

Operating Manual

Dry Block Temperature Calibrator

PYROS-650



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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 dependant on proper handling, operation and maintenance.



Electrical and electronic equipments with this symbol can not 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 equipments 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 model: **PYROS-650**

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.

2 - SCOPE OF SUPPLY

2.1 - Name:

Portable Temperature Calibrator **PYROS-650**, 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%.

Standard model with bronze block

- Operative range : Environment $\div +650^{\circ}\text{C}$.
- Stability : $\pm 0,5^{\circ}\text{C}$ a 450°C **.
- Display resolution : 1°C
- Reading accuracy : $\pm 1^{\circ}\text{C} \pm 1$ digit a 500°C .
- Probe : Tc
- Maximum ascent rate : $17^{\circ}\text{C}/1'$ ** (35 minutes from ambient to 650°C)
- Maximum descent rate : $10 \div 15^{\circ}\text{C}/1'$ ** (60 minutes from 650°C to 100°C)
- Test well : 1 hole $\varnothing 26 \times 150\text{mm}$ for interchangeable multi-holes inserts
- Thermostat test : 5 Vdc.
- Power supply : 230-115V 50/60Hz selectable
- Power : 600W.
- Size : $130 \times 280 \times 260(\text{h})\text{mm}$
- Package size : $415 \times 570 \times 235\text{mm}$
- Weight of calibrator : 6 Kg.
- Weight with package : 13,5 kg
- Structure in flanged plate with handle
- Microprocessor operated temperature regulator.
- Manual resetting safety thermostat.
- Switch test.
- Internal oven in stainless steel.
- Electronic control components thermally insulated.
- Double way Forced air-cooling system.
- 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 with ** has been recorded at an ambient temperature of $20^{\circ}\text{C} \pm 3$, power supply $230\text{V} \pm 10\%$, with Pt100 $\varnothing 4.5\text{mm}$ inserted in the block.

The technical dates are valid one year after the emission of the test report; after this period proceed to calibration of the over.

2.3 - Service (function):

The portable temperature calibrator **PYROS-650** has been designed for:

- Control and calibration of temperature sensors, in the laboratory, on board and in the field, in conformity with ISO 9000 standard.
- Calibration of thermostats with light indication when electric contact close.
- 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:

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2.6 - N° of correspondent catalogue sheet:

PYROS-650

2.7 - List of first equipment accessories:

- Standard equipment
(code PYROS-650)
 - * calibrator
 - * Electric power cable
 - * Tweezers for removing inserts
 - * Fuse kit
 - * Thermostat testing connection cables
 - * Instructions manual
 - * Calibration certificate traceable to national standard
 - * Insert with 4 holes \varnothing 3.2 – 5 – 6.35 – 9.5 mm
- Option accessories
 - * code PYROS-650-INS-2: Insert with 2 holes \varnothing 7 and 13mm
 - * code PYROS-650-INS-1: Insert with 1 hole \varnothing 15,7 mm
 - * code PYROS-650-INS-0: Blank Insert
 - * code PYROS-650-KOFFER: Marine type suitcase, IP 65
- Ordering Code **PYROS-650**
- Certification: all the instruments are supplied with final testing, stability and accuracy certification traceable to National Standards.

3 - GENERAL RECOMMENDATIONS

➔ **ATTENTION**

The configuration of the instrument is protected by a password and by the protection code. To accede at the configuration parameters reset the password & the protection code: contact our technical office.

Don't change these parameters to avoid malfunction or breaking of the calibrator with risks of serious personal injury.

- Position of the probe:

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 then the diameter of the probe; following this measure:
 - ◊ 0,5mm for $\varnothing 4,5\div 8$ mm probes (max. operative range 600°C)
 - ◊ 0,7mm for $\varnothing 8\div 12$ mm probes (max. operative range 600°C)
 - ◊ 1 mm for $\varnothing 12\div 17$ mm probes (max. operative range 600°C)
 - ◊ Reduce this tolerance for max. operative range lower then 300°C
- If this is not possible, use the reduction wells with the above-mentioned tolerances (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 then the temperature of the block otherwise the probe could break.

