



PORTABLE TEMPERATURE
CALIBRATOR

T375-M & T650-M

LCD

Operating Manual



Operating Manual

INDEX

WARNING	3
1 - INTRODUCTION	4
1.1 – Purpose of instructions	4
2 – SCOPE OF SUPPLY	4
3 - SAFETY INSTRUCTIONS	7
4 - PREPARATION OF OPERATION	8
4.1 – Installation & connection	8
4.1.1 - Removal of packaging	8
4.1.2 - Positioning the calibrator	8
4.1.3 – Electrical Supply: 115 or 230V	8
4.2 – Command List	9
5 – COMMISSIONING	10
6 – OPERATION PROCEDURE	13
6.1 – Description of instrument	13
6.1.1 - Thermoregulator	13
6.1.2 – Display messages	13
6.1.3 – Main switch	13
6.1.4 – Heating resistance	14
6.1.5 – Equalising block	14
6.1.6 - Temperature sensors	14
6.1.7 – Maximum temperature safety	14
6.1.8 – Cooling fan	14
6.2 – Start-up instructions	15
6.2.1 – Calibration note	15
6.2.2 – Calibration Instructions	16
6.2.3 – Switching off the equipment	17
6.3 – Use of the function SWITCH TEST	18
6.4 – Serial communication	19
7 - TERMOREGULATOR	20
7.1 – Description the panel functions	20
7.2 – Menu Structure	20
7.3 – Description of the menu	22
8- MAINTENANCE INSTRUCTION	25
9 - SEQUENCE OF MAINTENANCE	25
10 – TYPICAL FAULTS AND REMOVAL	26
11 - RICLIBRATION	27
12 – COMMUNICATION PROTOCOL RS232/C	28
13 - ADDENDUM	31
13.1 – Spare parts list – standard dotation	31
13.2 – Declaration of conformity and check report	32
13.3 – Drawing and wiring diagram	32
13.4 – WARRANTY (Limited Warranty and limitation of liability)	32
13.5 – Returns and shipping	32



WARNING

Hazardous voltage is 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.

Don not use the instrument for any application other than calibration of temperature, any other use of the instrument may cause hazards to the user.

Use the instrument only in normal environmental conditions.



Electrical and electronic equipment with this symbol cannot be thrown away in public dumpsites. 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

Legend of the symbols:

Indicate a potentially hazardous situation that, if not avoided, could cause damage to operator, the environment or the equipment in use.



ATTENTION – CAUTION
Indicates a potentially dangerous situation



ATTENZIONE: HOT SURFACE OR PART
Indicates a situation that may cause burns or damage from high temperatures



ATTENTION: RISK OF ELECTRIC SHOCK
Indicates a danger caused by electricity



INFORMATION:
Helpful for good use

Note:

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

1 - INTRODUCTION

1.1 – Purpose of instructions



This manual contains the use and maintenance instructions valid for the following equipment:
Portable Temperature Calibrator model: **T375-M & T650-M** complete of accessories.



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

2 – SCOPE OF SUPPLY

1 – Function of calibrator:



The T375-M & T650-M are compact and portable temperature calibrators used for control and calibration of temperature sensors, in the laboratory, on board and in the field, in conformity with ISO 9000 standard; possibility of thermal test on materials and control of thermostats with visual verification of the working or alarm threshold.

Reduced response time during the heating and cooling phases and rapid stabilization result in time saving in multi-point calibration operation.

The calibrator consists of an aluminium or copper block with an $\varnothing 26$ hole, in which the reduction inserts are housed; the interchangeability of the insert makes it possible to test sensors of various lengths and diameters.

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

The instruments are equipped with an RS232 serial interface that allows automatic operation from a PC.

2 – Further Information

Eurotron Instruments (UK) LTD
Unit 18 Austin Way
Royal Oak Industrial Estate
NN11 8QY
Daventry
United Kingdom

3 – Technical data:

Environmental range: temperature +5 ÷ +45°C, R.H. max. 95%.

Technical data (°C)	T375-M	T650-M
Operative range	T.Amb.+10°C÷375°C	T.Amb.+15°C÷650°C
Display accuracy Temperature deviation between the display and the reference probe.	±0,35 @375°C	±0,5 @600°C
Units of measure Display resolution	°C - °F 0.1°C / LCD display	°C - °F 0.1°C / LCD display
Mean heating time Stabilization included	From T.amb. to 375°C Approx 15 min	From T.amb. to 650°C Approx 40 min.
Mean cooling time Stabilization included	From 375°C to 50°C Approx 60 min	From 650°C to 100°C Approx 70 min.
Stability Maximum temperature difference at a stable temperature over 30 minutes	±0,1°C	±0,3°C
Axial uniformity from 40mm from the bottom	±0.02°C at 50°C ±0.20°C at 200°C ±0.40°C at 375°C	±0.6°C at 250°C ±0.5°C at 450°C ±0.5°C at 650°C
Radial uniformity from 40mm from the bottom	±0.1°C at 200°C ±0.2°C at 375°C	±0.15°C at 450°C ±0.6°C at 650°C
Standard insert	Ø26 x 150mm – Anticorodal	Ø26 x 150mm – Nickel-plated brass
Switch test, voltage	On/Off 5 Vdc	On/Off 5 Vdc
Adjustable ramp function	0.1÷10°C/min.	0.1÷10°C/min.
PC interface	RS232	RS232
Automatic calibration	On 5 points	On 5 points
Operating voltage	115/230 VAC ±10% 50/60Hz	115/230 VAC ±10% 50/60Hz
Electric power	650W	6510W
Electrical protection	3,15A fuse for 230V 6,3A fuse for 110/115V	3,15A fuse for 230V 6,3A fuse for 110/115V
Calibrator size	130x280x260(h) mm	130x280x260 (h) mm
Calibrator weight with standard equipment	5.3 Kg	6.5 Kg

- Customized insert with drilled holes for best accuracy
- Structure in flanged plate with handle.
- Microprocessor operated temperature regulator.
- Internal oven in stainless steel with aluminium or copper block.
- Switch test.
- Double way Forced air-cooling system.
- Electronic control components thermally insulated.
- Removable upper protection grid.
- Total absence of environmentally harmful cooling liquids.
- Socket with main cable and protection fuses.

- Electromagnetic compatibility: Emission EN50081-1
Immunity EN50082-2

NOTE: The data marked has been recorded at an ambient temperature of 20°C±3°C, power supply 230V± 10%.
 Probe used to detect the data: Pt100 ø3 mm for Pyros375 and TcN ø4mm for Pyros650
 The technical dates are valid one year after the emission of the test report; after this period proceed to calibration of the oven.
 Variations in the ambient temperature can alter the accuracy, in this case carry out the calibrations with a sample thermometer inserted in the suitable hole.

4 – List of first equipment accessories

	T375-M	T650-M
<u>Standard Equipment</u>	Electric power cable Tweezers for insert removing Kit of fuses Thermostat connection cables Instructions manual Test Report Reduction insert with 4 holes INS-A	Electric power cable Tweezers for insert removing Kit of fuses Thermostat connection cables Instructions manual Test Report Reduction insert with 4 holes INS-A
<u>Inserts</u>	Please refer to web page/ data sheet	Please refer to web page/data sheet
<u>Cases</u>	Please refer to web page/ data sheet	Please refer to web page/data sheet

Certification: all the instruments are supplied with final testing, stability and accuracy certification traceable to national standards.

3 - SAFETY INSTRUCTIONS

Take care of the instrument, avoid ambient with high humidity, strong magnetic field, external high temperature. Do not introduce any device in the instrument.
Use personal protective equipment and follow work area instructions

WARNING:



- **Pay attention to live parts- any contacts cause danger**
- Because 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 power supply.
- Carry out the maintenance, repair operation only with the equipment at ambient temperature, and disconnected from the electric power – electrical cable disconnected.
- Do not connect the switch test (4) and RS232 (11) 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 also 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



- During the use of the calibrator, the upper protection grid may overheat.
- Do not to block the suctions grilles of the appliance
- Do not touch the probe to calibrate when it is in the block.
- Before turning off the calibrator let it cool down
Do not switch off the calibrator at high temperatures: the protection grid and the carpentry could overheat causing damage to operator.
- Wait until the calibrator has returned to ambient temperature before storing it in its carrying case.



