PLB 150

Portable Liquid Bath
User’s Manual

Rev 1.6

INSTRUCTION MANUAL	REL.	DATE
PLB 150	1.6	06/10/2011

VALID FROM SERIAL NUMBER k322 11

INDEX

WARNING

Hazardous voltage are present in this electrical equipment during operation.
Non-observance of the safety instruction can result in severe personal injury or property damage.
Only qualified personnel should work on or around this equipment after becoming familiar with all warnings, safety notices, and maintenance procedures contained herein.
Only qualified personnel or our personnel should work on this equipment for maintenance operation.
The successful and safe operation of this equipment is dependent on proper handing, 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 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: REFERRED TO ACCOMPAINING DOCUMENTS

CAUTION: 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 Bath model: **PLB 150**

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 **PLB 150**, including accessories, as listed. (reference to paragraph 2.7)

2.2 - Technical data:

- Operative range : -35÷ +140°C* (from ambient)
- Stability : ±0.03°C at -10°C *(±0.02°C at 121°C)
- Display resolution : 0,01/0,1°C
- Reading accuracy : ±0,15°C a 100°C*
- Regulation & reading probe : Pt 100 class A din43760
- Auxiliary input : Pt100 and Thermocouples K, J, T, N, E, S, R (model TC)
- Reading : °C, °F or K
- Interface : RS 232
- Well size : 60 x 170mm – Access opening 55 mm dia. 50 cl. Capacity
- Usable liquids : silicone oil or water.
- Temperature ramps : minimum 0, 1°C/1'
- Maximum ascent rate : 3°C/1' *
- Maximum descent rate : 3,5°C/1' * (depending on the starting temperature)
- Thermostat test : 12 Vcc.
- Power supply : 230V ±10%, 50/60Hz (110/115V by request)
- Power : 300VA.
- Fuse : 2,5 A type F (3A F for the model 100/155V)
- Size : 160x330 x H. 370 mm
- Weight of calibrator : 10 Kg.(17 Kg with the package)

- Structure in flanged iron plate with handle.
- Micro-processor operated temperature regulator.
- Switch test.
- Internal oven in stainless steel.
- Electronic control components thermally insulated.
- Forced air cooling system.
- Socket with main cable and protection fuses.
- Electromagnetic compatibility : Emission EN50081-2
  Immunity EN50082-2

NOTE: **The data marked with * has been recorded at an ambient temperature of 20°C±3, power supply 230V±10%, with Pt100 ø3 mm inserted in the bath and with silicone oil 200C5. The above-mentioned data keep valid for one year after the issuing of the calibrating certificate; afterwards it is necessary to carry out the oven re-calibration.**
The minimum temperature depends from the ambient temperature, at 22°C the minimum temperature is –13°C.

Environmental range: temperature +5 a +45°C, U.R. max. 80%

CONTROLLER DATA

* Display : 2 lines 20ch x line (3,2x5,5) back lighting.
* µprocessor : 80C552 (family 80C51 CMOS).
* A/D converter Σ-Δ 24 bits
* E2PROM memory.
* Serial communication RS232 insulated.

2.3 - Services (function):

The portable temperature calibrator **PLB 150** has been designed for:

- Control and calibration of temperature sensors, in the laboratory and in the field, in conformity with ISO 9000 standards.
- Calibration of thermostats with light indication when electric contact close.
- Thermal test on materials.
- Possibility to set temperature ramps.

The calibrator has been designed to reduce the EMC effect in accordance with the harmonised regulation for residential, commercial, light industry and heavy industry.
N.B: The PLB 150 with the software AQ2sp for Windows™ can carry out:

- ◊ complete control of the oven from the PC
- ◊ manual or automatic calibration of one or more probes
- ◊ cyclic life or stress test on temperature sensors
- ◊ Test of thermostats to check the opening and closing of the switch
- ◊ filling and printing of the results obtained, guaranteeing that the ISO 9000 standard are observed

2.4 - Quantity:

- 1 piece.

