,02^{\circ}\text{C}$ a 0°C , $\pm 0,05^{\circ}\text{C}$ a 100°C
- Test well : version -1H: 1 hole $\varnothing 19 \times 104\text{mm}$ for the inserts
Version -2H: 2 holes $\varnothing 13 \times 104\text{mm}$ for the inserts
- Thermostat test : 5 Vdc.
- Power supply : $100 \div 240\text{V}$ 50/60Hz
- Power : 80 W
- Size : $130 \times 280 \times 260(\text{h})\text{mm}$
- Package size : $415 \times 570 \times 235\text{mm}$
- Weight of calibrator : 4,9 Kg.
- Weight with package : 11kg
- Structure in flanged plate with handle
- Microprocessor operated temperature regulator.
- Switch test.
- Electronic control components thermally insulated.
- Forced air-cooling system.
- Removable upper protection grid.
- Total absence of environmentally harmful cooling liquids.
- Socket with main cable and protection fuses.
- Electromagnetic compatibility: suitable for use in domestic residence, laboratory and industrial environments.

* Models: T140M-MK2

NOTE: The data has been recorded at an ambient temperature of $20^{\circ}\text{C} \pm 3$, power supply $110 \div 240\text{V} \pm 10\%$ with a Pt100 $\varnothing 3\text{mm}$.
The technical dates are valid one year after the emission of the test report; after this period proceed to calibration of the oven.

2.3 - Service (function):

The portable temperature calibrators **T140M-MK2** have been designed for:

- Control and calibration of temperature sensors, in the laboratory, on board and in the field, in conformity with ISO 9000 standard.
- Automatic calibration of thermostats with a simple function.
- Thermal test on materials.

The calibrator has been designed to reduce the EMC effect in accordance with the harmonised regulation for residential, commercial, light industry and heavy industry.

2.4 - Quantity:

1 piece.

2.5 - Constructor:

Eurotron Instruments(UK)ltd
Unit 18 Austin Way
Royal Oak Industrial Estate
NN11 8QY
Daventry – United Kingdom
Tel + 44 (0) 1327 871044
Email: sales@eurotron-uk.com

2.6 - N° of correspondent catalogue sheet:

TMSER-

2.7 - List of first equipment accessories:

- Standard equipment
 - * calibrator
 - * Electric power cable
 - * Tweezers for removing inserts
 - * Fuse kit
 - * Thermostat testing connection cables
 - * Instructions manual
 - * Calibration Certificate
 - * INS-A and INS B

T140M-INS-A	Insert with 4 holes (6.4,4.8,6.4, 3.3)
T140M-INS-B	Blank Insert
TMSER-CASE-03	Vynal Case
TMSER-CASE-01	Robust Transit case, IP65

3 - GENERAL RECOMMENDATIONS

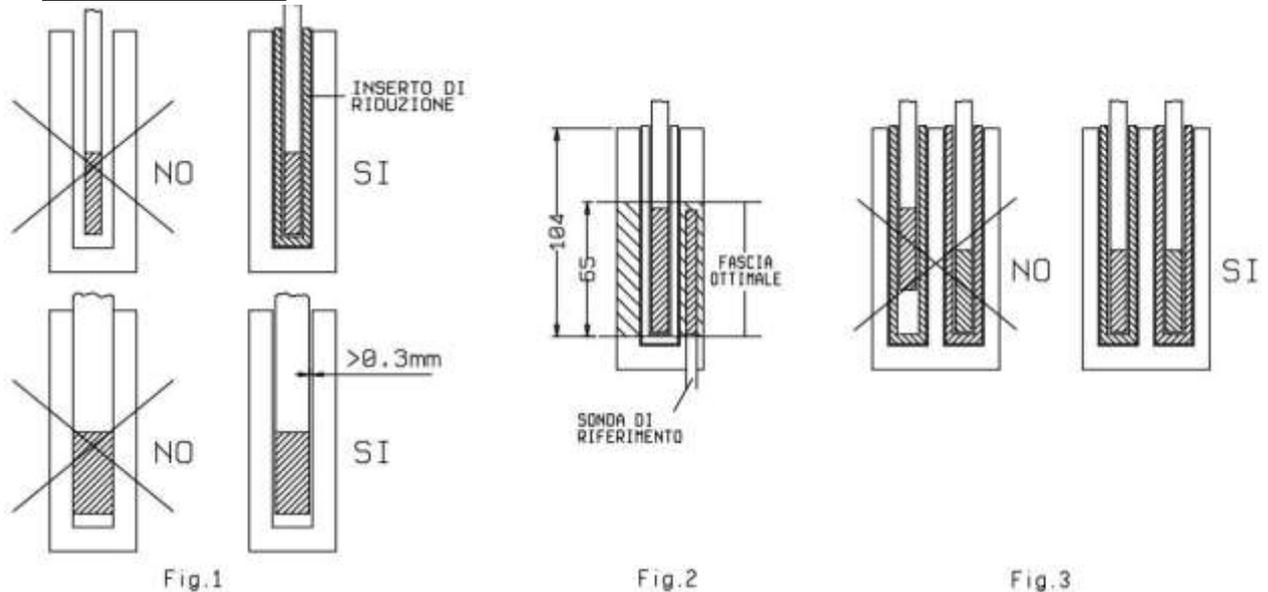
➔ **ATTENTION**

The configuration states of the instrument is protected by two codes factory settings. For any access or modification to the configuration states follow the instructions on chapter 10. Don't change these parameters to avoid malfunction or breaking of the calibrator with risks of serious personal injury.

3.1 - Notes for the probes positioning

To obtain the best result, follow the advises:

- Measure the diameter of the probe being checked.
- The diameter of the hole in the calibration block must be higher of 0,3 mm than the diameter of the probe.
- If this is not possible, use the reduction wells with the above-mentioned tolerance (fig.1).
- Avoid using holes which are too accurate and do not force the probes into the block.
- Put the probe or the insert in the block only at ambient temperature; for reduction insert using the tweezers.
- Insert the probe up to the bottom of the block: the sensitive element is in the optimal calibration zone (fig. 2).
- Calibration with a reference: take care to position the two probes, the standard one and the calibration one, at the same dept and as close together as possible (fig. 3).
- Always verify the range of the probes to be calibrated before using; the maximum temperature of the probes should be higher than the temperature of the block otherwise the probe could break.



- Advises:

- The time the probes takes to reach the Set point is much higher as the difference in diameter from the probes and the holes is bigger.
- Do not insert the probe when the instrument has already reached the set temperature; thermal shock causes instability and breakage of the sensitive element.
- For the calibration of temperature transducer with special execution, call our technical office and ask for equaliser block with special drillings.