- Never put any type of liquid inside the block.
- Do not change absolutely the configuration parameters
- Do not operate the instrument in an excessively wet, oily, dusty, or dirty environment.
- Do not put anything on the top of the calibrator.
- Do not put fuel objet near the calibrator.
- Do not use the equipment inside hazardous areas
... Use common sense any time.



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

- The thermo-regulator 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.

AFTER EVERY USE AT HIGH TEMPERATURE:
TO SET THE SET-POINT TO AMBIENT TEMPERATURE; LET THE CALIBRATION WORK UNTIL IT IS COLD

4 - 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 230V, 50Hz (3,15A) + earth or 115 V (6,3A) + earth.
- Positioning the insert into the block: reference at the instruction on chapter 5.
- Before start the calibration, read with attention the instruction manual, especially the chapter 3: General recommendation & safety instructions.

4.1 – Installation & connection

4.1.1 - 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.

The reduction insert is packed separately

The Insert must be fitted into the calibrator when it is ready to be used.

4.1.2 - Positioning the calibrator

Position the calibrator in vertical position in 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.



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

4.1.3 – Electrical Supply: 115 or 230V



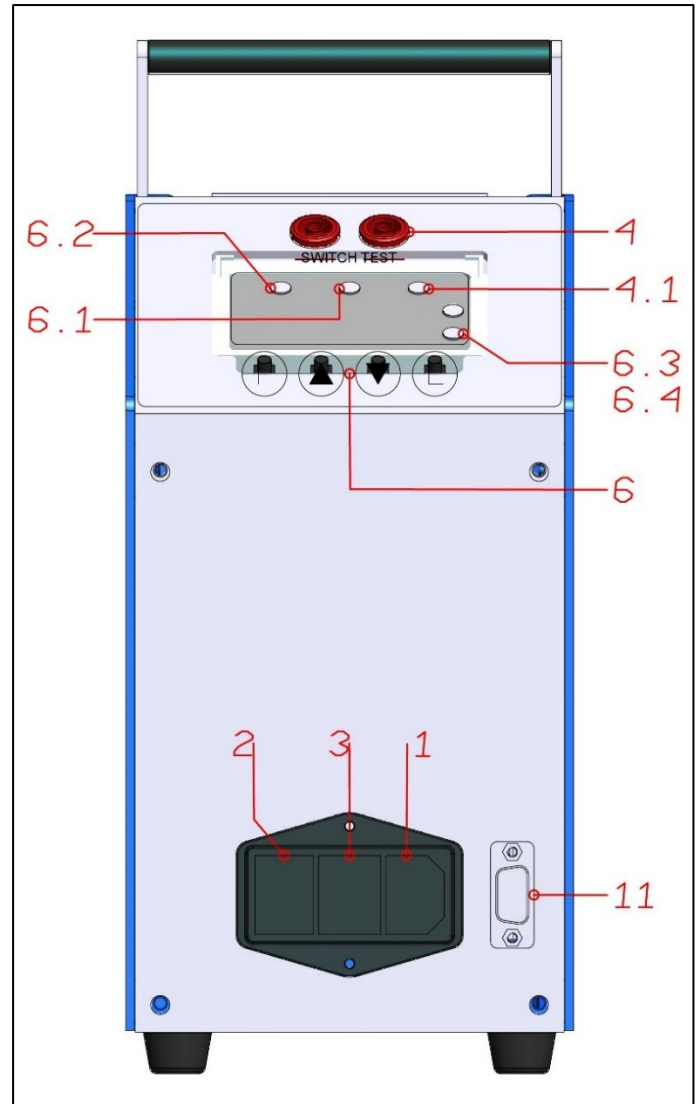
The calibrator runs on a voltage of 230 or 115Vac, 50/60Hz. The calibrator automatically set the power supply for 115 or 230V input.

A 2.5mt cable is supplied with the calibrator.

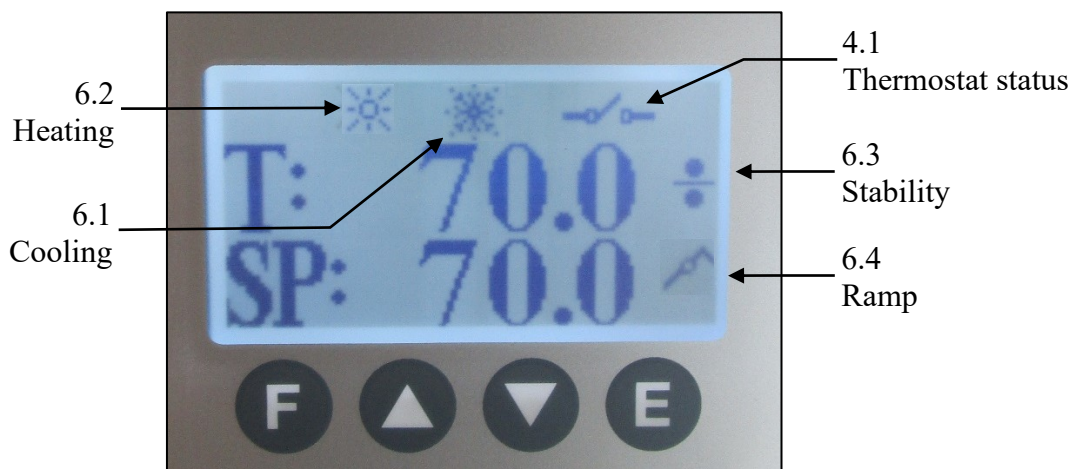
Make sure that the plant is earthen correctly before switching the instrument on.

4.2 – Command List

- 1 SUPPLY SOCKET
- 2 MAIN SWITCH
- 3 PROTECTION FUSES
- 4 SWITCH TEST BUSHES
Thermostat test
- 4.1 THERMOSTAT STATUS INDICATION
Indicate the open or closed state of the contact of the thermostat under test
- 6 TERMOREGULATOR & DISPLAY
Display1: Internal temperature or value of the current unit
Display2: Set point value or of current unit
F Button: Function input
▲ Button: Increase the displayed value
▼ Button: Decrease the displayed value
E Button: Confirm the value
- 6.1 COOLING INDICATION
Flashes when the calibrator is cooling
- 6.2 HEATING INDICATION
Flashes when the calibrator is heating
- 6.3 STABILITY INDICATION (⊕)
Flashes when the calibrator has reached the set temperature and stabilized
- 6.4 RAMP FUNCTION INDICATION
Flashes when the ramp function (RUN) is active
- 11 RS-232 CONNECTION



Display messages





→ **IMPORTANT:**

During transport to put the insert into its case



→ **IMPORTANT:**

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 7.2.

Do not change these parameters to avoid malfunction or breaking of the calibrator with risks of serious personal injury.



This appliance is equipped with a power cable with Schuko plug.

Strictly do not use reductions for Schuko plugs or anything else

Do not use other cables with plugs other than the one provided.

When switched on for the first time, the calibrator could emit unpleasant smells; after the first ignition, this emission ceases.

5.1 – Placement of the reduction insert

After having correctly installed the equipment, proceed with positioning the reduction insert and the insulating block cover; perform the operation with the calibrator cold.

When inserting the insert place it on the bottom without letting it fall.

Do not put any type of material or thermal paste between the insert and the block.

The oven is equipped with tweezers for inserting or removing the insert; the tweezers hook into the two side holes



**** ATTENZION:** In order to avoid odors in the environment, it is advisable that the first operation be done in an airy place, due to the processing residues present in the insert.

When the calibrator needs to be moved for any reason, remove the reduction insert from the block; it is advisable to carry out these operations with the calibrator at low temperature.

5.2 – Probe placement note:

To obtain the best result, follow the advises:

- Measure the diameter of the probe to test.
- Refer to figure 3 for insulation dimensions, insert depths and holes, etc.
- If necessary use the reduction insert
- Check that the diameter of the hole is bigger than the diameter of the probe:
 - ◊ 0.5mm for probe $\varnothing 4.5\div 8\text{mm}$ (working range max. 650°C)
 - ◊ 0.7mm for probe $\varnothing 8\div 12\text{mm}$ (working range max. 650°C)
 - ◊ 1mm for probe $\varnothing 12\div 17\text{mm}$ (working range max. 650°C)
 - ◊ For working temperatures below 550°C , the tolerances can be reduced.
- If it is not possible to have these values, replace the insert with one having the holes the appropriate tolerance (figure 1).
- Avoid using holes that are too accurate and do not force the probes into the insert.
- Put the insert in the equalizer block only at ambient temperature, using the tweezers.
- Insert the probe up to the bottom of the block: the sensitive element is in the optimal calibration zone (figure 3); in this conditions there is the best stability and the least non-uniformity
- Calibration with a reference: take care to position the two probes, the Master one and the calibration one, at the same depth and as close together as possible (figure 2).
- Calibration with probes shorter than the hole in the insert: position the Master at the same height as the calibration probe



Always verify the operating range of the probes and thermostats before calibration; only introduce them into the block if the calibration range is compatible with the temperatures set on the instrument.

