

Operating Manual

Dry Block Temperature Calibrator

PYROS Basic 140-1L + PYROS Basic 140-2L



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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 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 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 Basic140 suitable to calibrate and test the temperature gauges.**

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 Basic 140-1L** or **PYROS Basic 140-2L**, 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 20°C
- Stability : $\pm 0,05^{\circ}\text{C}$ 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 : **PYROS Basic 140-2L**: 2 x 13 mm diameter
PYROS Basic 140-1L: 1 x 19 mm diameter
Insertion depth: 104 mm
- Thermostat test : 12 Vdc.
- Power supply : $100 \div 240\text{V}$ 50/60Hz
- Power : 80 W
- Size : 130x280xh260(h)mm
- Package size : 415x570xh235mm
- 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.

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 **PYROS Basic 140** have been designed in conformity with ISO 9000 standard for:

- Control and calibration of temperature sensors, in the laboratory, on board and in the field.
- Calibration of thermostats with light indication when electric contact close.
- Thermal test on materials.

2.4 - Quantity:

1 piece.

2.5 - Constructor:

DRUCK & TEMPERATUR Leitenberger GmbH
Tel. +49 (0) 7121-90920-0, Fax +49 (0) 7121-90920-99
www.LR-Cal.net - E-mail: DT-Export@Leitenberger.de

2.6 - N° of correspondent catalogue sheet: PYROS Basic

2.7 - List of first equipment accessories:

- Standard equipment
 - * **PYROS Basic 140** calibrator
 - * Electric power cable
 - * Tweezers for removing inserts
 - * Fuse kit
 - * Thermostat testing connection cables
 - * Instructions manual
 - * Calibration certificate traceable to national standard
- with **PYROS Basic 140-2L**: * insert [PYROS-140-2L-INS-048](#) with 1 hole ø 4,8mm(3/16")
 - * insert [PYROS-140-2L-INS-064](#) with 1 hole ø 6,4mm(1/4")
- with **PYROS Basic 140-1L**: * insert [PYROS-140-1L-INS-4](#) with 2 holes ø 6,4mm, 1 hole ø 3,3mm and 1 hole ø 4,8mm
 - * insert [PYROS-140-2L-INS-0](#) blank
 - * insert [PYROS-140-2L-INS-032](#) with 1 hole ø 3,2mm(1/8")
 - * insert [PYROS-140-2L-INS-040](#) with 1 hole ø 4mm(5/32")
 - * insert [PYROS-140-2L-INS-048](#) with 1 hole ø 4,8mm(3/16")
 - * insert [PYROS-140-2L-INS-064](#) with 1 hole ø 6,4mm(1/4")
 - * insert [PYROS-140-2L-INS-079](#) with 1 hole ø 7,9mm(5/16")
 - * insert [PYROS-140-2L-INS-095](#) with 1 hole ø 9,5mm(3/8")
 - * insert [PYROS-140-2L-INS-111](#) with 1 hole ø 11,1mm(7/16")
 - * insert [PYROS-140-1L-INS-0](#) blank
- Option accessories
 - for **PYROS-140-1L**:
 - for both models: * [PYROS-KOFFER](#): Marine type suitcase, plastic made
 - for both models: * [PYROS-TASCHE](#): Cordura® soft bag
- Certification: all the instruments are supplied with final testing, stability and accuracy certification traceable to national standards.

3 - SAFETY INSTRUCTIONS

3.1 - Warning

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



- 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.
- Protection grid to avoid any contact with the internal oven.
- Protection fuses (3)
- Ground conductor.

- 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 - GENERAL RECOMMENDATIONS

4.1 - 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 then the temperature of the block otherwise the probe could break.