**REMEMBER TO SET UP AMBIENT TEMPERATURE AND LEAVE COOLING DOWN
BEFORE SWITCHING OFF THE CALIBRATOR**

4 - SAFETY INSTRUCTIONS



WARNING:

- Due to the fact that the calibrator is a portable instrument to be used in the field, it is very important to ensure that the socket has been earthen correctly when connecting it to the electricity supply.
- The calibrator must be switched off and cooled to a low temperature before any attempt to service the instrument is made.
- Never connect the switch test connection (4) and the RS232 (11) input to a voltage source.
- Do not connect any voltage during the test of the thermostats.
- Remove the fuse (3) from the calibrator only when the power cable has been disconnected.



- The calibrator is designed for interior use only, may not be used where gas or vapour may constitute an explosive hazard
- Keep clear the area around the calibrator on all sides and especially behind the calibrator
- After using, you must ensure that calibrator has cooled to a temperature below 50°C before switching off and placing it in the carrying case. Do not switch off the calibrator when it works at high temperature because the protection grid and the carpentry may overheat.



- During the use of the calibrator, do not touch the upper grid, the insertion tubes and the sensors because they may be very hot.
 - Never use oils or liquids in the well in order to avoid any damage to the calibrator.
 - Don't change absolutely the configuration parameters.
 - Don't put anything on the top of the calibrator.
 - Don't put fuel object near the calibrator.
- Use common sense any time.

The equipment adopt the following devices to protect operation from hazard:

- Thermo regulator that recognizes an eventual break of the temperature sensor (9) and disconnect the heating.
- Protection grid to avoid any contact with the internal oven.
- Protection fuses (3)
- Ground connector.

5 - PREPARATION OF OPERATION



- Remove the calibrator from the packaging and place it on a flat surface.
- Make sure that the instrument has been correctly earthen.
- Supply the oven with line 100-240V, 50/60Hz (2,5A) + earth,
- Before start, the calibration read with attention the instruction manual, specially the paragraph 3: - General recommendation -.

5.1 - Installation

5.1.1 - Removal of packaging

The calibrator is equipped with packaging suitable for transport and traditional shipping systems. Any damage caused during transport must be notified immediately to the carrier and a claim must be made.

5.1.2 - Positioning the calibrator

Position the calibrator in vertical position on a safe clean place; leave enough space around the calibrator to allow the air to circulate into the well.

****DANGER:** The calibrator is suitable for operating at high temperatures with the consequent danger of fire. Keep it away from any type of inflammable materials and never put any type of liquid inside the block (reference to paragraph 4).

*** WARNING:** To avoid any smell in the room it is better to switch on the calibrator outside the room for the first time

5.1.3 - Power supply: 100 ÷ 230V



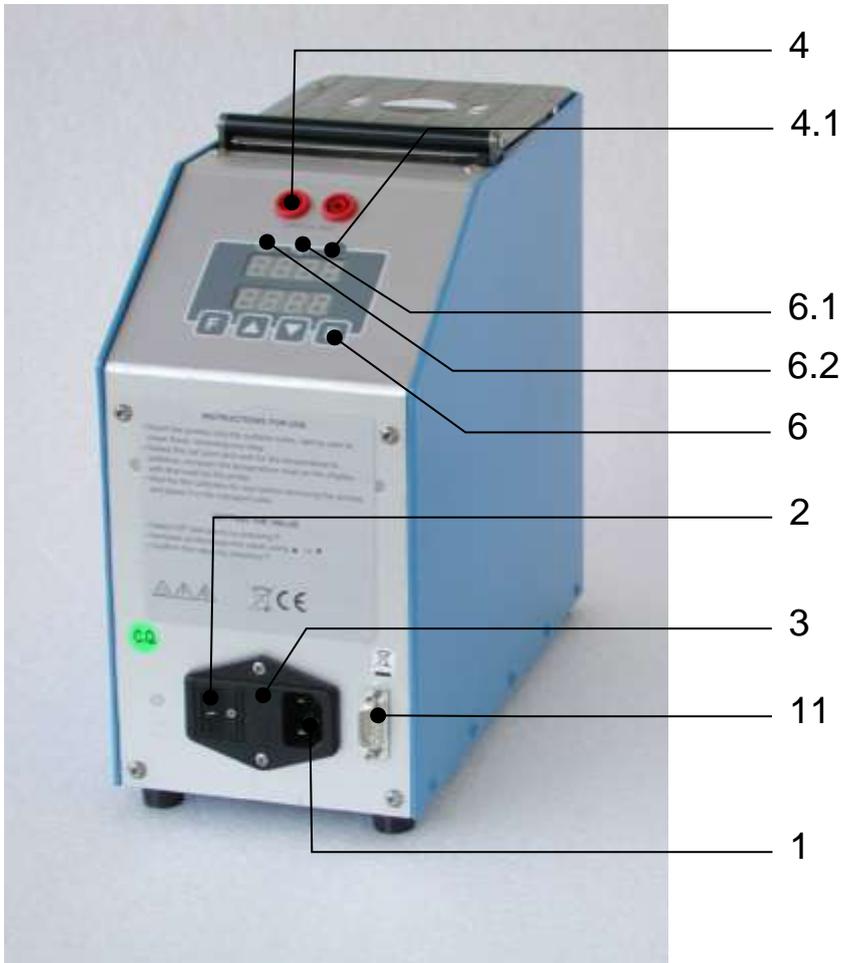
The calibrator runs on a voltage from 100 to 240 Vac, 50/60Hz.

A 2.5mt. cable is supplied with the calibrator fitted with two conductors plus earth (1mm²).

Make sure that the plant is earthen correctly before switching the instrument on.

Select the insert with the correct diameter (ref to item 3)

The calibrator is now ready for use.



COMMAND LIST

POS.	DESCRIZIONE
1	SUPPLY SOCKET
2	MAIN SWITCH
3	PROTECTION FUSES
4	SWITCH TEST CONNECTIONS
4.1	SWITCH TEST ON/OFF LIGHT
6	THERMOREGULATOR
6.1	COOLING LIGHT
6.2	HEATING LIGHT
11	RS232 INPUT

6 - OPERATION PROCEDURE

6.1 - Operation description

The **T140M-MK2** calibrator consist of a metal dry well with one hole of \varnothing 19x104 mm into which, the inserts available for almost any sensor size to be calibrated, are inserted.

The Thermo electric devices heat the block and an electronic μ controller with static relay output checks and regulates the temperature.

A fan mounted in the central side generates a constant airflow that reduces the temperature of the case.

6.2 - Description of instrument

6.2.1 - Thermo regulator

The thermo regulator (6) is a PID microprocessor, which can be set from -30 to 140°C. The display indicates the temperature and the Set point (ref to item 10.1).

- DISPLAY: indication of the temperature measured inside the block, set point selected and setting parameters.
- \blacktriangle \blacktriangledown KEY: used to increment (decrement) any numerical parameter. The increment (decrement) speed is proportional to the time the key remains depressed.
- F KEY: allow access to the various parameters of the menu levels.
- E KEY: allow to confirm the Set point or the parameter value.