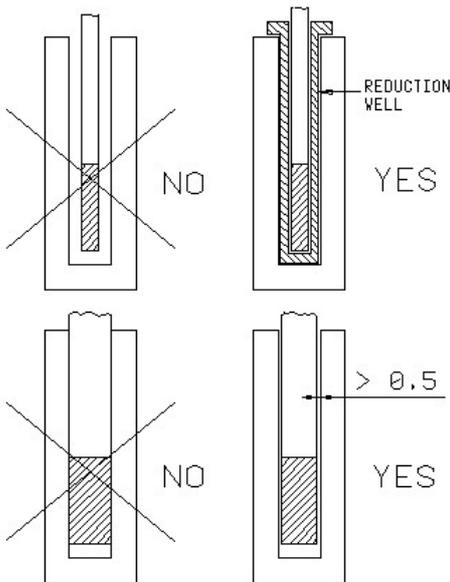


Fig.1

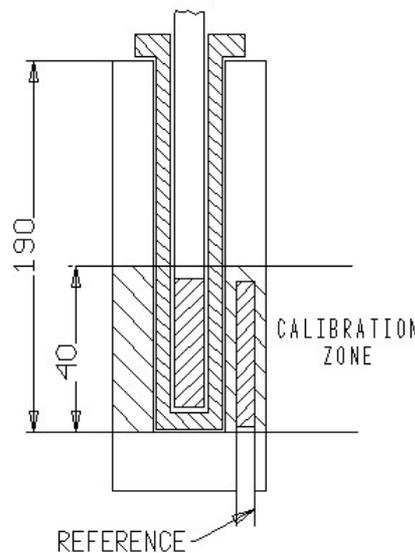


Fig.2

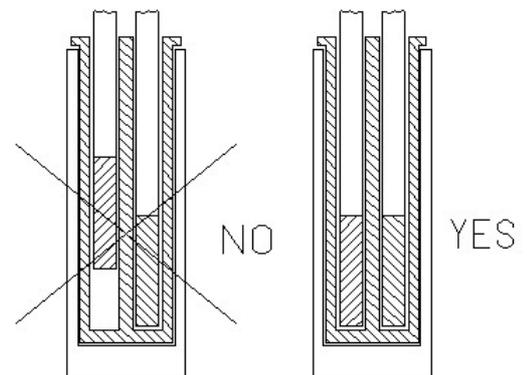


Fig.3

- Advises:

- The time the probes takes to reach the Set point is much more 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

ATTENTION:



- 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.
- Carry out the maintenance and repair operation only with the equipment at ambient temperature and disconnect the electrical cable.



- During the use of the calibrator, the upper protection grid may overheat.
- Don't touch the probe to calibrate when it's in the block.
- After using wait for the stabilisation at ambient temperature before returning the calibrator to its carrying case. Don't switch off the calibrator when it works at high temperature because the protection grid and the carpentry may overheat.



- Never put any type of liquid inside the block.
 - 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:

- The thermo regulator recognizes an eventual break of the temperature sensor (9) and disconnect the heating.
- Max. temperature safety thermostat (11) to disconnect the heating system.
- Protection grid to avoid any contact with the internal oven.
- Protection fuses (3)
- Ground conductor.

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 230V, 50Hz (3,15A) or 115 V (6,3A) + earth, 3,15A (6.3A for 115V).
- 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 a safe clean place; leave enough space around the calibrator to allow the air to circulate 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