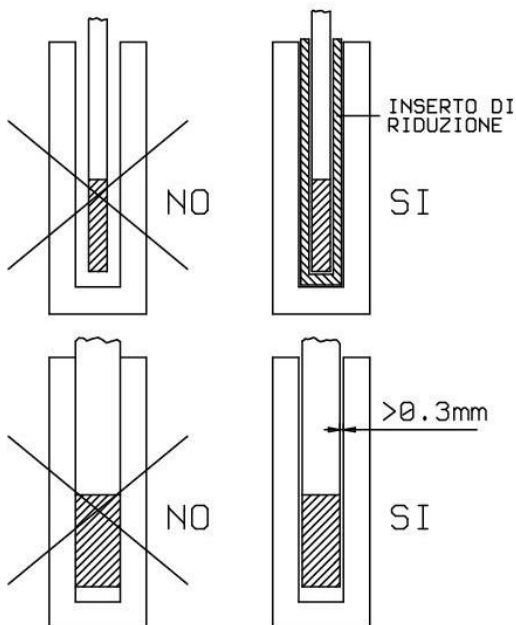


Fig.1

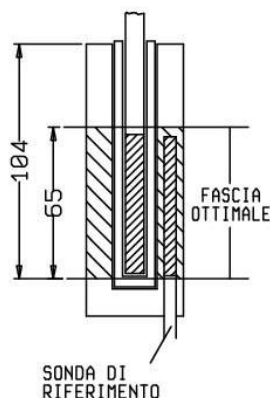


Fig.2

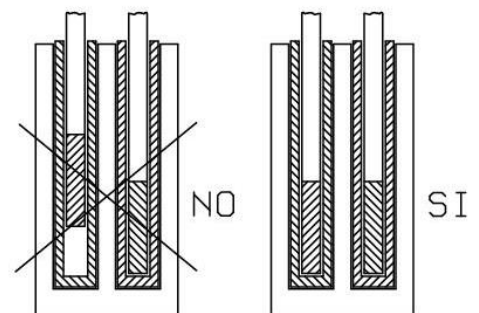


Fig.3

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 + earth, 1,5A Mx.
- 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

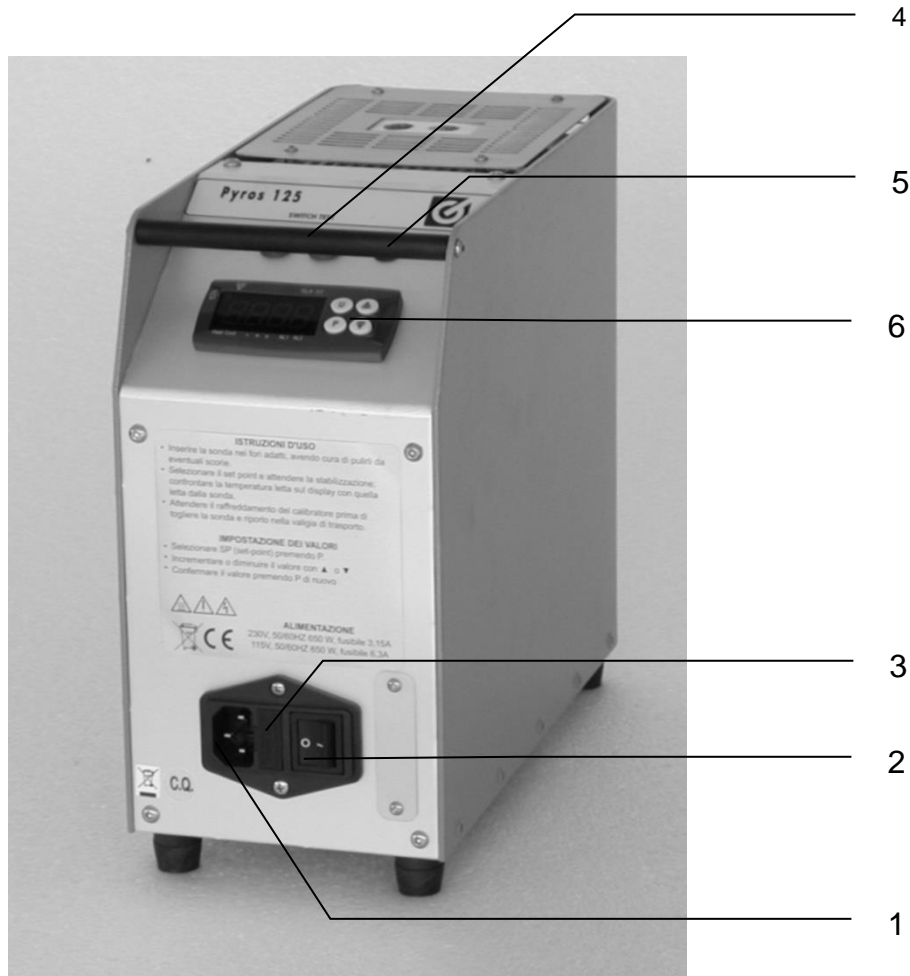
5.1.3 - Supply: 100 ÷ 240V



The calibrator runs on a voltage of 100÷ 240 Vac, 50/60Hz..