6.2.2 - Main switch

The main switch (2) is on the rear of the instrument; it is fitted with a socket for the voltage cable, a main switch and one fuse as for the following table:

MODELS	V100-230
T140M-MK2	2,5A

Note: use only fuses F. 5x20mm. All the electrical part is found below the main switch.

6.2.3 - Equalising block

The metal equalising block has a hole or two holes where introduce the inserts far almost any sensor size.

The function of this block is to make uniform the temperature on calibration zone.

If you want to fit the calibrator with an insert with different holes we recommend to read the item 3, this will avoid any unfortunate problems, which might arise if the wrong tolerances are used

6.2.4 - Temperature sensors

The temperature sensor used for the reading and thermoregulation is inserted directly into the equalising block so as to display the real temperature value

6.2.5 – Fan

Inside the calibrator there is a fan: the purpose of the fan is to cool the Heating/cooling unit with the Peltier devices.

Pay attention: every hole at the bottom and at the back of T140M-MK2 must be kept free in order to let the air flow properly.

6.3 - Start-up instructions

ATTENTION:

- The calibrator can only be used correctly if the user has a good knowledge of its basics.
- Before starting with the calibration following the installation procedures, read the instruction on item 3,4 & 5.

To calibrate a probe it is possible to follow two ways: calibration with internal indicator (6), or calibration with external reference.

A) Calibration with the internal indicator:

Make reference to the temperature value of the display (6).

It is opportune to refer the value to the test report to compensate the error of the display.

B) Calibration with external reference:

Make reference to the temperature value of the external standard instrument.

Put the two sensitive elements of the probes near and at the same dept (reference to fig. 1-2-3).



Before any calibration, follow the general recommendation:

- Switch on the calibration with the main switch (2); waiting for the end of self-test procedure; the display 2 indicate **Stby**; press one key to access the Set point.
- Put the probe to check into the equaliser block: reference to chapter 3. (Fig. 1-2-3).
- Set the required temperature value on the thermo regulator (reference to paragraph 10.1):
 - ◊ Press the **▲** or **▼** key to select the required Set point value.
 - ◊ Press the **E** key to confirm
- Wait for the stability of the temperature before starting any calibration (the flashing of the STABILITY LED on the right of the first display means that the calibrator internal temperature is stable).
- For a new calibration point, regulate the set point at the new temperature and wait for the stabilisation.

We suggest to insert a standard probe in the calibrator and compare the measure with the values indicated. It is possible to calibrate the instrument to more significant points, comparing the displayed temperature with the values of the standard probe.

ATTENTION



- At the end of the calibration DO NOT remove the probe if it is still at high temperature. Always allow the calibrator to cool down with the probes still inserted in order to avoid thermal shock to the probes itself and harm to people or things.
- Before returning the calibrator to its case make sure that the temperature of the block is almost the same as ambient temperature.

6.4 - Use of the function

- Switch test

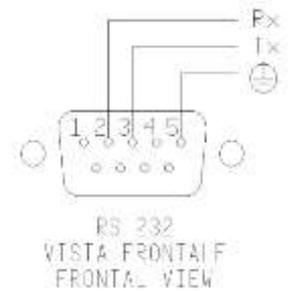
With the 'SWITCH TEST' function it is possible to control the Open and Close temperature of the thermostats (refer to item 10.1):

- Insert the sensor of the thermostat in the most suitable hole of the calibrator (refer to notes in paragraph 3).
- Connect the thermostat to the Switch Test input (4).
- Turn the equipment ON and press the key **▼ ▲** to enter the Set point that correspond to T. min.(item 6.3)
- Press **E** to confirm the value.
- Press **F** to select the function "Set 2" and press the key **▼ ▲** to enter T. Max.
- Press **E** to confirm the value.
- The thermostat switch temperature is expected to be found within T.min e T.max.
- Press **F** to select the function "**Grd**" (degree for minutes) and press the key **▼ ▲** to enter the heating slope rate value. Low values are preferable for a more accurate test.
- Press **E** to confirm the value.
- The Switch test led (4.1) will indicate the status of the switch: led ON when the switch is closed, led off when the switch is open.
- Press **F** to select the function "**run**" and press the key **▼ ▲** to enter "**run**" ON to activate the process.
- The led of the function will flash to indicate that the process is active.(item 10.1)
- The thermostat's release values are recorded in the parameters **SON** and **SOFF**. Refer to the procedure explained in paragraph 10.1.

- To stop the switch test enter “run” OFF

6.4.1 - Serial communication

On the front of the calibrator there is a 9 pole socket (11) connected to the thermo-regulator, which enables the calibrator to be completely controlled by a PC (reference to figure) by the RS-232 input.



The external PC must be conform to the IEC950 standard.

Fig.8

7 - MAINTENANCE INSTRUCTIONS

7.1 - Routine inspections instructions

- Switch off the calibrator before any maintenance operations.
- Check once a year the calibration date. Frequency of calibration is depending to the use of instrument; however, we suggest to calibrate the instrument every year.
- Check that the holes and the inserts of the calibrator are cleaned, any liquid or oil inside the well could make oxides or verdigris on the insert during the use at high temperature in this case the insert may become stuck.
- Before cleaning the calibrator, the well and the insert remember to switch off the calibrator.
- Clean the calibrator only when it is cold.
- Clean the calibrator with damp cloth and a little soap, never use solvents.
- Pay attention that the liquid may penetrate the calibrator and cause damage or create poisonous fumes.