2.5 - Manufacturer:

Eurotron Instruments (UK) ltd
Unit 13 Riley Close
Royal Oak industrial Estate
NN11 8QT Daventry
United Kingdom
www.eurotron-uk.com
sales@eurotron-uk.com
T + 44 (0) 1327 871044
F+ 44 (0) 1327 301255

2.6 - N° of correspondent catalogue sheet:

PLB-D-V03 (February 12)

2.7 - List of f**irst equipment accessories**

- Standard equipment *(codice: PLB 150)*
  - * **PLB 150** calibrator
  - * Silicon oil 200C5
  - * Closing top using for transport
  - * Fluid emptying system
  - * Support for probes
  - * Electric power cable
  - * Kit of fuses
  - * Kit of clamp-screw adapter for bushes (only version TC)
  - * Thermostat testing connection cables
  - * Instructions manual
  - * Calibration certificate traceable to International Standard
  - * Vinyl transit case
  - * RS232 cable
  - * Software AQ2sp

2.8 – Ordering Code

PLB150-TS-230-UK	Portable Liquid Bath, -35/140C TS version 230 V
PLB150-TS-115-US	Portable Liquid Bath, -35/140C TS version 115 V
PLB150-TS-230-EU	Portable Liquid Bath, -35/140C TS version 230 V
PLB150-TC-230-UK	Portable Liquid Bath, -35/140C TC version 230 V
PLB150-TC-115-US	Portable Liquid Bath, -35/140C TC version 115 V
PLB150-TC-230-EU	Portable Liquid Bath, -35/140C TC version 230 V
INSERTS	
PLB-INS-01	Insert: Blank, PLB150/250- , Ø 60 x 170 mm
PLB-INS-02	Insert : PLB 125/200- Ø 2 x4 -4.5-5.5-6.5-8.5-10.5-12.5mm
PLB-INS-03	Insert : PLB 125/200- Special (please contact us)
PLB-INS-IR	Insert: PLB 125/200- Black Body Insert
PLB-INS-ST	Insert: PLB 125/200- Surface Temperature Insert
PLB150-INS-IC	Insert: PLB 125- Zero Reference Insert
OPTIONS	
PLB-TC-OPT-01	SRS-PRT-45-190B reference sensor and special UKAS calibration
ACCESSORIES	
PTB-CASE-02	Aluminium Case for PTB/PLB series

3 – GENERAL RECCOMENDATIONS

➔**ATTENTION:**
The temperature adjuster has been configured in the factory with the parameters that are suitable to obtain performances that go will in the entire PLB 150 field.
Modification of these parameters could cause malfunctioning or breakage of the equipment with consequent risk of damage to objects or injury to persons.

Notes about the filling of the calibrator:
Before filling the bath, be aware of fundamental things regarding the liquids that can be used:

3.1 - Liquids

The PLB 150 calibrator is suitable in a field from temperature below Zero up to 140°C, different liquids can be put into the bath but not many can work on the entire calibrator field.
Before using the calibrator check the temperature field of the liquid to be used and always remain under the safety limits. The upper temperature limit is conditioned by vaporisation, smokiness, flammability and chemical deterioration of the liquid. The inferior temperature limit is conditioned by freezing of the liquid.
The principal features of a liquid for constant-temperature baths are: the temperature field, viscosity, specific heat, thermal conductivity, the thermal expansion, the dielectric resistivity, life span, safety, etc.

3.1.1 - Recommended temperature field

The recommended temperature field of the principal liquids which can be used with PLB 150 is shown in the table. It depends principally on the equipment in which it is used. Normally the temperature field of a liquid is greater than the one shown in the table but out of these values some features of the liquid can jeopardise functioning inside the PLB 150.

Liquid	Recommended field	Liquid	Recommended field
Water	10/80°C	Silicone 47V20	20/125°C (130C**)
Silicone 200C5	-20/125°C(136°C **Mx***)	Water/glicol 54%	-20/+70°C

*over the **Mx** value steam triggers combustion in the presence of a naked flame.

** smokiness increases considerably above this temperature value

3.1.2 - Viscosity

Viscosity is the property of fluids that indicates its resistance to mixing and it depends on the type of fluid and the temperature.
The more viscous the fluid, the more difficult the mixing of the fluid and consequently the distribution of a uniform temperature inside the bath.
Liquids with a viscosity higher than 10/20 centistokes do not allow good performance of the bath, therefore they should be avoided in the PLB 150. Oil viscosity is established at room temperature, the value for water at 20°C is 1 cst, for 47V20 oil it is 20 cst, for glycol it is 5cst and for 200C5 it is 5 cst.
Remember that viscosity, especially in oils, varies considerably when the temperature changes: this is the reason that characterises the use of oil in a well-defined field: normally the oils become more viscous when the temperature drops, creating problems in mixing and uniform distribution of the temperature.