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

6 - OPERATION PROCEDURE

6.1 - Operation description

The **PYROS Basic 140-2L** calibrator consist of a metal dry well with two holes (**PYROS Basic 140-1L**: one hole) into which, the inserts available for almost any sensor size to be calibrated, are inserted.

A Peltier devices heat/cool the block and an electronic μ controller with static relay output checks and regulates the temperature.

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

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 .
- **▲ ▼ 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:

MODEL	100÷240V
PYROS Basic 140	1,6A

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 two holes of 13 x 104 mm where introduce the inserts for 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 sensor

The temperature sensor used for the reading and thermoregulation is a Pt100 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.

6.3 - 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):

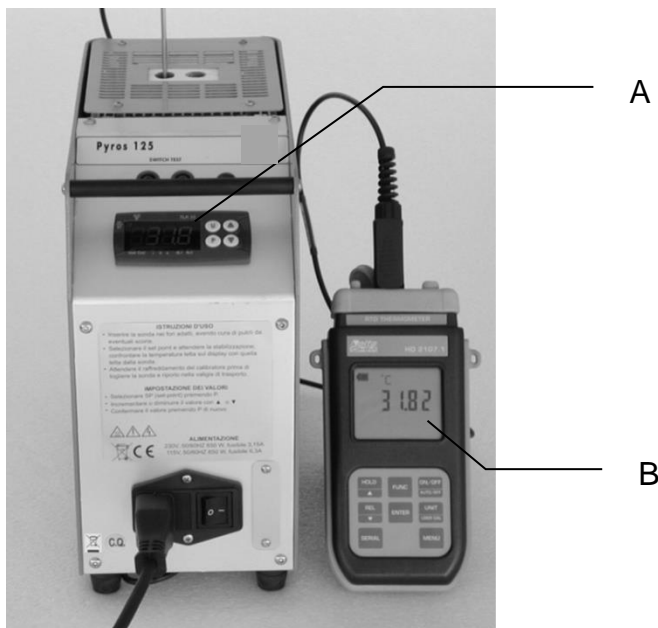
Make reference to the temperature value of the display (6).

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 than the Set Point the **Heat** red led and the – red led and are on.
 - If the temperature is higher than the Set Point the **Cool** red led and the + red led and are on.
 - Wait for the stabilisation of the oven before start with the calibration, the green led is on when the temperature is stable.
 - For a different calibration point, regulate the set point at the new temperature and wait for the stabilisation.
 - 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 the temperature of the standard.
- Do not set the value of SET POINT greater than 100°C above the temperature indicated.**
Example: if the internal temperature is -25°C and you want to reach +120°C, first set a value of about +60°C and when the temperature is close to 60°C, set to +120°C.

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 20°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 10% lower to the operating temperature of the thermostat then follow the instruction here below to set the Set point ramp.

- 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 "rEG" 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 1 minute 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
 - "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 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.

- Temperature measuring unit °F/°C.

- 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 "InP" set of parameters. Select this and press "P".
- Use the arrows to find "Unit" and press "P". **Select with the arrows °F.** and press "P", press ▼ again to return to the parameter "InP". Use the arrows to find the parameter **SP** and press "P".
- Use the arrows to find the parameter "SPHL" and press P, use the arrows in order to change the Mx set from 150°C to 257°F press P. Press ▼ or wait for a few seconds to return automatically to the initial page.
- From now the measuring unit of the temperature is °F.

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 traceable certification.

CALIBRATION OF THE REGULATOR:

To calibrate the **PYROS Basic 140** it is necessary a standard probe.