For example: introducing a probe with a range of $0\div 100^{\circ}\text{C}$ into a block at a temperature higher than 100°C could determine the breakage of the probe's sensitive element

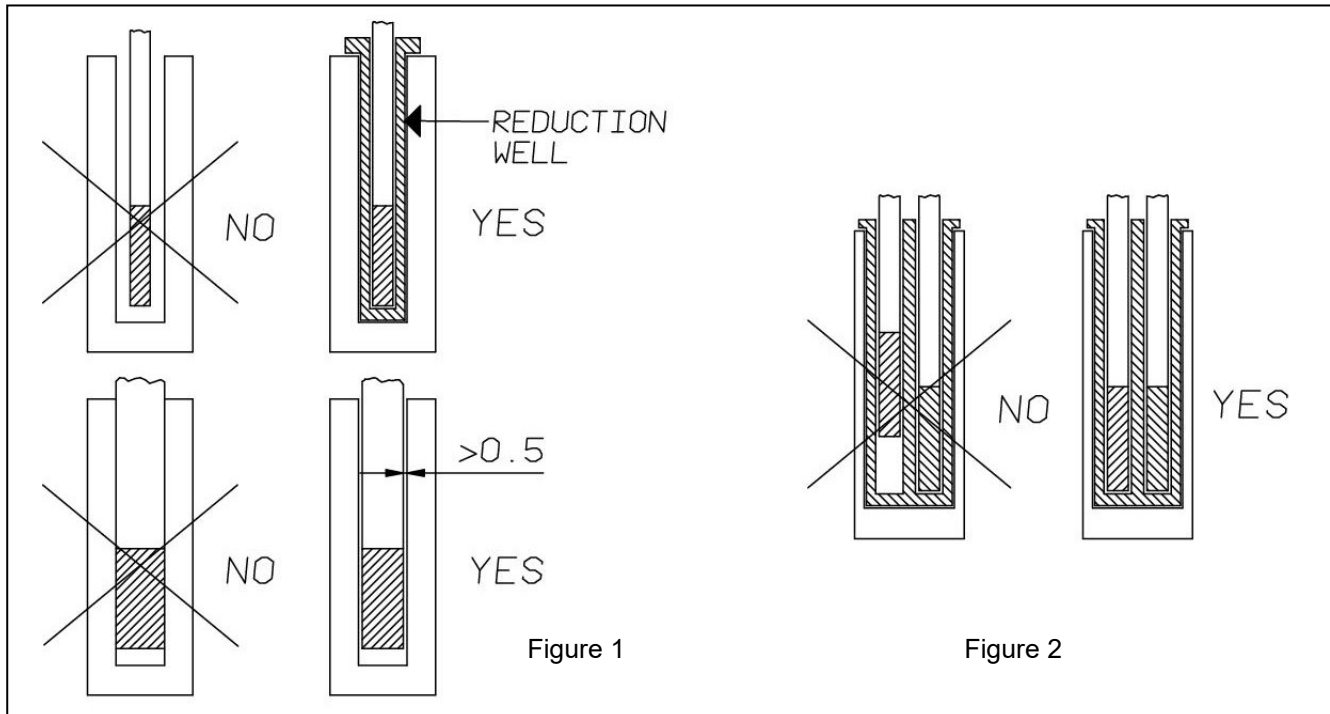
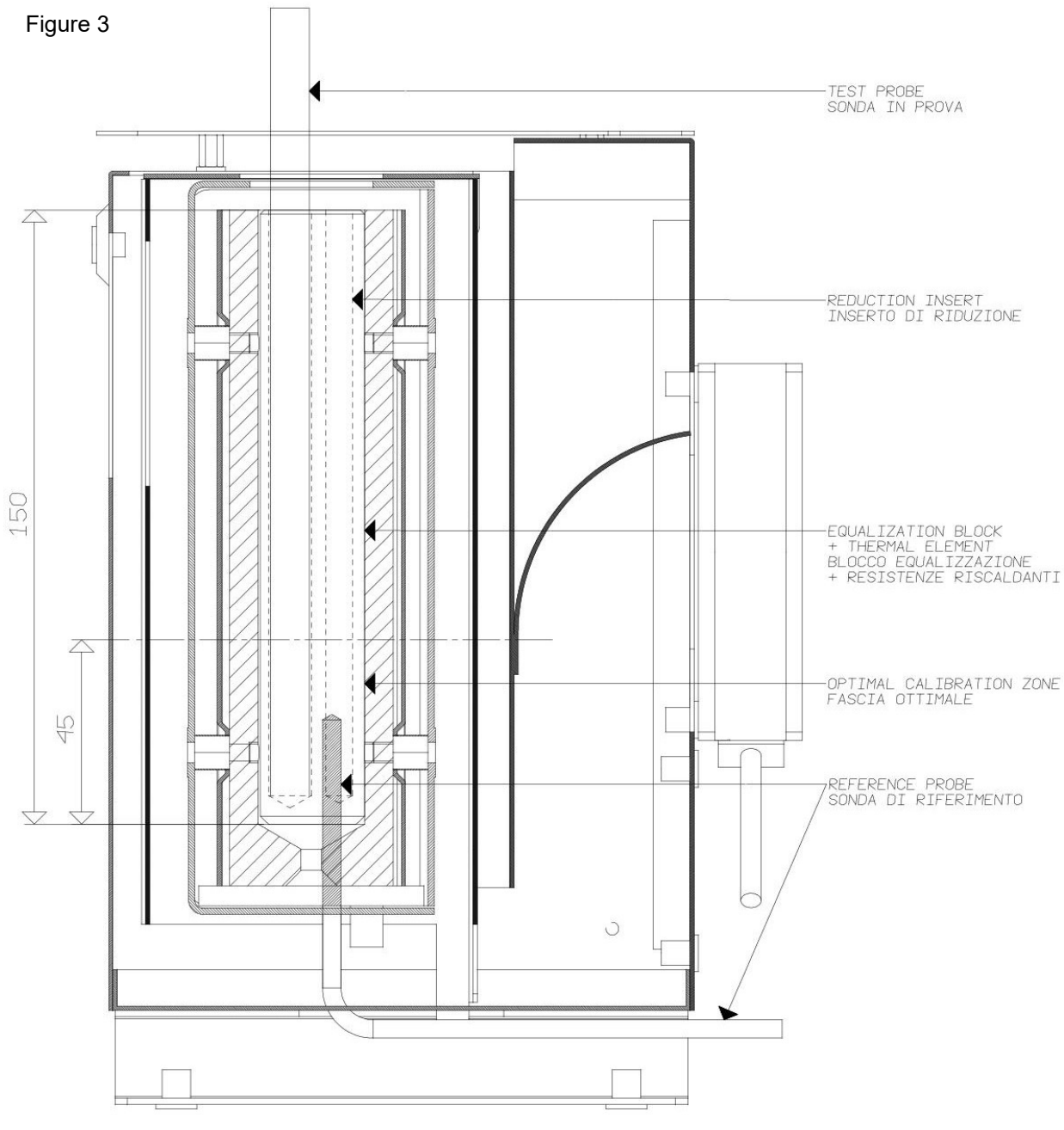


Figure 3



Advice:



- Time the probes take to reach the set point is much higher when the difference in diameter from the probes and the hole 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 THE AMBIENT TEMPERATURE AND LEAVE COOL THE CALIBRATOR BEFORE SWITCHING OFF

6 – OPERATION PROCEDURE

6.1 – Description of instrument



Please refer to chapter 7- Thermoregulator for a more detailed description of the function, the adjustment menu and the commands

6.1.1 - Thermoregulator

The thermoregulator (6) is a PID a microprocessor that can be set up to 650°C

- DISPLAY: indication of temperature measured inside the block and of the set point value; indication of the configuration parameters.
- ▲ ▼ KEY: used to increment or decrement any numerical parameter. The increment or decrement speed is proportional to the time the key remains depressed.
- F KEY: allow access to the various parameters of the menu level.
- E KEY: allow confirming the set point or the parameter value.