3.1.3 - Thermal expansion

Thermal expansion indicates how liquid volume changes with variation of the temperature.
It is an important factor especially regarding oils, which increase in volume with increase in temperature. Read the filling instructions and do not fill over the values indicated because thermal expansion could cause the liquid to escape from the bath.
Silicone oils increase by about 10% with respect to their initial volume with a temperature increase of 100°C.

3.1.4 - Life Span

The life span that you can expect depends on many conditions: evaporation, chemical deterioration, gelling, etc.
The life span of an oil becomes shorter because the higher the temperature the greater oxidation of the oil in contact with the air.
To increase the life span:

1. use the most suitable oil at high temperature for the shortest time possible
2. place a lid with holes on the bath to allow passage of the probes, in order to limit contact between the hot oil and air.

For example: continuous use at 125°C, in open bath conditions, of 200C5 silicone oil cause deterioration in a few tens of hours; with the deterioration of its conditions the viscosity increases considerably; at temperature below zero the 200C5 oil becomes doughy and mixing in the PLB 150 is impossible.

3.1.5 - Bath filling

Fill the calibrator with the suitable fluid depending on the field of calibration. The liquid we recommend is 200C5 silicone oil. Fill the bath with about 42-43cl of oil. Do not exceed the recommended quantity, as thermal expansion at the high temperatures could cause the liquid to escape from the upper opening.
Using 200C5, bath performances are optimal in the field from 50°C to 160°C, but with a fumes suction device it can be used up to 125°C limiting the running time to the highest values in order to increase the life span, while at a low temperature the viscosity, even if high, allows good functioning of the PLB 150, adjusting the magnetic stirrer to maximum speed.
If the liquid is often used at high temperatures, we suggest you realise a lid with holes that allow passage of the probes and place it on the bath.
Before replacing the liquid in the calibrator with a different one, it is recommended to clean the container with absorbent paper in order to prevent mixtures of different liquids that worsen the operating conditions and, most of all, cause the liquid to leak due to incompatibility of the maximum temperature.

3.1.6 - Stirrer adjustment

The rotational speed of the magnetic stirrer can be adjusted using knob 6.
The speed increases with a clockwise movement. Adjustment is based on the vortex produced in the liquid: an ideal vortex should be about 2cm high.
The rotational speed should be raised, at low temperatures, when high viscosity silicone oil is used. At high temperatures reduce the rotational speed in order to prevent having vortexes that are too high causing the liquid to escape.
Switch the PLB 150 off if rotation is blocked, adjust the speed controller to maximum and switch the calibrator on again.
If it still doesn't work, perform the maintenance indicated in chapter 7-8.

3.1.7 - Notes regarding positioning of the probes:

In order to get the best performances in the calibration, observe the following recommendations:

1. Verify that the probe is inserted for about 140÷150 mm, avoiding touching the bottom.
2. As for the calibration by means of a reference sample, it is necessary to position the two probes, respectively the sample one and the probe to be calibrated, at the same level and as close as possible.
3. Do not insert the probes in the centre of the tank as they interfere with stirring.
4. Always verify the operating range of the probes and thermostats before calibration; only introduce them into the liquid if the calibration range is compatible with the temperatures set on the instrument. (For example: introducing a probe with a range of 0÷50°C into a liquid at a temperature higher than 120°C could determine the breakage of the probe's sensitive element).3.1.8 - Recommendations:

1. Do not close the container when the temperature is very high; wait for the temperature of the liquid to reach room temperature and then close using the appropriate lid.
2. Avoid transporting the PLB 150 calibrator without having emptied and closed it beforehand, following the previous recommendations.

- The lid is equipped with a shut-off valve calibrated at 10mbar to let out vapours. The valve cannot hold the liquid; therefore avoid transporting the FLUID containing liquid because in the case of overturning the liquid would escape through the bleeder valve.

4 - SAFETY INSTRUCTIONS

ATTENTION:

- Due to the fact that the thermostat is a portable instrument, 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 disconnected from the electric power.

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

- Don't change absolutely the configuration parameters.
- Do not operate the instrument in an excessively wet, oily, dusty, or dirty environment.
- Do not connect any voltage to the input (4-5-15)

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

- Protection fuse (3)
- Thermal fuse to protect the container in case of over-temperature
- Ground conductor.
- Closing tap for the transport

Suggest:

- Don't put anything on the top of the calibrator.
- Don't put fuel object near the calibrator.
- If the bath is operating at high temperature, a fume hood should be used to remove any vapours given off by hot bath fluid.
- Never put any type of liquid unless water or silicon oil inside the calibration block.