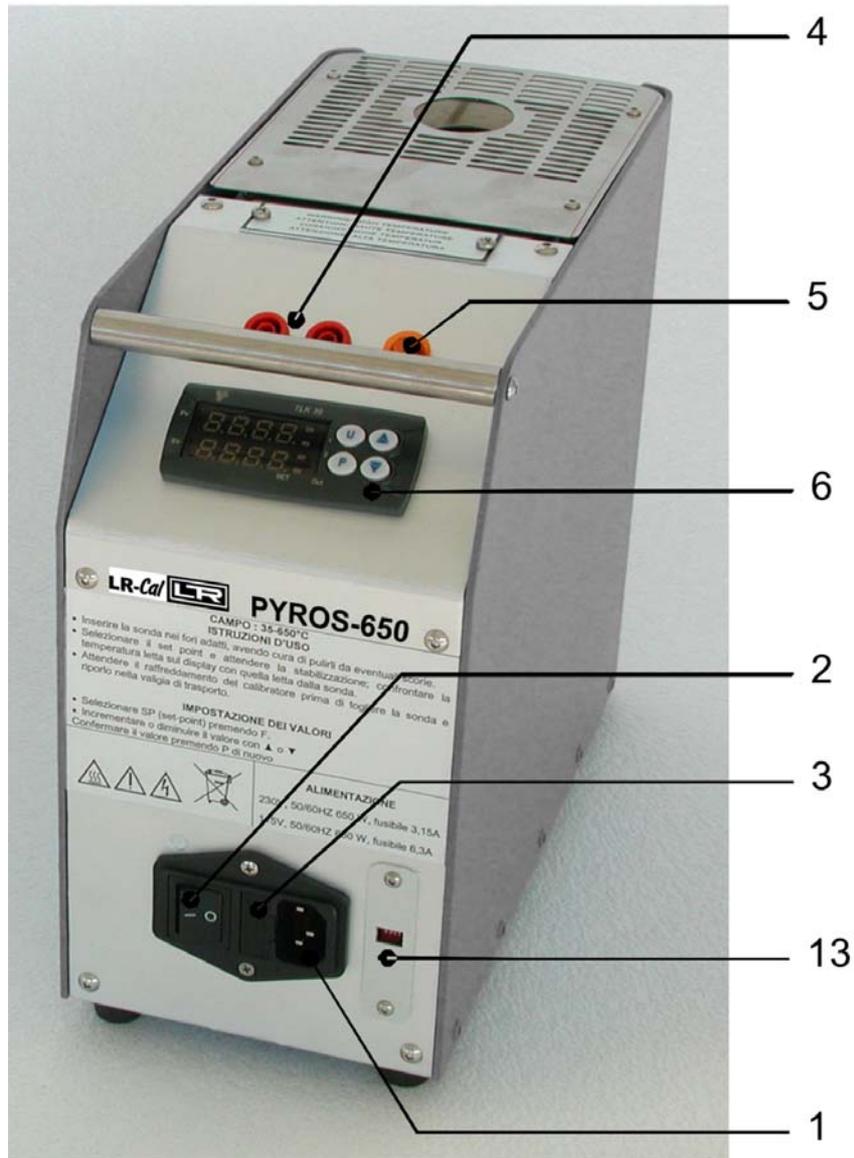
5.1.3 – Supply: 115 or 230V switchable



The calibrator runs on a voltage of 230 or 115Vac, 50/60Hz. The equipment is configured for the 230V power supply or for the voltage indicated by the voltage switch(13). If it is necessary to change the tension, for example from 230 to 115V:

- ◇ unscrew the two screws of the plate 13
- ◇ move the switch 13, with a screwdriver, in order to read 115
- ◇ screw the plate back, in the opposite direction, so that you read the inscription 115V.

A 2.5mt. cable is supplied with the calibrator fitted with 2 conductors plus earth (1mm²). Make sure that the plant is earthen correctly before switching the instrument on.



COMMANDS LIST

| POS. | DESCRIZIONE |
|------|--------------------------|
| 1 | SUPPLY SOCKET |
| 2 | MAIN SWITCH |
| 3 | PROTECTION FUSES |
| 4 | SWITCH TEST |
| 5 | SWITCH TEST ON/OFF LIGHT |
| 6 | TEMPERATURE REGULATOR |
| 13 | VOLTAGE SWITCH/INDICATOR |

6 - OPERATION PROCEDURE

6.1 - Operation description

The **PYROS-650** calibrator consist of a metal dry well with one hole of 26x150mm into which, the inserts available for almost any sensor size to be calibrated, are inserted.

A heater element heats 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 0 to 650°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.
- P KEY: allow access to the various parameters (repeatedly press), access to the various phases of configuration .

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 two fuses as for the following table:

| MODELS | V230 | V110/115 |
|------------|-------|----------|
| PYROS5 650 | 3,15A | 6,3 A |

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

6.2.3 - Heating resistance

The resistance is stainless steel made; the max. power is 600W. and it can reach temperatures approaching 650°C.

Bear in mind, however, that constant use at extreme temperatures reduces the life of the resistance itself. 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.

6.2.4 - Equalising block

The metal equalising block has an hole of 26mm 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

6.2.5 - Temperature sensors

The temperature sensor used for the reading and thermoregulation is a Thermocouple probe; the probe is inserted directly into the equalising block so as to supply a temperature value close to the real value in the block.

6.2.6 - Safety thermostat

The calibrator is supplied with a max. temperature safety thermostat with manual reset (11) that disconnect the heating system.

In case the thermostat intervenes:

- ◇ Waiting the cooling of calibrator: the temperature must decrease at least 60÷80°C respect to maximum set point (standard position).
- ◇ Switch off the calibrator then switch on again a few second later on.
- ◇ If the problem persists: disconnect the electrical cable to the oven and proceeding to repair of eventual faults (reference to paragraph 4). Consulting chapter 9 - typical faults - for any problems on the thermostat.

N. B: the thermostat mounted on standard ovens has been calibrated in factory to intervene at 665°C±10°C.

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 (paragraph 5); read the instruction on paragraph 3 & 4.

To calibrate the 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 sensitive elements of the probes near and at the same dept (reference to fig. 1-2-3-5).