6.1.2 – Display messages



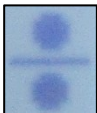
Indicates operation of the heating system – 6.2.



Indicates cooling of the oven – 6.1



Indicates the open or closed states of the contact of the thermostat under test connected at the switch-test plugs – 4 & 4.1.



Indicates that the calibrator has reached the set temperature and stabilized – 6.3.



Indicates that rump function (RUN) is active – 6.4.

6.1.3 – Main switch

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

MODEL	V230	V110/115
T375-M	3.15A	6.3A
T650-M	3.15A	6.3A

Use only fuses 5x20mm.

All the electrical part is found below the main switch

6.1.4 – Heating resistance

The resistance is stainless steel made; the max power is 600W and it can reach maximum temperatures of the calibrator.



Bear in mind, however, that constant use at extreme temperatures reduces the life of the resistance. Limit the number of hours at which the resistance is used at maximum temperatures to the time required by the calibrator in order to prolong the life of the resistance.

6.1.5 – Equalising block

The equalising block is in aluminium or copper with the hole $\varnothing 26\text{mm}$ for the reduction insert.

Holes have been made on the reduction insert to make it possible to fit various types of probes.

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

For maximum accuracy of the probes introduced with respect to the internal probe of the calibrator, it is recommended to stay in the optimal calibration zone (Approx 50mm from the bottom).

If you want to fit the calibrator with a block or insert with different holes, we recommend that you should contact the technical support department who will check to see if it is feasible. This will avoid any unfortunate problems, which might arise if the wrong tolerances are used.

6.1.6 - Temperature sensors

The temperature sensor used for thermoregulation and reading of the instrument is inserted directly into the equalization block in order to indicate the real temperature. There could, however, be some differences due to the tolerances of the sensors themselves.

6.1.7 – Maximum temperature safety

The calibrator is equipped with a maximum temperature safety that disconnect the heating system. In case of intervention:

- ◇ Waiting the cooling of calibrator: the temperature must decrease at least $60\div 80^{\circ}\text{C}$ respect to maximum set point.
- ◇ Switch off the calibrator then switch on again a few second later on.

If problem persist: disconnect the electrical cable to the oven and proceeding to repair of eventual faults; therefore, switch on the oven. Consulting chapter – Typical Faults – for any problems on the thermostat or contact our technical office.



T375-M: has been factory calibrated to operate at $390\pm 5^{\circ}\text{C}$.

T650-M: has been factory calibrated to operate at $670\pm 5^{\circ}\text{C}$.

6.1.8 – Cooling fan

A fan is installed in the calibrator. The fan works with two different speed: the control system activates the fan on minimum speed when the temperature increases, and maximum speed when temperature decreases. The fan keeps at low temperature the external body of the calibrator when temperature increases and assist the cooling process.

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

6.2 – 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 procedure; read the instruction on chapter 3 & 4

6.2.1 – Calibration note

With the calibrator, it is possible to carry out the calibration by comparison in the following ways:

- A) Calibration with oven temperature indicator (6)
- B) Calibration with an external standard reference.

A) Calibration with oven temperature indicator – Figure 4-A:

The probe under test must be inserted into the equalization block of the Pyros, which works as a temperature generator.

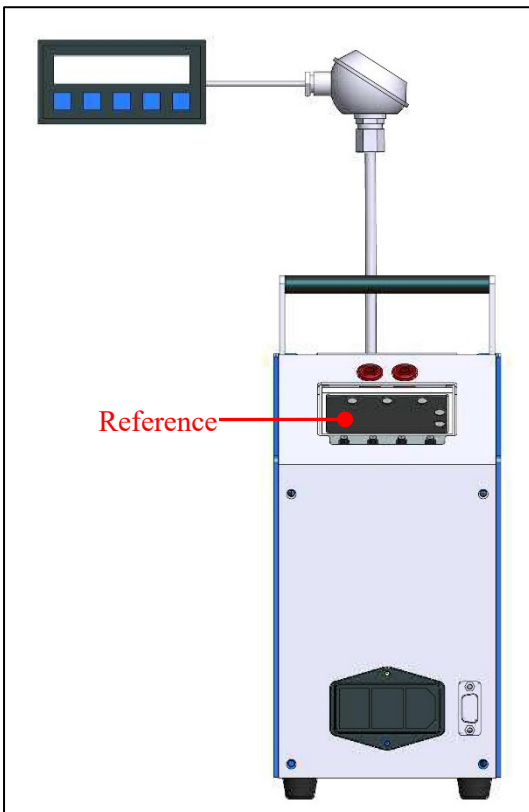
The reference value is the calibrator temperature read on the display (6); it's opportune to refer the value to the Test Report to compensate the error of the display.

B) Calibration with external standard reference – Figure 4-B:

THIS METHODOLOGY IS RECOMMENDED TO OBTAIN MAXIMUM PRECISION BY AVOIDING TEMPERATURE VARIATIONS OF THE CALIBRATOR DISPLAY DUE TO VARIATIONS IN THE WORKING ENVIRONMENT TEMPERATURE.

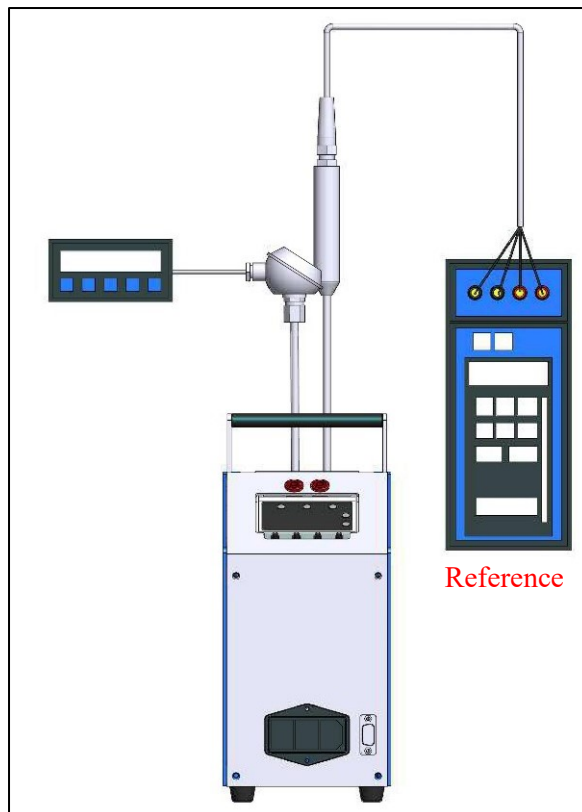
The external standard reference and the probe under test must be inserted into the equalization block of the Pyros, which works as a temperature generator.

The reference value is the temperature read from the external reference.



Probe under test calibrated with the temperature indication of the calibrator.

FIG 4A.



Probe under test calibrated with an external reference **FIG 4B**

6.2.2 – Calibration Instructions

Before any calibration, follow the general recommendation:

- Starting the calibration only at ambient temperature: thermal shock can break the sensitive element of the probe and cause harm to operator.
- To place the reduction insert inside the block.
- Put the probe to check into the equaliser block: reference to paragraph 5.2 (figures 1-2).
- Switch on the calibrator with the main switch (2).
Waiting for the end of self-test procedure; the display indicates **Stby**; press one key to access the Set point
- Set the required temperature value on the display:
 - ◇ Press the ▲▼ key to select the required set point value.
 - ◇ Press the E key to confirm the input value.



- Wait for the stabilisation of the oven before starting any calibration
The flashing of the icon \pm on the right of display means that the calibrator internal temperature is stable.
- To working at different temperatures set the set point at the new value and wait for the stabilisation.



- The temperature indicated by the oven display should not be considered as a reference temperature but only as a general indication of the internal temperature.
To consider the temperature indicated by display as a reference, correct the value read with the indication given on the test declaration accompanying the calibrator
We suggest inserting a temperature Master with UKAS certificate in the block; compare the measure with the values indicated by the Master.
Do not ever use the Master; it is possible to calibrate the instrument at the most significant points, comparing the displayed temperature with the temperature of the Master.



IMPORTANT:



- At the end of the calibration DO NOT remove the probe if it is still at high temperature (over 100°C). Always allow the calibrator to cool off with the probe still inserted in order to avoid thermal shock to the probe itself and harm to people or things.
- Before switch off the calibrator make sure that the temperature of the oven is almost the same as ambient temperature.