..... use common sense any time.

AFTER ANY USE AT HIGH TEMPERATURE, BRING THE SET POINT TO ROOM TEMPERATURE LETTING THE CALIBRATOR GO TILL IT'S COLD

AFTER ANY EXTENDED USE AT A TEMPERATURE BELOW ZERO, BRING THE SET POIN TO ABOUT 95-100°C LETTING THE CALIBRATOR WORK TILL THE WATER INSIDE OIL HAS COMPLETELY EVAPORATED.
USING THE CALIBRATOR AT A TEMPERATURE BELOW ZERO FOR A LONG TIME WITH HIGH ENVIRONMENTAL HUMIDITY NEEDS IT TAKES A LONG TIME TO EVAPORATE THE WHOLE WATER INSIDE OIL (more than one hour could be necessary)
AIR HUMIDITY WHEN THE OIL HAS A LOW TEMPERATURE CONDENSES ON OIL SURFACE IN THE SHAPE OF ICE CRYSTALS.
AT 95-100°C THE FORMATION OF FOAM MEANS THAT THE WATER INSIDE OIL HAS EVAPORATED

5 - PREPARATION OF OPERATION

- Remove the calibrator from the carrying case and place it on a flat and level surface.
- Make sure that the instrument has been correctly earthen.
- Supply the oven with line 2A- 230V, 50Hz (110 o 100V where required) + earth.
- Before start the calibration read with attention the instruction manual, specially the paragraph 3: - General recommendation -.

5.1 - Installation

5.1.1 - Removal of packaging

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

5.1.2 - Positioning the calibrator

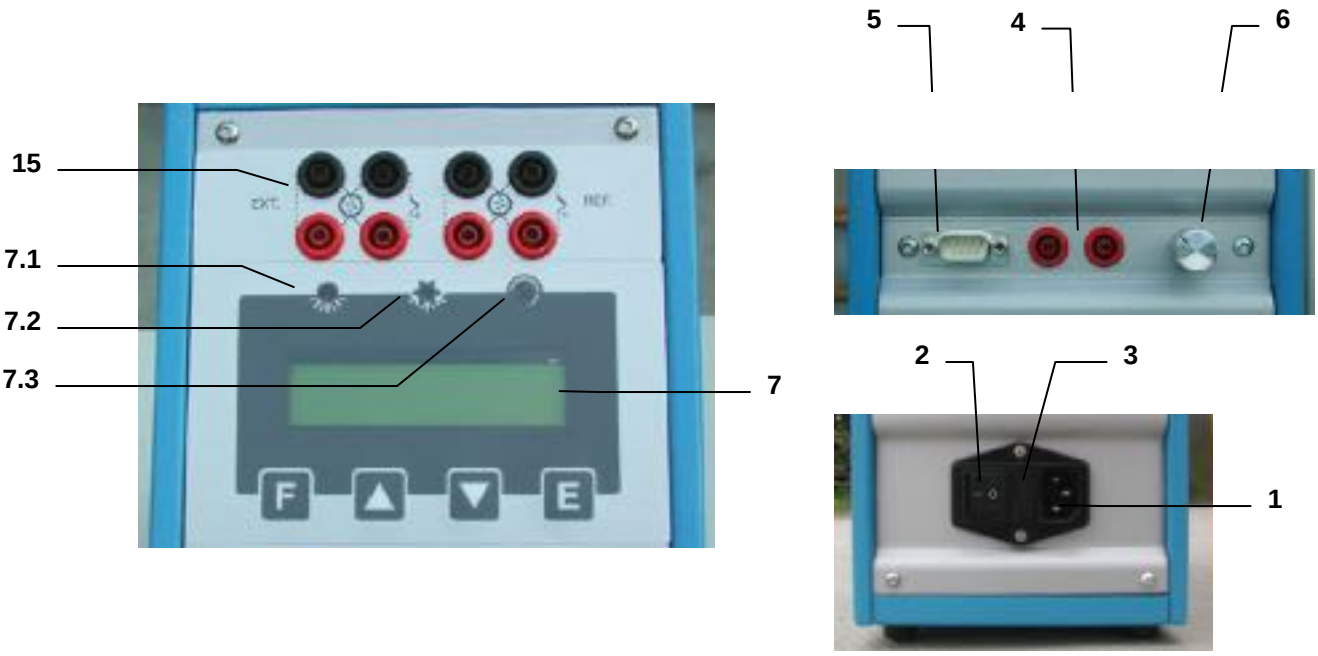
Position the calibrator in a safe clean place.