Before any calibration follow the general recommendation:

- Switch on the calibration with the main switch (2); waiting for the end of self-test procedure.
- 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 P to adjust the Set Point.
 - ◇ Press the ▲ key to increment the set point value.
 - ◇ Press the ▼ key to decrement the set point value.
 - ◇ Push on P again.
- If the temperature is lower then the Set Point the two red leds are on.
- Wait for the stabilisation of the oven before start with the calibration.
- For different calibration point, regulate the set point at the new temperature and wait for the stabilisation.
- The temperature indicated by the display must not be considered as a reference temperature but only as a general indication of the temperature inside the block.
We suggest to insert one primary standard with traceable certificate in the block; compare the measure with the values indicated by the standard. Don't ever use the primary standard: it's possible to calibrate the instrument to more significant points, comparing the displayed temperature with that temperature of standard.

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 off with the probe still inserted in order to avoid thermal shock to the probe 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.

- Cooling

To reduce the oven's temperature, change the set point to 0°C and wait for the natural cooling.

6.4 - Use of the function

- Switch test

You can test the operating point of the thermostats by the 'SWITCH TEST' function (4).

- Put the thermostat in the most suitable hole of the block (see the note in paragraph 3).
- Connect the terminals of the thermostat to the socket (4).
- Switch on the calibrator.
- Set the test temperature 5% lower to the operating temperature of the thermostat then increase the Set Point one or two °C each time in order to switch Off/on the thermostat, the lamp (5) will come on or Off when the thermostat electric contact works.
- Set the test temperature lower to the operating temperature + the differential of the thermostat, the lamp (5) will come Off/on when the thermostat electric contact works.

- Configuration of the set point ramp:

- Press and hold the "P" button for about 2 seconds to open the main menu. The arrows allow you to scroll through.
- Select "ConF" then press the "P" button. "0" appears on the display. Enter the number '381' using the arrows and press the "P" button again (if the password is entered correctly, the code is displayed that identifies the first set of parameters ("]SP"); if not, the instrument returns to the condition it was in previously).
- Use the arrows to find the "ⁱrEG" set of parameters. Select this and press "P".
- Select "SLor". **To obtain a variation of 0.1 °C per minute, configure the parameter SLor=0.1**. Save by pressing "P" and wait; in about 20/30" the instrument automatically returns to the main page indicating the temperature. THIS RAMP IS NOW CONFIGURED FOR ALL THE SETPOINTS.
- If you wish to disable this ramp, repeat this procedure from the start to re-access configuration of the SLor parameter. Access this and then press the UP arrow; immediately after the value SLor=99.99 is the "InF" value (ramp disabled). Select it and press "P" to confirm. Wait for a few seconds to return automatically to the initial page.
 - "**ConF**": parameter configuration menu
 - "ⁱ**rEG**": ramp parameter menu
 - "**SLor**": ramp speed. The parameter has a range of 0.00 to 99.99 [unit/min.]. Setting this at "**InF**" disables the ramp.
- During the rise in temperature with the ramp the thermostat opens or closes its contact, the turning on or off of the lamp (5) identifies the moment of triggering, at this point note the value of the display (6) before setting a lower temperature at the triggering point of the thermostat, considering the differential. During the fall in temperature check the thermostat has intervened with the turning off or on of the lamp (5) and note the value of the display (6), if the value set is not sufficient set a lower temperature. The two temperature values recorded are equivalent to the trigger points of the thermostat if necessary repeat the test two or more times to verify the repeatability of the thermostat.

6.5 - Re-calibration methods

To have instrument always efficient is opportune to re-calibrate it periodically.

Frequency of re-calibration is depending to the use of instrument; however we suggest to re-calibrate instrument every year.

To re-calibrate instrument is necessary to have a standard temperature instrument with DKD or S.I.T certification.

7 - MAINTENANCE INSTRUCTIONS

7.1 - Routine inspections instructions

- Check that the holes of the calibrator are cleaned, any liquid or oil inside the hole could make oxides or dirty during the use at high temperature.
- 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.