Note:

The stability of the oven is activated when the temperature is equal to Set-Point $\pm 0.5^{\circ}\text{C}$ for 10 minutes continuously.

6.2.3 – Switching off the equipment

CAUTION Risk of burns



Before touching the probes under test or transporting the calibrator, ensure that the block is at ambient temperature.



Switching off or disconnecting the electric supply the fan stops with consequent reduction in cooling time and risk of internal overheating if the calibrator is at high temperature; set 20°C and way before turning off the calibrator.

At the end of the tests:

Reduce the temperature of the calibrator by setting the set point value to ambient temperature.

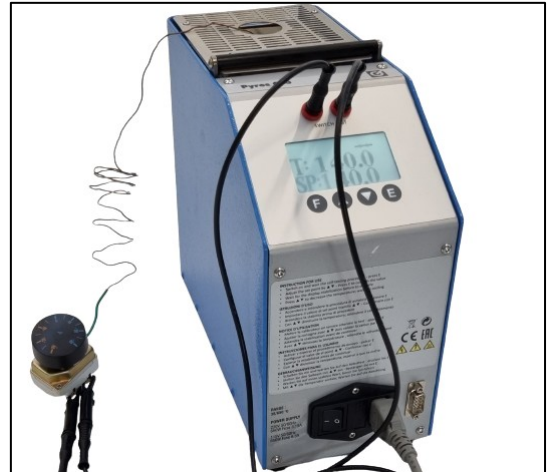
Wait for the time to reach a value close to ambient

Turn off the calibrator and disconnect it from the power supply.

6.3 – Use of the function SWITCH TEST

It is possible to control the intervention point of the thermostats by the 'SWITCH TEST' function (reference to chapter 7.2).

- Put the thermostat in the most suitable hole of the block.
- Connect the terminals of the thermostat to the boshes (4)
- Switch on the calibrator.
- With ▲▼ keys to enter the Set point that correspond to T. min.; the value must be at least 10% lower than the thermostat intervention point.
- Press E to confirm the value and wait the stability.

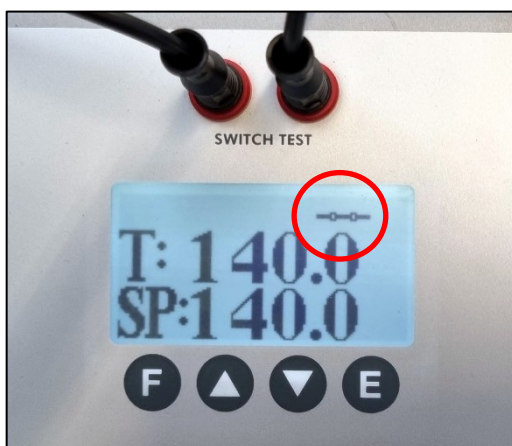


- Press F to select the function SET2; press the key ▲ ▼ to enter T. Max.; the value must be higher than the intervention point.
- Press E to confirm the value.
- The thermostat switch temperature is expected to be found within T.Min e T.Max
- Press F to select the function GRD (degree for minutes); press the key ▲▼ to enter the heating slope rate value. Low values are preferable for a more accurate test (for example values less than 1°C for minute are preferable).
- Press E to confirm the value.



- The Switch Test icon (4.1) will indicate the status of the switch:

The switch is **CLOSED**



The switch is **Open**



- Press **F** to select the function **RUN**; press the key **▲▼** to enter run ON and activate the process.



- The icon (6.4) indicate that the process is active (chapter 7.2)

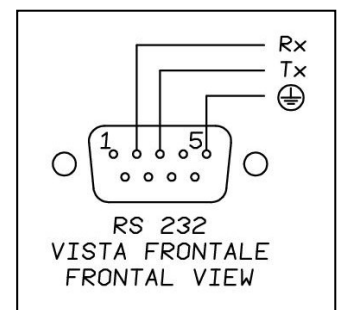


- The thermostat's release values are recorded in the parameters **SON** and **SOFF**; refer to the procedure explained in chapter 7.2.
- Temperature runs between T.Max and T.Min until the function is switched off. **SOF** and **SOFF** values are continuously updated during every run.
- To stop the switch test, enter **RUN OFF**



6.4 – 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. Reference to communication protocol (chapter 12).



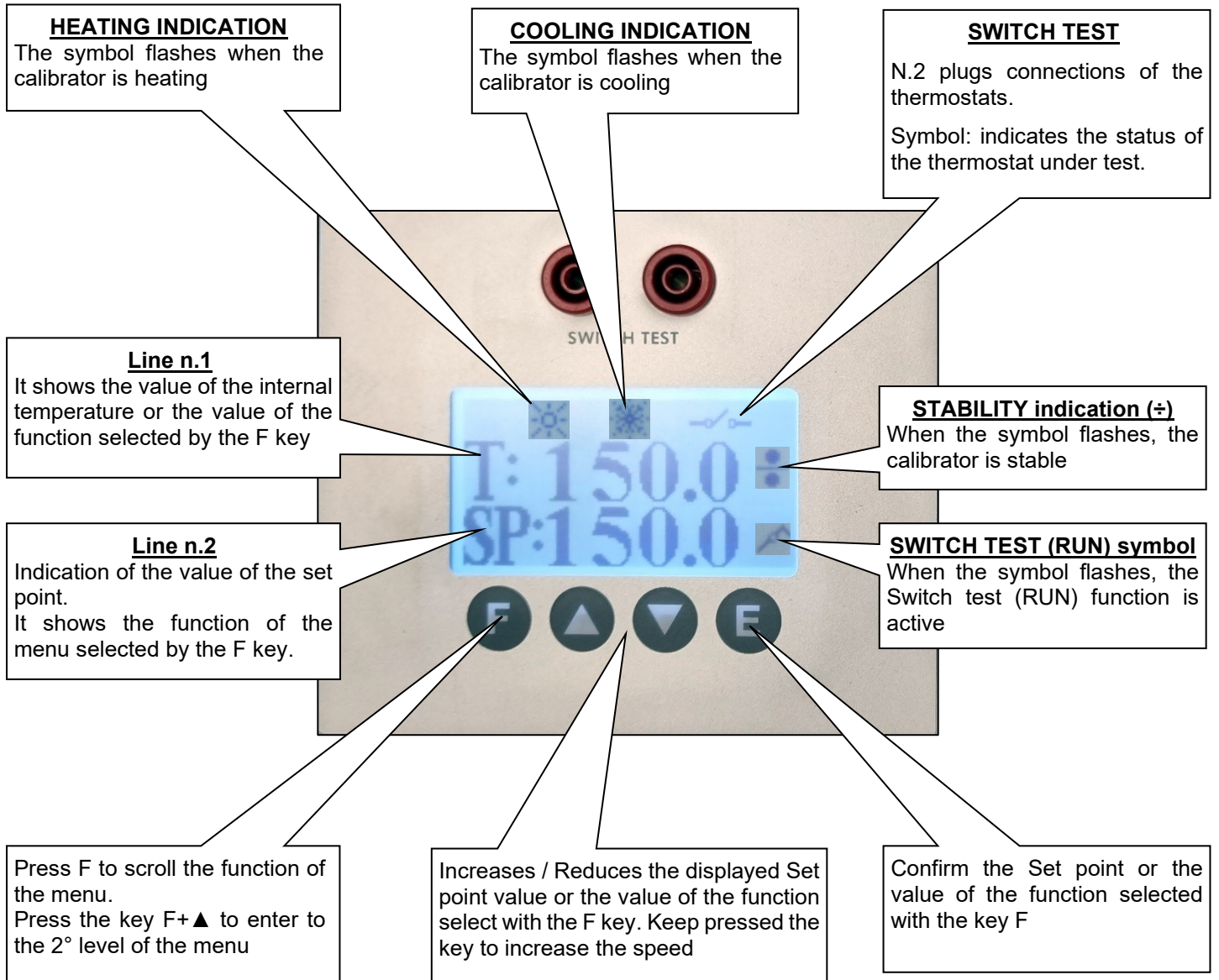
The external PC must be conforming to the IEC950 standard.