The two parameters that allows to calibrate the **PYROS Basic 140** are the following :

Par.		Description	Range	Default
15	OFSt	Measuring offset	-1999÷9999	0
16	rot	Rotation of the measuring straight line	0.000÷2.000	1.000

Set a Positive or negative Offset that is simply added to the value read by the probe before visualization, which remains constant for all the measurements:

if instead, it is desired that the offset set should not be constant for all the measurements, it is possible to operate the calibration on any two points.

In this case, in order to decide which values to program on par. **OFSt** and **rot**, the following formulae must be applied:

$$\text{rot} = (D2 - D1) / (M2 - M1)$$

where: M1 measured value 1

D1= visualization value when the instrument measures M1

M2= measured value 2

D2= visualization value when the instrument measures M2

$$\text{OFSt} = D2 - (\text{rot} \times M2)$$

EXAMPLE:

If you want to calibrate the **PYROS Basic 140** to the values 0,0 and 100,0°C proceed in this steps:

Insert a standard thermometer in the oven and set the set point of 0,0°C and

wait until the oven is stable then read the value of the display of **PYROS Basic 140**: 0,0=M1
value of the Pyros

1,1=D1 value of the standard thermometer

Set the set point to 100,0°C and

wait until the oven is stable then read the value of the display of **PYROS Basic 140** :

100,0=M2 value of the **PYROS Basic 140**

99,6=D2 value of the standard thermometer

$$\text{Rot} = (99,6 - 1,1) / (100,0 - 0,0) = 0,985$$

$$\text{OFSt} = D2 - (\text{rot} \times M2) = 99,6 - (0,985 \times 100,0) = 1,1$$

Follow this step to introduce the two values :

- 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 (“**JSF**”); if not, the instrument returns to the condition it was in previously).
- Use the arrows ▼▲ to find the “**]InP**” set of parameters. Select “**]InP**” and press “P”. The display will show **SEnS**, with the key ▼▲ select **OFSt**.
- Use the arrows ▼▲ to set 1,1 (for example) and press **P** to confirm.
- Use the arrows ▼▲ to select **rot** and press **P** to confirm.
- Use the arrows ▼▲ to set 0,985 (for example) and press **P** to confirm.

Wait for 1 minute to exit from the programming menu, the instrument return automatically to the main page indicating the temperature.

Now the calibration is completed.

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. Refer to item 6-5 for the re-calibration.