8 - SEQUENCE OF MAINTENANCE

Not applicable

9 - TYPICAL FAULTS



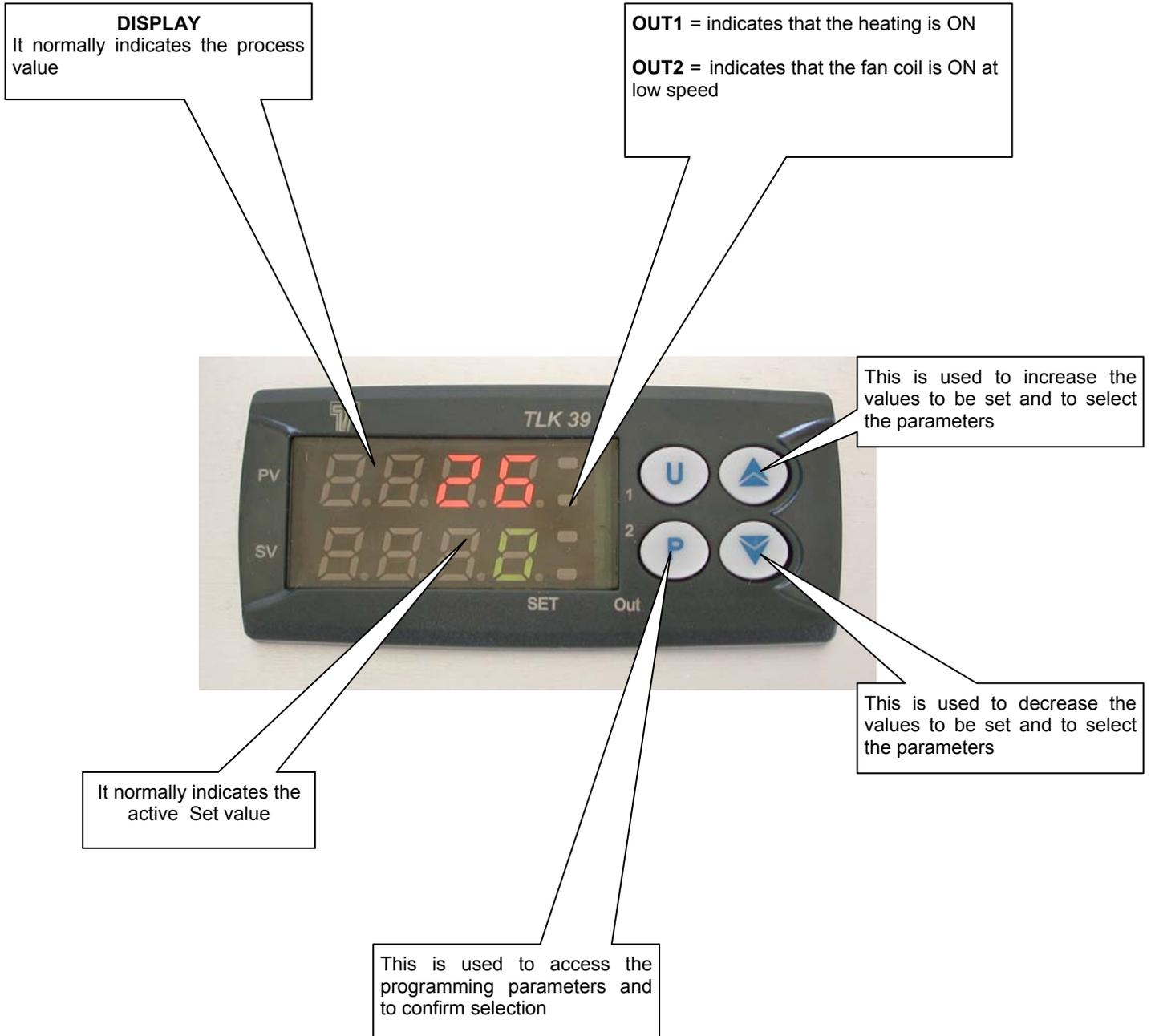
Before carrying out these operations the instrument must be disconnect from the electricity supply and the equaliser block must be at ambient temperature.

| 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 | <ul style="list-style-type: none"> - 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. | <ul style="list-style-type: none"> - The static relay (10) is faulty. - The safety thermostat (11) has been triggered. - The thermo-regular is faulty | <ul style="list-style-type: none"> - Replace the static relay. - Wait the cooling; the temperature must decrease at least 60÷80°C and switch off to reset the alarm Ref 6.2.6. - Replace the thermo-regulator. |
| 4 | The display indicates a different temperature from the one measured in the block. | <ul style="list-style-type: none"> - The probe (9) is faulty. | <ul style="list-style-type: none"> - Replace the probe. |
| 5 | The temperature does not stop at the value of the point, which has been set. | <ul style="list-style-type: none"> - The static relay (10) is faulty. | <ul style="list-style-type: none"> - Replace the static relay. |
| 6 | The temperature does not decrease to the set value as quickly as it should. | <ul style="list-style-type: none"> - The thermo-regulator (6) is faulty. - The cooling fan (7) is faulty. | <ul style="list-style-type: none"> - Replace the thermo-regulator. - Replace the fancoil. |
| 7 | The display show '-----' or 'uuuu' or 'oooo' | <ul style="list-style-type: none"> - The control probe N.9 is faulty or in short circuit - The thermo-regulator (6) is faulty. | <ul style="list-style-type: none"> - Replace the probe. - Replace the thermo-regulator. |
| 8 | The display indicates ErEP | <ul style="list-style-type: none"> - Eprom faulty | <ul style="list-style-type: none"> - Push the P button of the thermo-regulator |