ATTENTION:

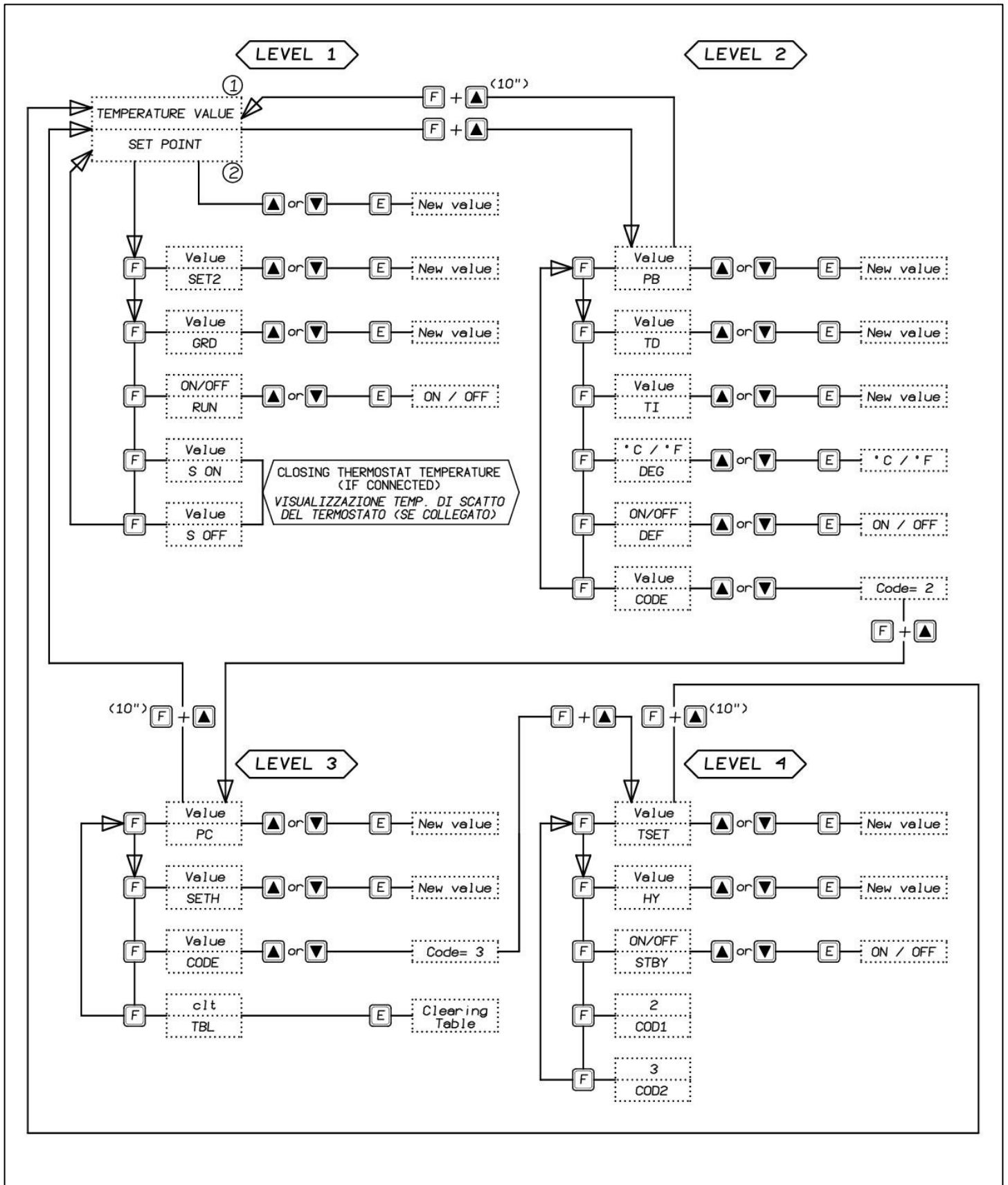
After switching on the calibrator and connecting the serial cable wait the end of the start-up procedure and press a display the button E to activate serial communication

7 - TERMOREGULATOR

7.1 – Description the panel functions



7.2 – Menu Structure



7.3 – Description of the menu



The calibrator has four menu levels.

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 functions for re-calibration of the instrument.

At the fourth level, there are the procedures to set the Max temperature thermostat

1° MENU LEVEL	
PRESS THE F KEY TO STEP THROUGH MENU	
Function	Description
SP	<p>SET POINT Temperature set which the oven has to reach following technical specifications, press the ▲▼ key to adjust the set point and press E key to accept new the new value.</p>
SET2	<p>SET POINT2 Temperature set, which the oven reaches with the set gradient and the ongoing launched ramp procedure, press the ▲▼ key to adjust the set point 2 and press E key to accept new the new value.</p>
GRD	<p>GRADIENT Speed of change in temperature when passing from the SP value to the SET2 value and vice versa; press the ▲▼ key to adjust the GRD and press E key to confirm. For descent ramp from SET2 to SP the gradient value must be negative</p> <p> NOTE: gradient value to be set must be lower than the ones stated in the technical data, at point 2 (Cooling gradient max -7°C/min - heating grad. max. 18°C/min).</p>
RUN	<p>Switch test process. Select ON or OFF by the ▲▼ key and press E key to start or stop the Switch test process; the oven will reach the temperature SET2 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 SET2 is lower than the SP the GRD value must be set with the minus sign “-“ otherwise the calibrator will not accept the run and the display show Err. When the ramp is active, the led will flash on the display. 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.</p> <p> ESEMPIO APPLICATIVO DELLA PROCEDURA DI RAMPA We suppose to test a thermostat with the expected switch range between 100÷120°C Sp= 100°C SET2=120°C Gradient= 2°C/min.</p> <ul style="list-style-type: none"> - Set SP to 100°C using ▲▼ keys. Press E to confirm. - Press F and set SET2 to 120°C using ▲▼ keys. Press E to confirm - Press F and set GRD to 2°C/min using ▲▼ keys. Press E to confirm. - Press F and set RUN to ON using ▲▼ keys. Press E to confirm. <p>After pressing 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</p>
S ON	<p>Switch on Displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" has closed</p>
S OFF	<p>Switch off Displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" has open.</p>



The values of **SON** and **SOFF** will change at each loop or each time you select “run OFF”.

2° MENU LEVEL

PRESS **F+▲** AT THE SAME TIME TO ACCESS THE 2nd LEVEL DEL MENU.


PRESS **F** TO SCROLL THROUGHT THE MENU FUNCTIONS.

PRESS **F+▲** AT THE SAME TIME OR WAIT 20 SEC TO COME BACK THE PRIMARY MENU.

Function	Description
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 a 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.
Units DEG °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 ON/OFF	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 ▲▼ key to set the number recorded in the <u>Cod1</u> parameter, and press F+▲ keys at the same time to step to the third menu level.  The default set value is 2. It is possible to have the Access key number by reading register 13 (chapter 12)

3° MENU LEVEL

TO ACCESS THE 3rd LEVEL MENU: GO TO 2nd LEVEL MENU – AT THE FUNCTION **CodE**, ENTER THE PASSWORD WITH ▼▲ AND PRESS F+▲ AT THE SAME TIME (PASSWORD DEFAULT VALUE= 2)
PRESS F TO SCROLL THROUGHT THE MENU FUNCTIONS.
PRESS F+▲ AT THE SAME TIME OR WAIT 20 SEC TO COME BACK THE PRIMARY MENU

Function	Description
PC	Calibration point. Press ▲▼ key to set the temperature value read with the standard thermometer. Press E to confirm.
SET H	Maximum value of the Set point. Factory set and cannot be changed
CODE	This is the Code to step the third menu level. Press ▲▼ key to set the number recorded in the <u>Cod2</u> 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 indicates CLR : Press E to clear the calibration points above introduced with the function PC

4° MENU LEVEL

TO ACCESS THE 4rd LEVEL MENU: GO TO 3rd LEVEL MENU – AT THE FUNCTION **CodE**, ENTER THE PASSWORD WITH ▼▲ AND PRESS F+▲ AT THE SAME TIME (PASSWORD DEFAULT VALUE= 3)
PRESS F TO SCROLL THROUGHT THE MENU FUNCTIONS.
PRESS F+▲ AT THE SAME TIME OR WAIT 20 SEC TO COME BACK THE PRIMARY MENU

Function	Description
TSET	Set point of the thermostat switch. Press ▲▼ key to set the value and press E to accept The manufacturer sets the value.
HY	Hysteresis of the thermostat switch. Press ▲▼ to set the value and press E key to accept The manufacturer sets the value.
STBY	Initial waiting procedure. OFF value: When it is started up, the calibrator immediately run to the last set point value chosen after turning off. ON value: When it is started up, the calibrator goes on the waiting position and STBY flash on the display; press any key in order to move it from the waiting position and to choose the desired Set Point value.
COD1	Access code value to the 3rd level of the menu. The factory set value is 2. The value can only be modified through serial communication; write the desired value between 0 and 99 in variable 13 (chapter 12).
COD2	Access code value to the 4th level of the menu. The factory set value is 3. The value can only be modified through serial communication; write the desired value between 0 and 99 in variable 13 (chapter 12).