****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 or to use a fume hood to remove any vapours given off by hot bath fluid.

5.1.3 - Supply

The calibrator runs on a voltage of 230 Vac (110-100V by request), single-phase, 50/60Hz.
A 2.5mt. cable is supplied with the calibrator fitted with 2 conductors plus earth ($2.5mm^2$).
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 PLUGS
5	RS232
6	MIXER SPEED CONTROL
7	DISPLAY
7.1	HEAING LED
7.2	COOLING LED
7.3	SWITCH TES LED
15	EXTERNAL PROBES SOCKETS (OPTIONAL)

6 - OPERATION PROCEDURE

6.1 - Operation description

The **PLB 150** calibrator consist of an Aluminium block with one hole into which the sensors to be calibrated are inserted. The capacity of the Fuid is 500cc.
A heater element heats the block and an electronic μcontroller with triac output checks and regulates the temperature. Liquid stirring is ensured by a magnetic system. A grid, to prevent the inserted probes from stopping its operation protects the stirrer. A speed adjustment system is supplied, to ensure the best homogeneous condition, according to the type of fluid used.
A fan mounted in the bottom side generates a constant air flow that reduces the temperature of the case.

6.2 - Description of instrument

6.2.1 - Thermoregulator

The thermo regulator (7) is a PID microprocessor which can be set from -20 to 125°C. The upper display shows the measured value while the lower one displays the input set point value.
For further specifications and methods of use, see the paragraph 10.1 concerning the thermo regulator.

6.2.2 - Main switch

The main switch (2) is found on the front of the instrument; it is fitted with a socket for the voltage cable, a main switch and one fuse (2,5A for model at 230V).
Note: use only fuses F. 5x20mm. All the electrical part is found below the main switch.

6.2.3 - Carrying handle

The calibrator is fitted with a carrying handle

6.2.4 - Liquid container

The capacity of the container is about 500 cc.
Follow the indication of chapter 3 to fill the container with the suitable calibration liquid.
The magnetic stirrer inside the container makes the temperature of the liquid homogeneous in order to have the best performance. A metallic grid protects the magnetic stirrer.

6.2.5 -Temperature sensor

The temperature sensor used for the reading and thermoregulation is a PT100Ω probe; the probe is inserted directly into the aluminium container.

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 (8), or calibration with external reference.

Calibration with the internal indicator (7):
Make reference to the temperature value of the display (7) (fig.2).
It is opportune to refer the value to the test report to compensate the error of the display.

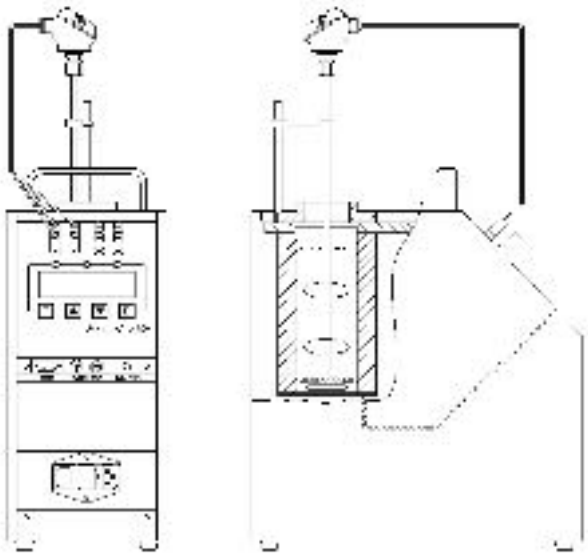


Fig.2

Calibration with external reference and reading on the calibrator display:
Make reference to the temperature value of the external standard instrument inserted in the container and connected directly to the FLUID (Fig.3); temperature is read on the second line of display (for the configuration of the external reference seeing 10.1). When possible: put the sensitive elements of the probes near and at the same dept (reference to Fig.3)

Calibration with external reference and reading on an external instrument:
Make reference to the temperature value of the external standard instrument inserted in the container and connected to an external instrument (Fig.3). When possible: put the sensitive elements of the probes near and at the same dept (reference to fig.3).