10 - APPENDICES

10.1 -Thermoregulator

Description of the functions



10.2 - Spare parts list PYROS-650

(Reference numbers referring to the enclosed drawings)

| | | |
|-----|-------------------------|---|
| 1-3 | CUP SOCKET | 3SCH28366 |
| 3 | FUSES | 5x20 3,15A for 230V 5x20 6,3A for 115V |
| 4 | SWITCH TEST CONNECTION | 3B&BPAN10A |
| 5 | SWITCH TEST LAMP | 3RSC3693970 |
| 6 | THERMO REGULATOR | 4TCNTLK39HCOR |
| 7 | 12V FAN COIL | 3PPS3312M |
| 8 | SAFETY THERMOCOUPLE | 3D2417 |
| 9 | REGULATION THERMOCOUPLE | 3D1653 |
| 10 | 25A STATIC SWITCH | 3CGPRA4425D08 |
| 11 | SAFETY THERMOSTAT | 4ED10085 |
| 12 | RESISTOR | 3D2906 |
| 13 | 230V / 115V SWITCH | 3RSC321290 |
| | ELECTRIC POWER CABLE | 3NEP5942AW |
| | TWEEZER FOR THE INSERTS | 2DC535-000 |
| | SWITCH TEST CABLES | 3MRC372124 + 3MRC212320 |

10.3 - 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.

10.4 - Drawing and wiring diagram

The drawings are at the end of the manual.

"Declaration of conformity"

DRUCK & TEMPERATUR Leitenberger GmbH, Bahnhofstr. 33, 72138 Kirchentellinsfurt, GERMANY

Declares that the: **THERMOSTATIC CALIBRATOR PYROS-650**

is conforms with the requirements of the following European directive:

- Low voltage directive 73/23/EEC amended by 93/68/EEC and by 2006/95/CE
- EMC directive EMC 2004/108/CE