8 - SEQUENCE OF MAINTENANCE

Not applicable

9 - TYPICAL FAULTS

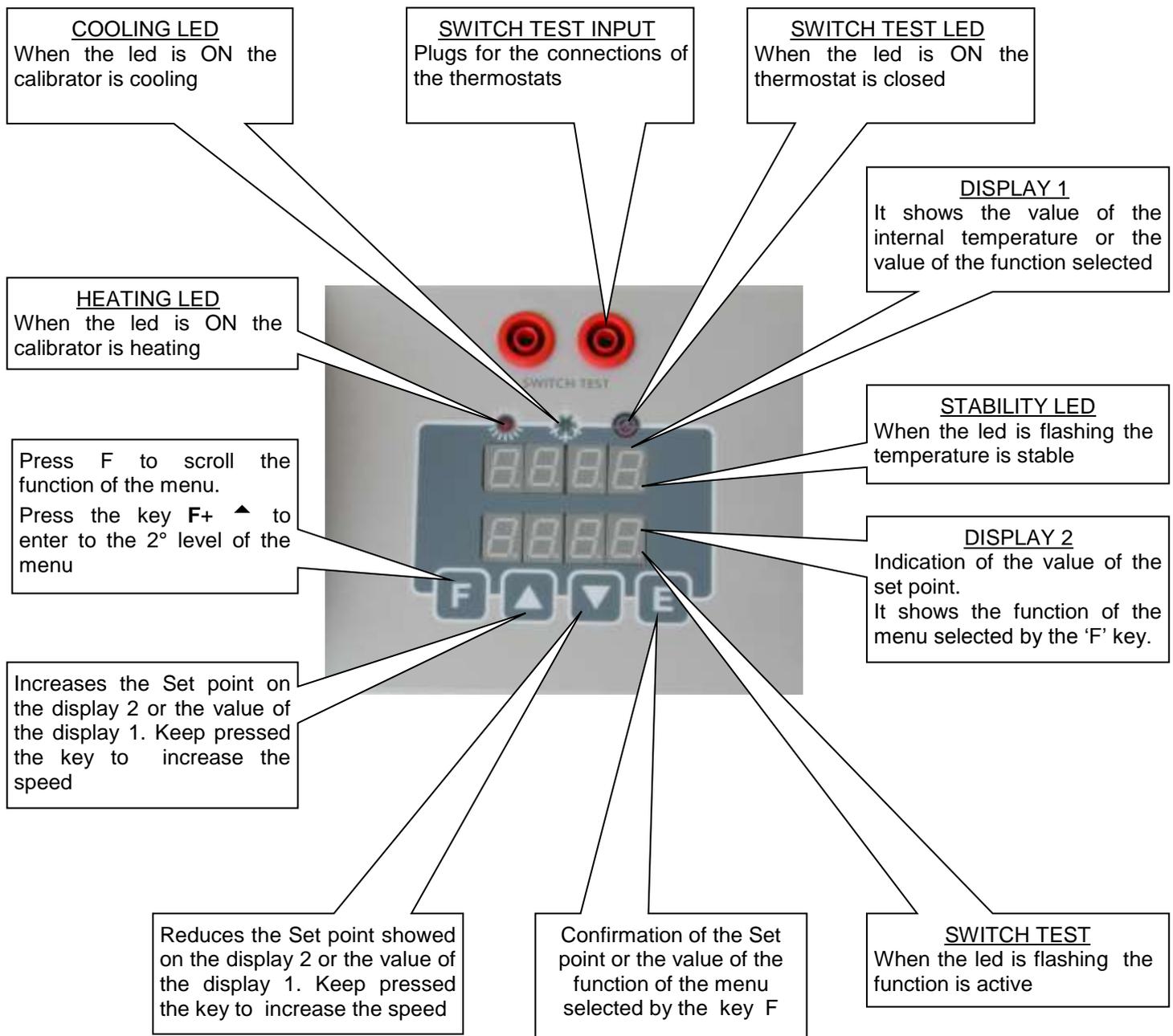


Before carrying out these operations the instrument must be disconnect from the electricity supply and the equaliser block must be at ambient temperature.

N°	FAULT DESCRIPTION	FAULTY COMPONENT OR FUNCTION	METHOD FOR REMOVAL
1	The calibrator does not work when the power cable is connected and the main switch is turned on.	<ul style="list-style-type: none"> - The fuse (3) is cut off. - The power cable is cut off. - The main switch is faulty. 	<ul style="list-style-type: none"> - Replace the fuses. - Replace the power cable with a similar one. - Replace the cup socket (1-3)
2	The fuses (3) are triggered when the power cable is connected and the main switch is turned on.	<ul style="list-style-type: none"> -The fuse is wrong. -The power supply(9) is faulty 	Check the value of the fuse(ref. to item 6.2.2)
3	The control panel is working properly but the temperature does not increase and the calibrator indicate Err after few seconds	<ul style="list-style-type: none"> -The Peltier device(10) is faulty -The Peltier driver (5)is faulty 	<ul style="list-style-type: none"> -Replace the Peltier device -Replace the Peltier driver
4	The display indicates a different temperature from the one measured in the block.	<ul style="list-style-type: none"> -The internal probe is not calibrated. -The probe (8) is faulty. 	<ul style="list-style-type: none"> -Calibrate the internal probe. Ref to item 10.1 -Replace the probe.
5	The temperature does not stop at the value of the set point.	The thermo regulator (6) is faulty.	-Replace the thermo-regulator.
6	The temperature does not decrease to the set value as quickly as it should.	<ul style="list-style-type: none"> -The Peltier device(10) is faulty -The Peltier driver (5)is faulty 	<ul style="list-style-type: none"> -Replace the Peltier device -Replace the Peltier driver
7	The display indicate 810	- Internal probe (8) is faulty	<ul style="list-style-type: none"> -check if the probe connector is closed - change the probe

10.1 -Thermoregulator

Description of the functions



DESCRIPTION OF REGULATOR'S MENU

The calibrator has three menu levels (see image 10.1):
at the first level there are the functions for the continuous usage,
at the second level there are more specific functions for the regulation of the calibrator,
at the third level there are the calibration procedures.

1st MENU LEVEL

PRESS THE **F** KEY TO STEP THROUGH THE MENU

- **SP**
SET POINT: temperature set which the oven has to reach following technical specifications, press the **▲** or **▼** key to adjust the set point and press **E** key to accept the value.
- **SEt2**
SET POINT2: temperature set which the oven reaches with the set gradient and the ongoing launched ramp procedure, press the **▲** or **▼** key to adjust the Set Point 2 and press **E** key to accept the value.
The value of **SEt2** must be always higher than **SP**.
- **Grd**
GRADIENT: Heating slope rate during the change from the temperature **SP** to the **SEt2** or **SEt2** to **SP** value; press the **▲** or **▼** key to adjust the **Grd** and press **E** key to accept the value.
NOTE: gradient value to be set must be lower than the ones stated in the technical data, at point 2.2 (heating grad. max. 6°C/min).
- **run**
Switch test process.
Select **ON** or **OFF** by the **▲** or **▼** key and press **E** key to start or stop the Switch test process; the oven will reach the temperature SP2 from **SP** with the Heating slope rate selected, starting from the same temperature as the one with which the ramp has been confirmed. If the value of SP2 is lower than the SP, the calibrator will not accept the **run** and the instrument will display "**Err**".
The led will flash to indicate that the function is active(item 10.1). The Set Point will change the value following the selected slope rate.
When the internal temperature reaches the **SEt2** set temperature, the internal temperature will decrease with the cooling slope rate; the **SP** value will be considered as the new set point value.
During the ramp process, the derivative parameter will not be considered.
During the ramp the led on the right of the SET POINT flash and the SET POINT increase or decrease the value.

RAMP PROCEDURE EFFECTIVE EXAMPLE

We suppose to test a thermostat with the expected switch range between 120 and 100°C.

Sp= 100°C

SP2 =120°C

gradient = 2°C/min.