8- MAINTENANCE INSTRUCTION

To ensure that the instrument is always efficient, it is advisable to recalibrate it periodically; check the calibration date on the documents annually.

The recalibration frequency is not a fixed figure, but linked to the use of the equipment: the more it is used, the more frequently it must be recalibrated; our advice is to recalibrate the calibrator at least once a year.

To recalibrate the instrument, it is necessary to have a certified temperature sample and follow the instructions in chapter 11.

Check the power supply cable and replace it if damaged.

Keep the calibrator away from dust and prevent the fans from sucking dirt from the bottom of the machine or worse from being blocked; check cleanliness.

Periodically check that the holes and the inserts are cleaned.

Any liquids or oil inside could form oxides or verdigris on the insert during the use at high temperature; in this case the insert may become stuck.

9 - SEQUENCE OF MAINTENANCE



The instrument does not require any particular maintenance.
For any repairs, contact our technical office.



Change the fuses if necessary
Before the change of the fuses always, disconnect the power cable from the power supply

9.1 – General cleaning



Keep the calibrator clean to improve its performance.

For cleaning the calibrator:

- The calibrator must be cold at room temperature.
- The calibrator must be disconnected from the mains: power cable disconnected from the front socket
- Clean the instrument externally with a damp cloth; electrical connections must not come into contact with moisture.



Warning: Improper cleaning can cause damage to the instrument
DO NOT use aggressive cleaners
DO NOT use sharp and hard objects

Cleaning block and inserts

Abrasive dust can settle in the calibrator holes causing jamming of the insert. To prevent this, remove the insert from the heating block on a regular basis; blow compressed air into the hole in the block and the insert. Clean with a dry cloth

Cleaning the fan grilles

On the bottom of the calibrator, there is the ventilation grid through which the cooling air is sent to the calibrator. It is important to keep the grill clean.

External cleaning

Clean the calibrator externally with a damp cloth; DO NOT use solvents

10 – TYPICAL FAULTS AND REMOVAL



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 RE
1	The calibrator does not work when the power cable is connected and the main switch is turned on.	The fuse (3) is cut off. The power cable is cut off. The main switch is faulty.	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.	The fuse is wrong. The heater element (10) is faulty	Check that is inserted the proper fuse for the power supply and replace the fuse Send the Pyros to repair
3	The control panel is working properly but the temperature does not increase and the calibrator indicate Err after few seconds	The heater element is faulty The thermo-regulator (6) is faulty.	Press any button to see if restore the heating Send the Pyros to repair Replace the thermo-regulator.
4	The control panel is working properly but the temperature does not increase The display indicate Ht	The maximum temperature safety has intervened for over temperature.	Verify the set point of the safety thermostat tSet : Ref to the level 4 of the menu Wait for the temperature to drop; switch Off the calibrator and On again. If the fault persists, repair the equipment
5	The display indicates a different temperature from the one measured in the block.	The internal probe (9) is not calibrated. The probe (9) is faulty. The thermo-regulator (6) is faulty.	Calibrate the internal probe. Replace the probe. Replace the thermo-regulator.
6	The temperature does not stop at the value of the point, which has been set.	The thermo-regular (6) is faulty.	Replace the thermo-regulator.
7	The temperature does not decrease to the set value as quickly as it should.	The fan (12) is faulty. The thermo-regulator (6) is faulty.	Check that the fan is working and that the calibrator grills are ot obstructed. If necessary, replace the fan. Replace the thermo-regulator.
8	The display indicate 810 or 786	Internal probe (9) is faulty	Check if the probe connector is closed Change the probe 9

Example of calibration of the internal probe



The calibrator 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 calibrator.

The calibration is done by adjusting the internal probe at one or more points of the range using a standard thermometer.

Attention: 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 T375-M use the points: 50-120-190-260-340°C,
For the T650-M use the points: 100-200-300-400-500-600°C.
3. Set the first calibration point and wait for the calibrator to be stable (see the stability symbol)
4. Enter the third menu level (see instructions) and select Pc.
5. Use ▲▼ to set the value read on the standard thermometer and press **E** 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.

12 – Communication Protocol Rs232/C



After switching on the calibrator and connecting the serial cable wait the end of the start-up procedure and press E to activate serial communication

General characteristics:

Baud Rate	9600	Parity:	No
N. Bit:	8	Bit di 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.

Variable	Parameter	Format	Only reading
0	Set Point	Float	
1	Ramp ON/OFF	Int: 1=ON, 0=OFF	
2	Set Point 2	Float	
3	Gradient	Float: 0 - ±99.99°C/min	
5	Proportional Band	Integer: 0 – 99%	
6	Integral Time	Integer in sec.	
7	Derivative Time	Integer in sec.	
10	Units (°C/°F)	Int: 0=°C; 1=°F	
13	Cod.1 – Access Key	Int: 0-99	
14	Baud rate	4800-19200	X
15	Address	Int: 0-99	
16	Serial number	String max 20 char.	
19	Min. Set point	Float	X
20	Cod.2 – Access Key		X
21	Wait On/Off	Int: 0=OFF; 1=ON	
22	Switch ON temperature	Float	X
23	Switch OFF temperature	Float	X
24	Firmware Version	String 9 char.	X
27	Internal Sensor type	0= Pt100 2= TcK	
28	Stability range	Float: 0 – 99.99	X
29	Symbol of stability	0= NO 1= YES	X
31	Alarm set		X
33	Offset ambient temperature.		X

Each commands string is ASCII character succession.

First is \$ character; the next must indicate the instrument address (default 1) and then 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:

For Reading, use the command RVAR.

Example: reading of the Set Point (0 variable)

The command string is: **\$1RVAR0_<cr>**

Each character 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: 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 character 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>**

At this point the new value us stored.

INTEGER VARIABLES

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

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

Example: 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 1; otherwise the value is 0.

The command string is: **\$1WVAR1_1<cr>**

Do likewise for the other variables.

13 - ADDENDUM

13.1 – Spare parts list – standard notation

Reference number to the enclosed drawings

POS.	DESCRIPTION	MODEL T375-M	MODEL T650-M
1-3	FILTERED CUP SOCKET 6A	3SCH3103553	3SCH3103553
3	PROTECTION FUSES 230V MODEL	3.15A (5X20)	3.15A (5X20)
	<i>PROTECTION FUSES 115V MODEL</i>	6.3A (5X20)	6.3A (5X20)
4	SWITCH TEST BUSHES	3B&BPAN10A	3B&BPAN10A
6	THERMOREGULATOR + DISPLAY LCD	4ED210404R1 + 4ED210404R1A	4ED210404R1 + 4ED210404R1A
9	THRMOREGULATION PROBE	2D3329 – Pt100	3D1653 - TcK
10	HEATER ELEMENT	3D2906	3D2906
11	RS-232	ICIDSUB09PS + 2TRCIISVUV	ICIDSUB09PS + 2TRCIISVUV
12	12V FAN COIL – 92x92x25mm	3PPS3312M	3PPS3312M
	ELECTRIC POWER CABLE	3NEP5942AW	3NEP5942AW
	TWEEZER FOR REMOVING INSERTS	2DC535-000	2DC535-000
	SWITCH TEST CABLE	3MRC372124 + 3MRC212320	3MRC372124 + 3MRC212320

13.2 – 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

13.3 – Drawing and wiring diagram

The drawings are at the end of the manual

13.4 – 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 Giussani at the number above with a description of the problem.

13.5 – Returns and shipping

Carefully observe the following guidelines for shipping the instrument:

All tools sent must be free of any type of dangerous substance and must be cleaned first.

Remove the insert from the calibrator.

Use the original packaging or use a suitable transport container.



→ **IMPORTANTE:**

During transport, the insert must be placed in the case.

Shipping with the insert inside could cause damage to the calibrator.