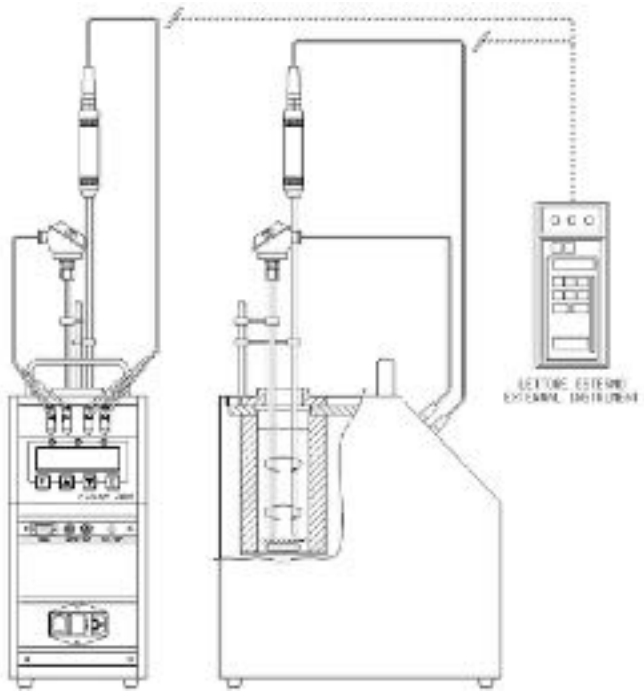


Fig.3

Before any calibrations follow the general recommendation (chapter 3):

- Starting the calibration only at ambient temperature: thermal shock can break the sensitive element of the probe and cause harm to operator.
- Put the probe to check into the bath: reference to chapter 3.
- Switch on the calibrator with the main switch (2); waiting for the end of auto test procedure.
- Set the required temperature value on the display:

  ◊ Press the ▲ key to increment the set point value.

  ◊ Press the ▼ key to decrement the set point value.

  ◊ **Press the - E - key to confirm the input value.**

- It is advisable to wait for the stabilisation of the oven before starting any calibration.
- Adjust the stirrer with the knob 6 for the best performance. The fluid must be mixed well for good temperature uniformity and fast controller response. Set the knob in middle position to start.
- The display shows the temperature of the calibrator and the set-point; when the temperature is reached and it's stable, the display shows the symbol ÷
- For different calibration point, regulate the set point at the new temperature and wait for the stabilisation.
- The temperature indicated by display must not be considered as a reference temperature but only as a general indication of the temperature inside the bath.
  We suggest to insert one primary standard with SIT certificate in the bath and compare the measure with the values indicated by the standard.
  In case the FLUID200 is connected with an external probe SIT certificated (ref. 6.4.1), the calibrator/probe system is considered a primary standard.

N.B: To modify the regulation parameter or to set the ramp, see the instructions on chapter 10.1.

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 moving the calibrator make sure that the temperature of the liquid is close to the ambient temperature and the closing cap is well tightened.

- Cooling

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

6.4 - Use of the function

6.4.1 - Reading the external probes (only for model –TC)

It is possible to display one or two probes tied to the EXT and REF inputs.
The following probes can be connected:

1. THERMOCOUPLES TYPE J, K, R, S, N, E with automatic compensation of the terminal clamp temperature.
2. THERMAL RESISTANCE Pt 100 to 2, 3 or 4 wires.

- Connect the probe's wires to the clamps (15) as it is indicated in the figures.
  - ◊ Thermocouple – connect the wires to the clamps 2-4 to make attention to the polarity; connect the clamps 1-3 as indicated. Reference to Fig. 6-A and select the thermocouple.
  - ◊ Pt100 to 4 wires – connect the clamps 1-2-3-4 as indicated in Fig. 6-B and select Pt100.
  - ◊ Pt100 to 3 wires – connect the wires to clamps 1-2-3; connect the clamps 3-4 . and select Pt100 3W. Reference to Fig. 6-C
  - ◊ Pt100 to 2 wires – connect the wires to clamps 2-4; connect the clamps 1-2 & 3-4; select Pt100; In case of two wires connections remembers to us shortest wires possible. Refer to Fig. 6-D

- In order to read the external probe's temperature press the **F** key up to read SENSOR, select EXT or REF or EXT + REF then confirm with E key. Press the ▲ and **F** keys together to jump to the second level of the parameters, press **F** to read EXT SENSOR TYPE and REF SENSOR TYPE and press the ▼ and the ▲ keys to select the probe; the temperature will be displayed on the at the bottom of the display.
- Press the ▲ and **F** keys together to jump to the first level again , the temperature will be indicated on the bottom of the display.
- In order to read in the '°F' way, refer to the procedure explained in paragraph 10.1 till **Units°C/°F/K**; the conversion of the new scale will be carried out at once.