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

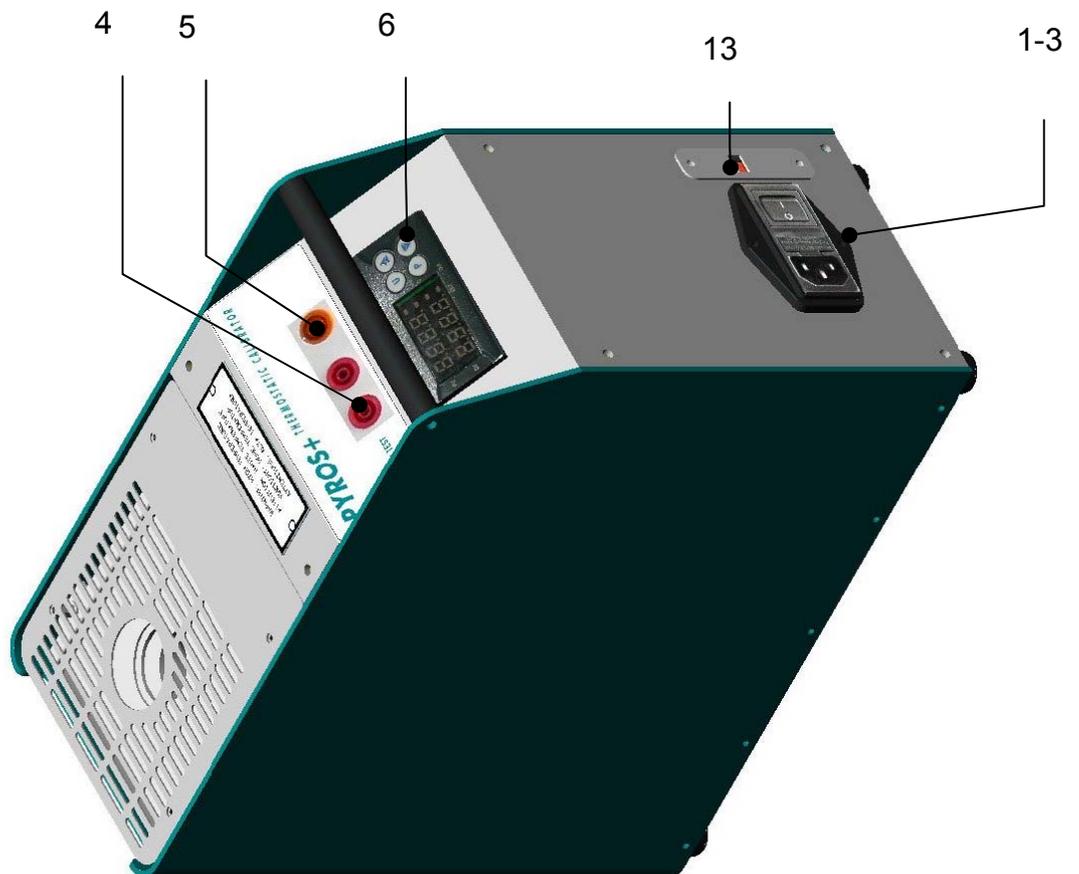
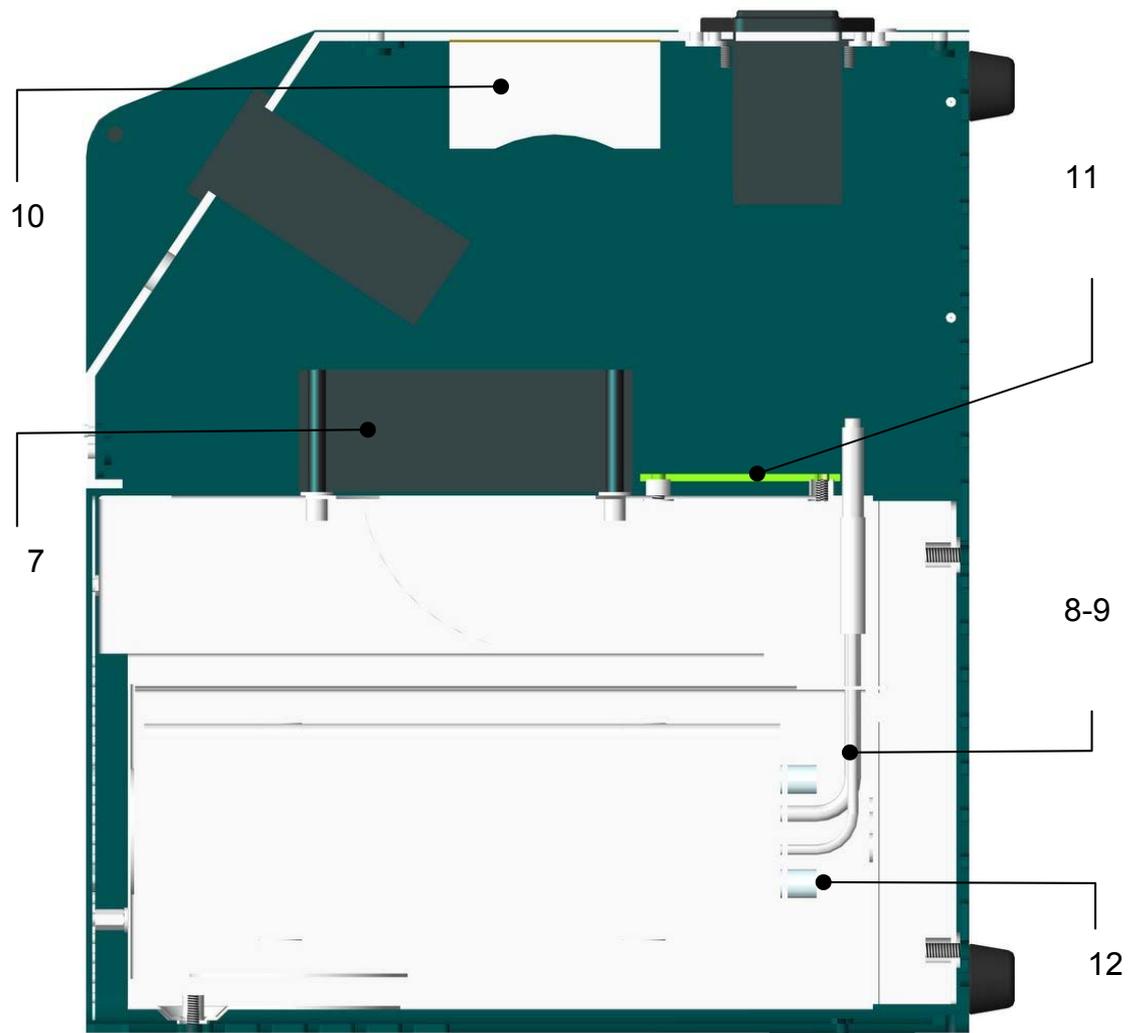
- EN 50081-1 light industrial emission.
- EN 50082-1 industry immunity.
- EN 6101-1 safety requirements for electrical equipment