EU Declaration Of Conformity

We declare the product(S)

Temperature Calibrator

Model (S)

T375-M and T650-M

Manufactured by:

Eurotron Instruments UK LTD

Unit 18 Austin Way, Royal Oak Industrial Estate
NN11 8QY
Daventry
United Kingdom

Comply with:

LVD Directive

Directive **2014/35/EU** relating to the making available on the market of electrical equipment designed for use within certain voltage limits

EMC Directive

Directive **2014/30/EU** on the harmonisation of the laws of the Member States relating to electromagnetic compatibility

Daventry, 02-02-2024

Massimiliano Moltrasio
Managing Director

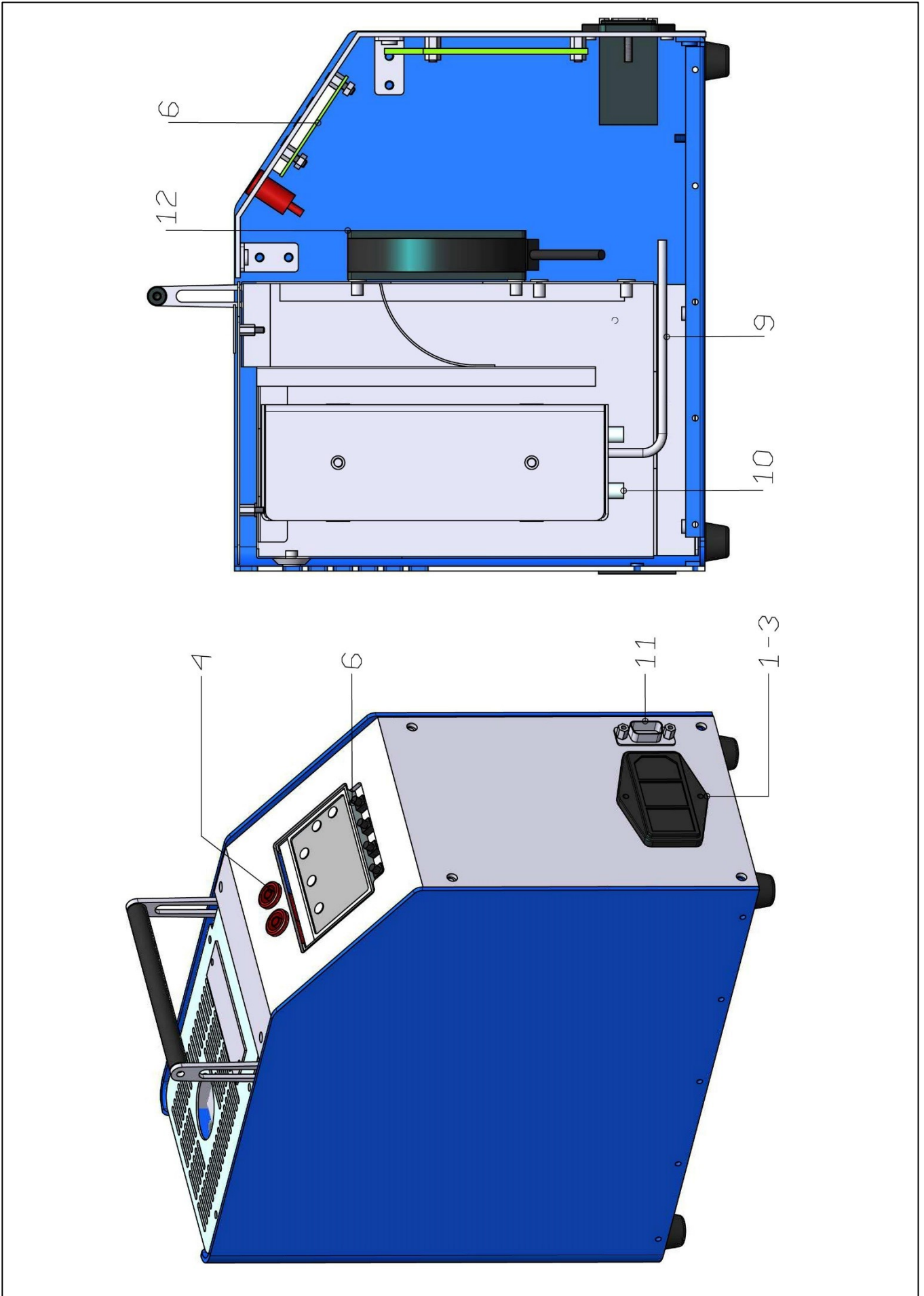


Supporting Documents

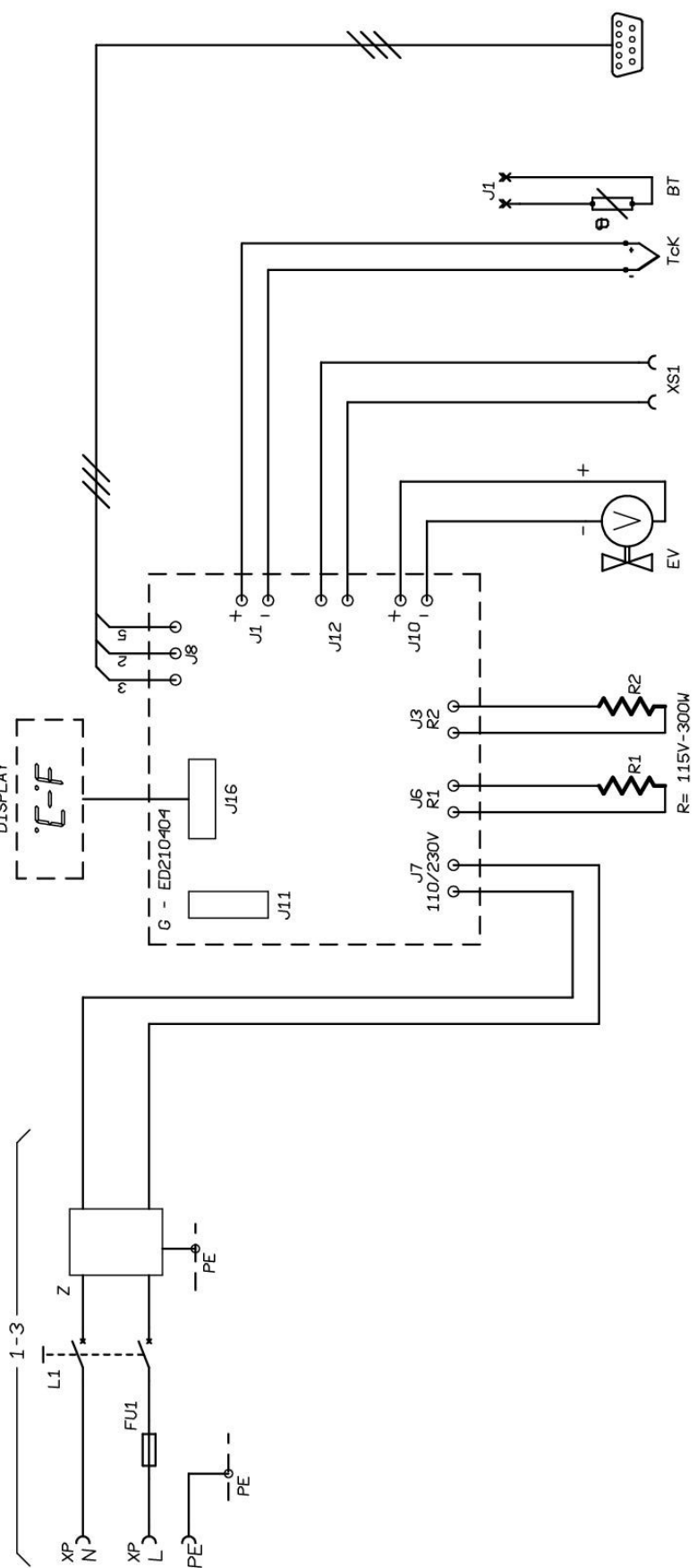
Lab EMC. Report n° TR20230-0350-00 for T375-M

Lab EMC. Report n° TR20230-0184-00 for T650-M

www.intek.it



3D5176



1-3
POWER SUPPLY CUP SOCKET
100-240V 50HZ

6
THERMOREGULATOR & DISPLAY

12 EV- FAN
4 XS1 - SW. TEST
9 TcK- Pt100- Pyros375
11 RS- 232
Pt100- Pyros650

10 HEATER ELEMENTS
R1-R2

V. ALIM SUPPLY	FV1- FUSE
230V	3.15 A
115V	6.3 A