- Set **SP** to **100°C** using the **▲** or **▼** keys. Press the **E** key to accept.
- Press the **F** key and set **SP2** to **120°C** using the **▲** or **▼** keys. Press the **E** key to accept.
- Press the **F** key and set **GRD** to **2°C/min** using the **▲** or **▼** keys. Press the **E** key to accept.
- Press the **F** key and set **RUN** to **ON** using the **▲** or **▼** keys. Press the **E** key to accept.
Press the **E** key to confirm the start of the ramp, the oven temperature will ascend with the heating slope rate. The temperature will loop continuously between 100 and 120°C until you select **run OFF**. Of course, there will be some oscillations at the beginning since the ramp slope will not be suitable but they will stop in a short time and then the oven temperature will follow the ramp's set point
- **Son** "Switch on" displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" has closed.

- **SOFF**

"Switch off" displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" has open. The values of **Son** and **SOFF** will change at each loop or each time you select "run **OFF**".

2nd MENU LEVEL

PRESS THE **F** + **▲** KEYS AT THE SAME TIME TO ACCES THE SECONDARY MENU.

PRESS THE **F** KEY TO STEP THROUGH THE MENU.

PRESS THE "**F** + **▲** KEYS AT THE SAME TIME OR WAIT FOR ABOUT 20 SECONDS TO COME BACK THE PRIMARY MENU

- **Pb**

Value of the Proportional Band expressed in percentage of the value of the end of the scale. Proportional band means the length of time in the measure field within which there is the variation of the regulation probe exit alarm and therefore the adjustment of the heating element power.

- **td**

Derivative Time expressed in seconds. When there is a step variation of temperatures, the derivative action induces an greater initial adjustment, so that the oven will have a greater power than it usual has due to the proportional and integral action only. Since the error keeps existing, the derivative action reduces the impact giving the integrative action the task of reducing the error.

- **ti**

Integral Time value expressed in seconds. The integrating action cancel the error between the chosen set point and the temperature reached only by the proportional action. Integral time means the length of time necessary to the integrative action to double up the proportional action default parameters will be kept recorded.

- **dEG Units °C/°F**

This parameter allows selecting the temperature measuring unit. By selecting "**°C**" all temperatures will be expressed in Celsius degrees; by selecting "**°F**" all temperatures will be expressed in Fahrenheit degrees.

- **dEF**

Default Parameter; this function allows choosing to set the thermoregulator with the P.B., T.I., T.D. parameters either as a default or as a customisable adjustment. By selecting the "**OFF**" parameter and confirming by the "**E**" key it is possible to modify the adjustment parameters, which will keep operational even if the calibrator is turned off. By selecting the "**ON**" key (followed by the confirmation by pressing the "**E**" key) the adjustment values will be set on the default ones recorded by the manufacturer, and therefore not allowing to be changed. By turning the calibrator off the parameter will set on OFF but the default parameters will be kept recorded.

- **CodE**

This is the Code to step the third menu level. Press **▲** or **▼** key to set the number recorded in the "**Cod1**" parameter, and press "**F**" + **▲** keys at the same time to step to the third menu level. **The default set value is 2. If you lost the access key remember that it is possible to have the number by reading the register 13 (item 10.3)**

3rd MENU LEVEL

MENU THAT CAN BE SELECTED BY PRESSING THE "F + ▲" KEYS AT THE SAME TIME WHEN THE **KEY** PARAMETER IS REACHED AT THE SECOND LEVEL AND WHEN THE SET VALUE CORRESPONDS TO THE RECORDED ONE.

PRESS THE **F** KEY TO STEP THROUGH THE MENU.

PRESS THE "F + ▲" KEYS AT THE SAME TIME OR WAIT FOR ABOUT 20 SECONDS TO COME BACK THE PRIMARY MENU

- **Pc:**
Calibration point. Press the ▲ or ▼ key to set the value read with the standard thermometer and press **E** key to accept

- **SetH**

Maximum value of the Set Point. It is set by the manufacturer and cannot be changed by the user.

- **CodE**
This is the Code to step the fourth menu level. Press ▲ or ▼ key to set the number recorded in the " **Cod2**" parameter, and press "F" + ▲ keys at the same time to step to the fourth menu level.
The default set value is 3.

- **tbl**
Clearing of the calibration table. The display indicate **Clr:** Press the key **E** to clear the calibration points above introduced with the function **Pc**

4rd MENU LEVEL

MENU THAT CAN BE SELECTED BY PRESSING THE "F + ▲" KEYS AT THE SAME TIME WHEN THE **CodE** PARAMETER IS REACHED AT THE THIRD LEVEL AND WHEN THE SET VALUE CORRESPONDS TO THE RECORDED ONE.

PRESS THE **F** KEY TO STEP THROUGH THE MENU.

PRESS THE "F + ▲" KEYS AT THE SAME TIME OR WAIT FOR ABOUT 20 SECONDS TO COME BACK THE PRIMARY MENU

- **tSET**
Set point of the thermostat switch. NOT APPLICABLE ON THE T140M-MK2

- **Hy**
Hysteresis of the thermostat switch. NOT APPLICABLE ON THE T140M-MK2

- **Stby**
initial waiting procedure. If the value "**OFF**" is set, when it is started up, the calibrator immediately run to the last set point value chosen after turning off. If the value "**ON**" is set, when it is started up, the calibrator goes on the waiting position and the SP flash. It is necessary to press any key in order to move it from the waiting position and to choose the desired Set Point value.

- **Cod1**
- Access key value to switch to the Third level of the menu. (the default value is 2) It is possible to modify the Cod1 only by the Serial communication.

- **Cod2**
- Access key value to switch to the fourth level of the menu. (the default value is 3)) It is possible to modify the Cod2 only by the Serial communication.

EXAMPLE OF THE CALIBRATION OF THE INTERNAL PROBE

The appliance can have a complete or partial re-calibration yearly or when chosen by the user. Calibration can be carried out directly on the keyboard of the appliance. The calibration is done by adjusting the internal probe at one or more points of the range using a standard thermometer.

The calibration is possible only by setting the temperature unit “ °C”.