NOTE: The calibrator always thermally adjusts with the control probe situated inside the block.

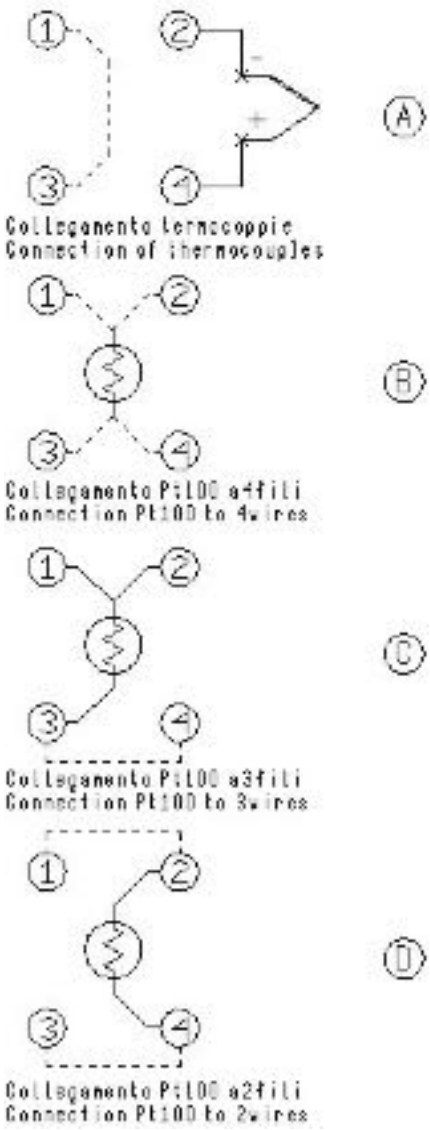


Fig. 6

MESSAGE OF ERROR OF THE EXTERNAL PROBES DISPLAY
The display in the case of connection or configuration errors indicates:
EST SENSOR FAIL : wrong connection or configuration of the EXT probe
REF SENSOR FAIL: wrong connection or configuration of the REF probe
SENSORS FAIL: wrong connection or configuration of the REF and EXT probes

Do not connect any voltage higher than 5 V to the input 15

6.4.2 - Switch test

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

- Put the thermostat in the container avoiding touching the bottom. (see the note in paragraph 3).
- Connect the terminals of the thermostat to the socket (4).
- Switch on the calibrator.
- Set the test temperature upper to the operating temperature of the thermostat: the lamp (7.3) will come on when the thermostat electric contact works.
- The instrument store the switch test value. Follow the instruction and the flow chart on chapter 10.1, up to SW ON - SW OFF to display the stored values.
- Push on together the ▲ & ▼ keys to reset the value of 'SW. ON - SW. OFF'.
- See chapter 10.1 for ramp generation.

Do not connect any voltage higher than 5 V to the input 4

6.4.3 - Serial communication RS 232

For PC control use the serial communication RS 232 (5) (references fig.7)
With RS232 you can read and/or change the operative parameters, for example: set point, external probe, slope rate etc..
Reference to communication protocol instruction (chapter 10.2).

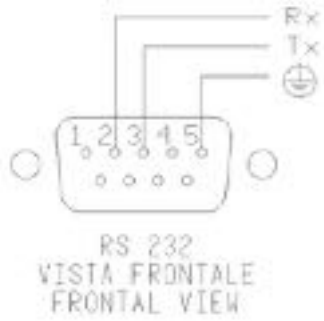


Fig.7

The external PC must be conform to the IEC950 standard

NOTE: use the RS 232 cable with the pin 2 and 3 crossed.

7 - MAINTENANCE INSTRUCTIONS

7.1 - Routine inspections instructions

- Check once a month the level of the liquid inside the container.
- Check once a month the liquid and change it if exhausted.
- 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 the instrument is necessary to have a standard temperature instrument, the software 'CALIBRA' and follow the instructions of the software or alternately follow the instructions of item 10.1.