8 - SEQUENCE OF MAINTENANCE

Not applicable

9 - TYPICAL FAULTS



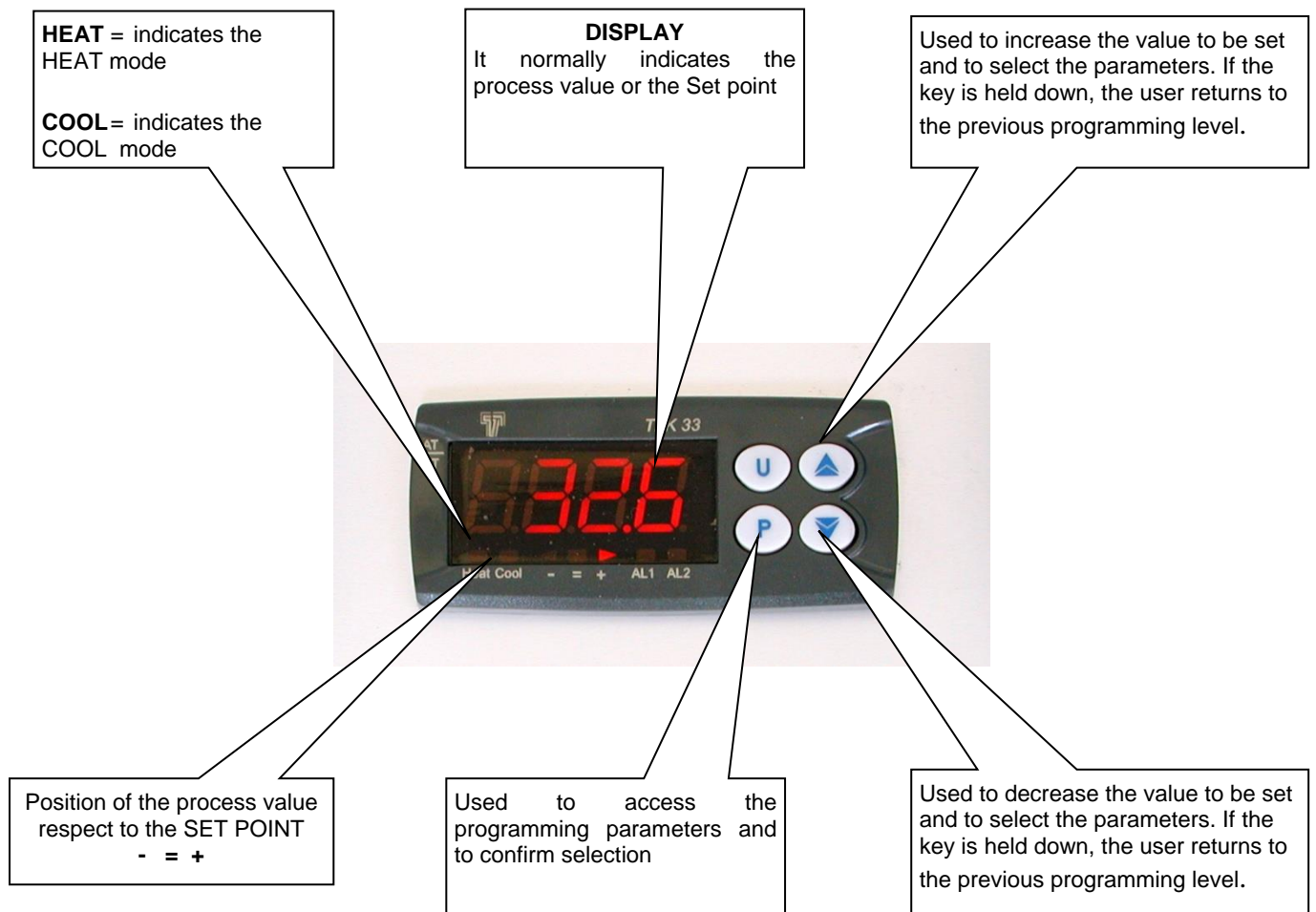
Before carrying out these operations the instrument must be disconnect from the electricity supply and the equaliser block must be at ambient temperature.

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. - Replace the cup socket (1-3)
2	The fuses are triggered when the power cable is connected and the main switch is turned on.	<ul style="list-style-type: none"> - The fuse (3) 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 thermo regulator (6) is faulty 	<ul style="list-style-type: none"> - 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 thermo regulator (6) must be recalibrated -The probe (8) is faulty. -The thermo regulator is faulty 	<ul style="list-style-type: none"> -Recalibrate the thermo regulator -Replace the probe. -Replace the thermo regulator
5	The temperature does not stop at the value of the point.	The thermo regulator (6) is faulty	<ul style="list-style-type: none"> - Replace the thermo regulator
6	The temperature does not decrease/increase to the set value as quickly as it should.	<ul style="list-style-type: none"> - The thermo regulator (6) is faulty. - The fan (7) is faulty. 	<ul style="list-style-type: none"> - Replace the thermo regulator - Replace the fan
7	The display show '-----' or 'uuuu' or 'oooo'	<ul style="list-style-type: none"> - The control probe (8) 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
9	The display does not work	<ul style="list-style-type: none"> - The power supply(9) is faulty 	<ul style="list-style-type: none"> - Replace the power supply

10 - APPENDICES

10.1 -Thermoregulator

Description of the functions



10.2 - Spare parts list(Reference numbers referring to the enclosed drawings)

1-2	CUP SOCKET	3SCH28366
3	FUSES	5x20 - 1,6A
4	SWITCH TEST CONNECTION	3B&BPAN10A
5	SWITCH TEST LAMP	3RSC3693970
6	THERMO REGULATOR	4TCNTLK33GDOO
7	12V FAN	3PPS-3412NGH
8	REGULATION SENSOR	3D2124
9	POWER SUPPLY	3DGMPPS125135
10	PELTIER DEVICE	0D3317

ACCESSORIES

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