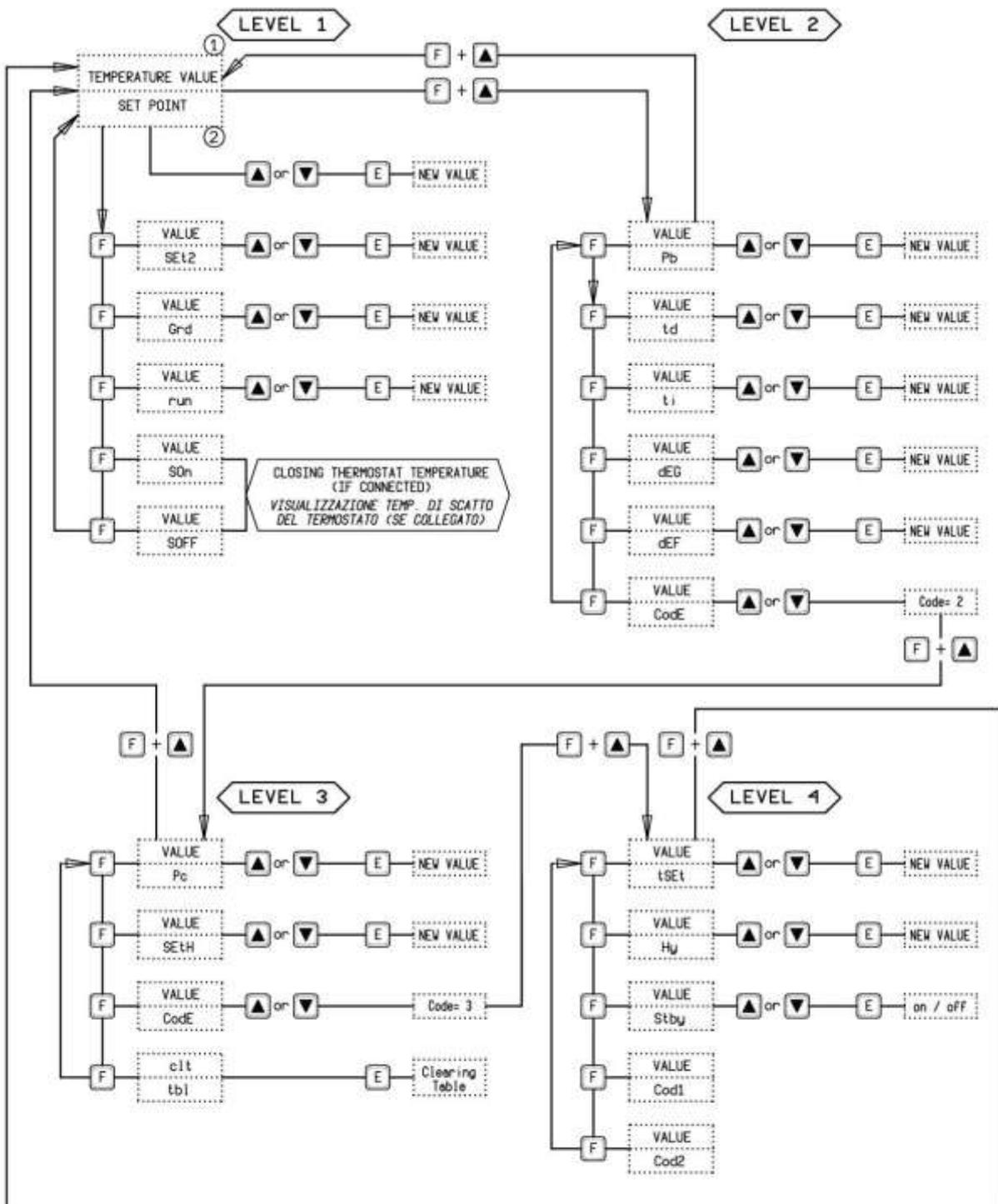
The purpose of re-calibration is to correct the error between the temperature indicated and the value of a standard thermometer.

To calibrate the internal probe it is necessary to have a standard thermometer with a precision greater than the calibrator to follow the instructions below:

1. Insert the standard thermometer probe in the most suitable hole of the calibrator.
2. Choose one or more calibration points (max 10 points) depending on the appliance range or the field where one wishes to carry out the calibration. For example for the PYROS 140 use the points: -15-0-50-100-125°C.
3. Set the first calibration point and wait for the calibrator to be stable (see the stability led)
4. Enter the third menu level (see instructions) and select Pc.
5. Use the ▲ or ▼ key to set the value read on the standard thermometer and press E Key to confirm the value. Confirmation is indicated by a beep.
6. Repeat the step 3-4-5 for the other points.

At the end of the operation wait for about 20 seconds to come back to the principal menu

10.2 - Microprocessor regulator: control description



NOTE:

- ① The first line of the display is the value of the Function
- ② The second line of the display is one of the Function of the menu
- ③ After 20 seconds the set point value is showed at the bottom line of the display

① La prima linea del display indica il valore delle funzioni del menu
 ② La seconda linea del display e' una delle funzioni del menu.
 ③ Dopo 20 secondi il valore di set point ritorna a essere indicato sulla riga inferiore del display

10.3 - Communication Protocol RS232/C

General characteristics:

Baud Rate: 9600 Parity: No
 N. Bit: 8 Bit of stop: 1

The communication runs in half duplex way which means that is transmission and reception could not be contemporaneously present.

The regulator replies only after receiving command; it never replies itself.

The command and reply are ASCII character string, as detailed forward. The communication program will be able to convert ASCII to decimal to extract numeric values. The default address is 1.

Baud rate: 2400, 4800, 9600 e 19200 baud, the Default value is 9600; the other parameters are standard.

VARIABLES AVAILABLE IN READING	
0	Set point
1	Ramp ON/OFF. 1=On, 0=OFF
2	Set point 2
3	Gradient
5	Prop. Band
6	Integral time
7	Derivative time
10*	Units (°C/°F)
13	Access key
14	Baud rate
15	Address
16	Serial number
18	Mx. set point
19	Min. set point
21	Wait ON/OFF
22	Switch on temperature
23	Switch off temperature
24	Firmware Version
27**	Internal sensor type
28	Stability range
29	Stability symbol 0=no, 1=yes
31	Alarm set
33	Offset ambient temperature

VARIABLES AVAILABLE IN WRITING	
0	Set point
1	Ramp ON/OFF
2	Set point 2
3	Gradient
4	Resolution,
5	Prop. band
6	Integral time
7	Derivative time
10*	Units (°C/°F)
13	Access key
15	Address
16	Serial number
21	Wait ON/OFF

27** Internal sensor type	
0	Pt100
2	Tc K

10*Units (°C/°F)	
0	Correspond to the °C
1	Correspond to the °F

* ; the value of the variable 10 corresponds to the table.
 **; the value of the variable 27 corresponds to the table.

Each commands string are ASCII character succession.

First is \$ character; the next must indicate the instrument address (default 1) and than is the command (4 characters).

Possibility:

RVAR (data reading)
 WVAR (data writing)

The ultimate part of string is depending of a type command. The character (cr) concludes the sequence

DATA READING:

Example 1) reading of the Set Point (0 variable):
the command string is: **\$1RVAR0_<cr>**

Each characters means:

\$	beginning of message
1	instrument address
RVAR	reading command
0	number of the variable to read (see the table of the "VARIABLES" on the previous page)
_	space
<cr>	end of message

the response string is: ***1_110,0** (110,0 is only for example)
The character <cr> concludes the message.

The response does not include the measure unity, to read the unity read the variable 10:

the command string is: **\$1RVAR10_<cr>**

the response string is: ***1_0 for °C**

the response string is: ***1_1 for °F**

DATA WRITING:

FLOAT VARIABLES

For writing you use the command WVAR.