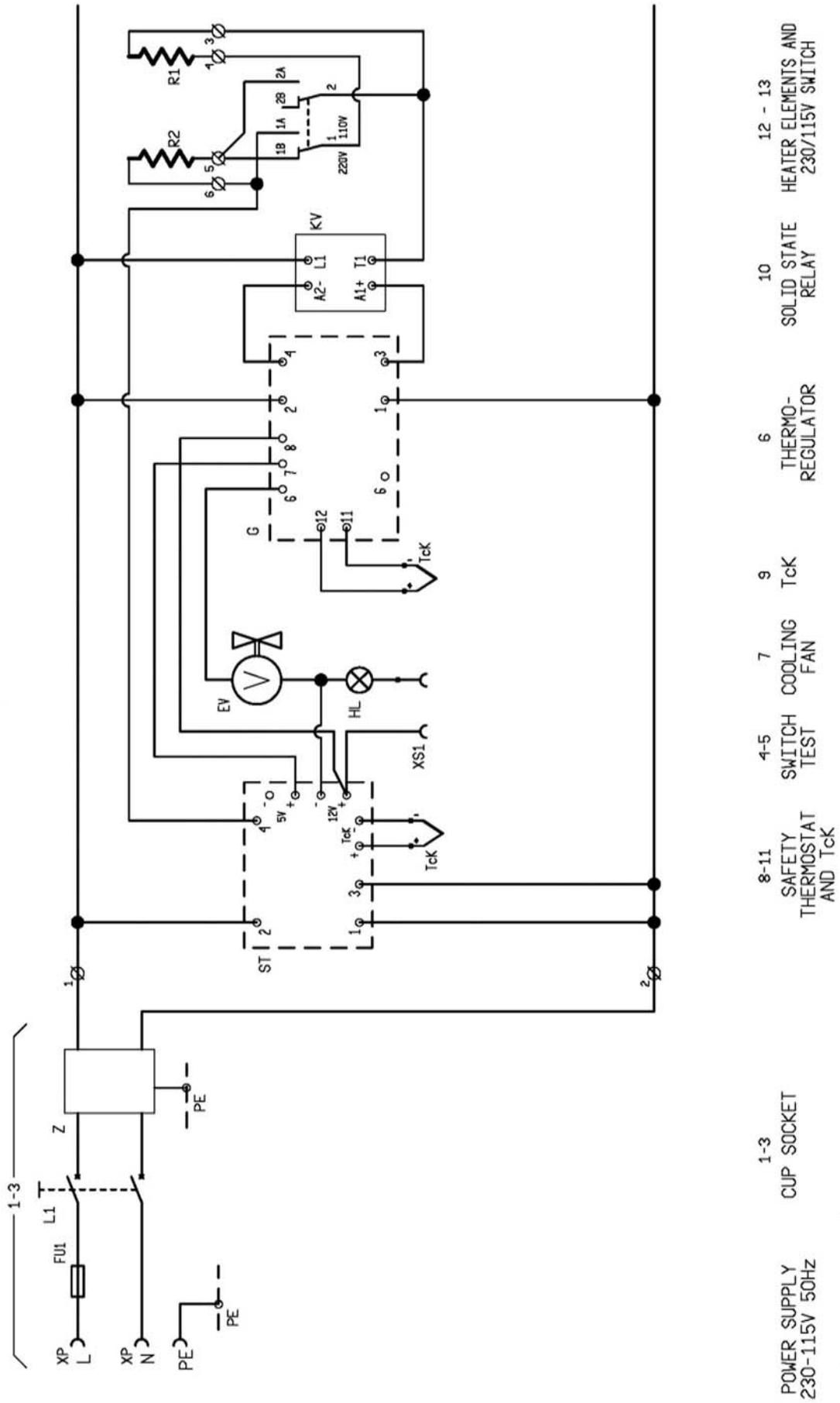
The conformity with the above-mentioned requirements is certified by affixing the CE Mark on the product.

DRUCK & TEMPERATUR Leitenberger GmbH



Gernot Coulon (C.E.O.)
March 2nd, 2009





1-3 CUP SOCKET
 POWER SUPPLY
 230-115V 50HZ

| V ALTH SUPPLY | FUSE |
|---------------|--------|
| 230V | 3.15 A |
| 115V | 6.3 A |

NOTES:

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