Examples 1) writing of the Set point to 132,4°C

If the unity of measure of the temperature is already °C it is enough to write the SET POINT (see the table of the "VARIABLES" on the previous pages).

the command string is: **\$1WVAR0_132,4<cr>**

Each characters means:

\$	beginning of message
1	instrument address
WVAR	writing command
0	number of the variable to read (see the table of the "VARIABLES" on the previous pages)
_	space
132,4	numerical value of a data with the character . to separate the decimal part of the number
<cr>	end of message

At reception of the command, the answer of the instrument is:

***1<cr>**

This string shows the recognition of the command.

If the unity of measure of the temperature is not °C You should write first the variable 10 UNITS to 0(see the table of the "VARIABLES" on the previous pages).

the command string is: **\$1WVAR10_0<cr>**

INTEGER VARIABLES

We have just shown the procedure for the writing of a float data.

The variables 1, 10 have two or more states (for example, the measure unit) and to activate them it is necessary to assign to the variable number the number corresponding to that one which should be set, according to the table indicated below:

1	Ramp	ON = 1	OFF = 0
10	Units	°C = 0	°F = 1

Example 1: the variable 1 corresponds to the activation of the ramp. If you want to set it to ON in order to activate the ramp, you should assign the value 0, otherwise the value 1.

the command string is: **\$1WVAR1_0<cr>**

Do likewise for the other variables.

10.4 - Spare parts list T140M-MK2

(Reference numbers referring to the enclosed drawings)

POS.	DESCRIPTION	CODE
1-2	CUP SOCKET	3SCH28366
3	FUSES	5x20 - 1,6A
4	SWITCH TEST CONNECTION	3B&BPAN10A
5	PELTIER driver	4ED10179
6	THERMO REGULATOR	4ED10112
7	12V FAN	3PPS-3412NGH
8	REGULATION probe	3D2124
9	POWER SUPPLY	3SWTSBU120106
10	PELTIER DEVICE	0D3317
11	RS232 in/out	3ICIDSUB09PS

ACCESSORIES

ELECTRIC POWER CABLE	3NEP5942AW
TWEEZER FOR THE INSERTS	2DC535-000
SWITCH TEST CABLES	3MRC372124 + 3MRC212320

10.5 - Declaration of conformity and check report

The declaration of conformity CE is at the end of the manual; the test report is included with the calibrator.

10.6 - Drawing and wiring diagram

The drawings are at the end of the manual.

Eurotron Instruments (UK) Ltd (EiUK)
05/13/2010

Declaration of conformity “CE10”

Declares that the: **Portable Temperature Calibrator T140M-MK2**

is conforms with the requirements of the following European directive:

- Low voltage directive 2006/95/CE
- EMC directive 2004/108/CE

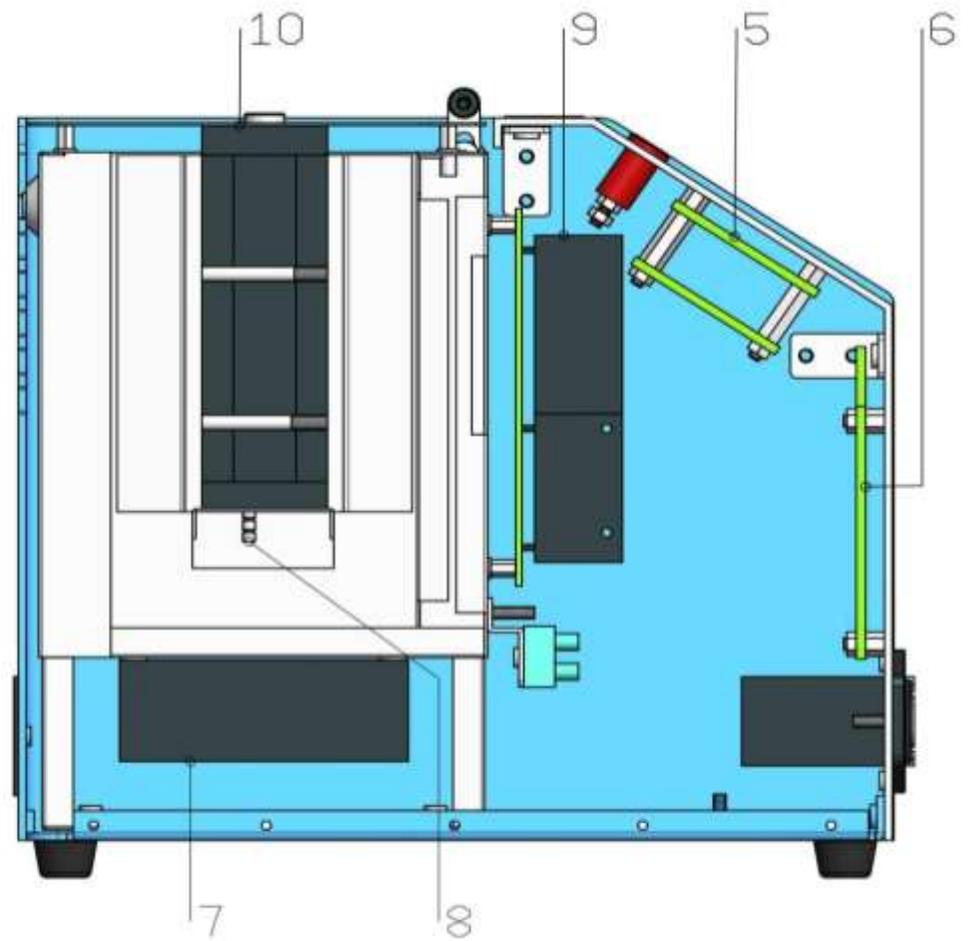
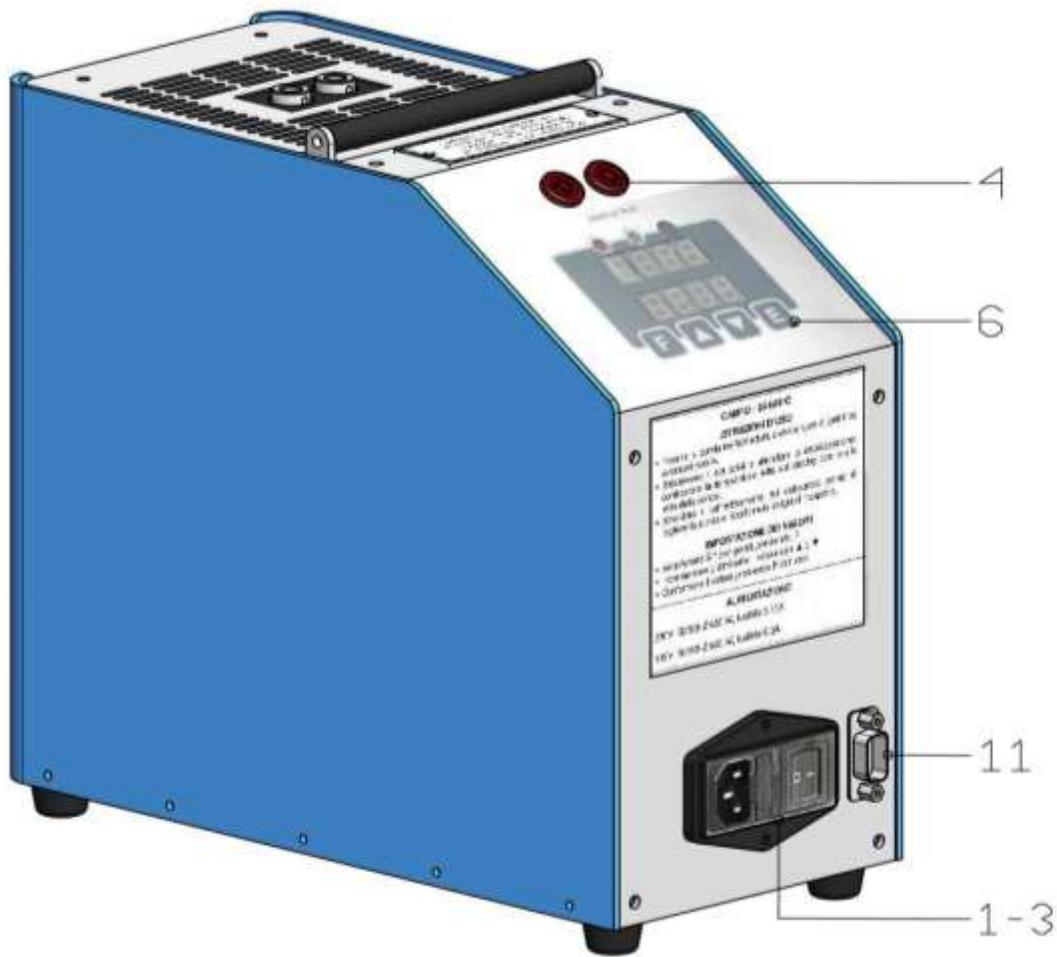
and that it has been designed in accordance with the following harmonized regulation:

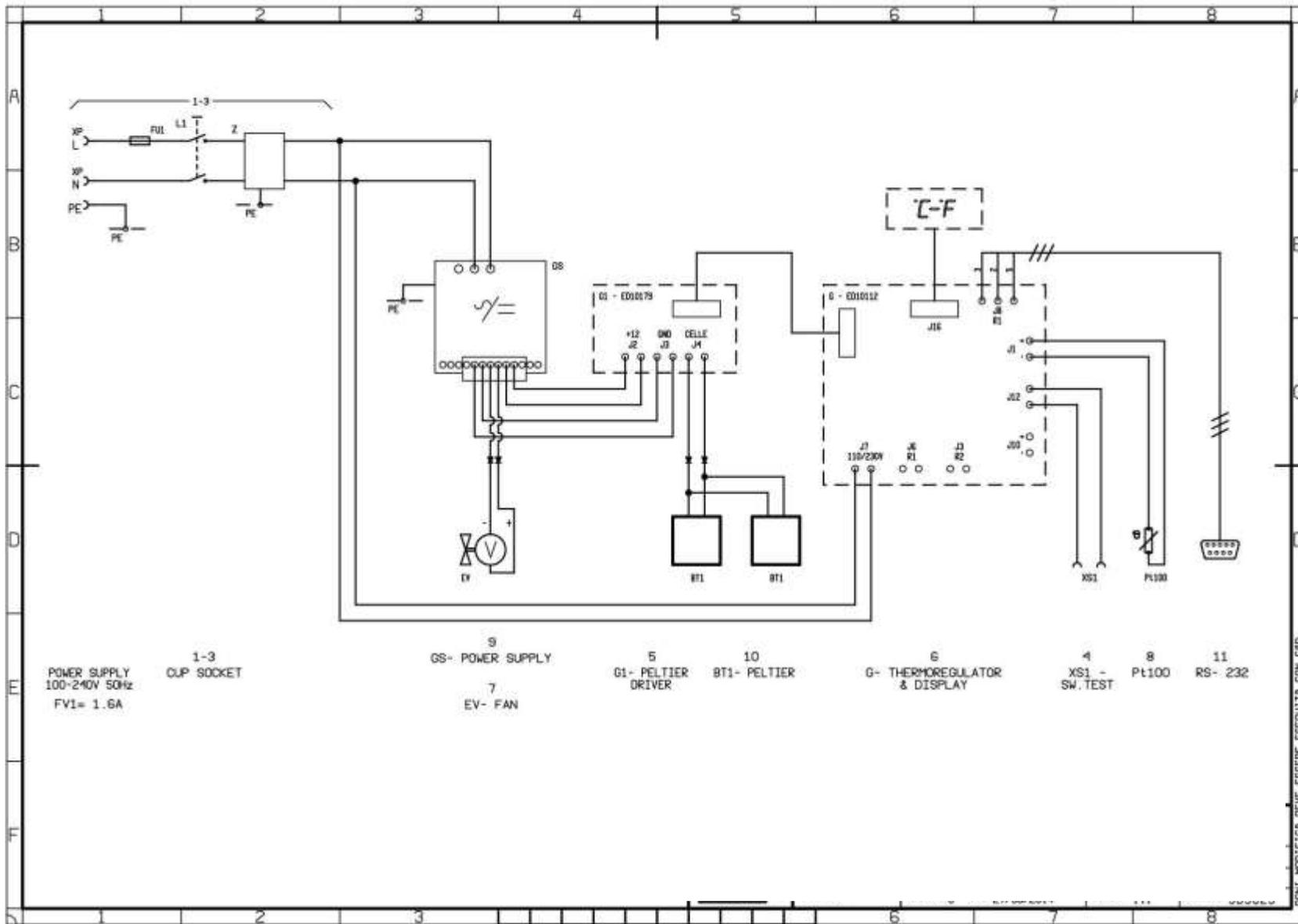
- EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use
- Part 2-010 particular requirements for laboratory equipment for heating of material
- EN 62233:2008 Measurement methods for electromagnetic fields of household appliance and similar apparatus with regards to human exposure.
- EN 61326-1:2006 +Ec1:2008. Electrical equipment for measurement, control and laboratory use- EMC requirements. Part 1: general requirements

The conformity with the above-mentioned requirements is certified by affixing the CE Mark on the product.

Eurotron Instruments (UK) Ltd
Massimiliano Moltrasio
Director









EiUK (Eurotron Instruments UK)
Unit 18 Riley Close, Royal Oak Industrial Estate
NN11 8QY- Daventry- United Kingdom
+44 (0) 1327 871044
+44 (0) 1327 301255
Sales@eurotron-uk.com

Service
+44 (0) 1327 871044
service@eurotron-uk.com