8 - SEQUENCE OF MAINTENANCE

1. The level of the liquid is about 30mm under the top edge(ambient temperature): If the liquid level is low fill up the level with the same liquid (ref. to chapter 3)
2. If the liquid is dirty, thick or exhausted at ambient temperature it is advisable to change it. To change the liquid proceed with the emptying, cleaning a filling again:

Emptying of the liquid from the calibrator(ref. to pictures)
To remove completely the liquid from the calibrator reduce the temperature to a value which is close to the ambient temperature; remove (fig 1) the air valve (14) from the closing cap(11) and replace it with the appropriate pipe(fig 2). Screw the cap of the container and overturn the calibrator by making the liquid leak (collect it inside a container having adequate dimensions).

fig 1

Cleaning of the grid inside the well:
To take off the grid it is necessary to unscrew the insulating ring nut, remove the spring (fig 3) and then hook the grid with a wire(fig 4).
Under the grid there is the stir bar for mixing the fluid.
Clean the well with a paper towels before mounting and filling again.

fig 2

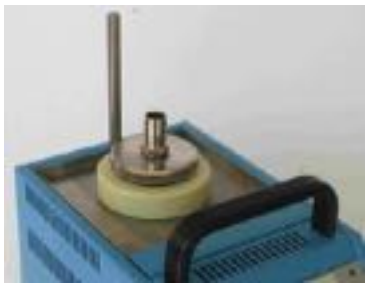
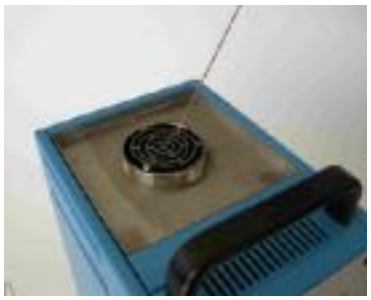


fig 3

fig 4



Filling
Follow the instructions of chapter 3

For the retrieval of the exhausted liquid use petrol tank in plastics.
Don't disperse in the surrounding.
The excesses, the refusals and the containers must be eliminated according to the dispositions of the laws.

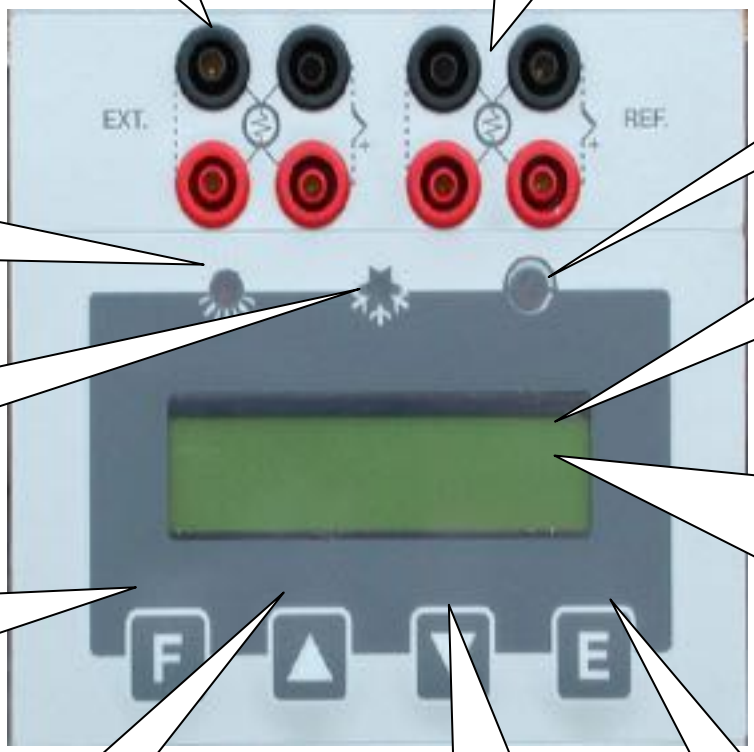
9 - TYPICAL FAULTS

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.	- 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.	- There is a short circuit in the supply card (12). - The main switch is faulty.	- Replace the supply card. - Replace the cup socket.
3	The control panel is working properly but the temperature does not increase.	- The thermo regulator (7) is not generating a signal. - The supply card (12) is faulty.	- Replace the thermo regulator - Replace the supply card
4	The display show a different temperature from the one measured in the well.	- The thermal element (8) is faulty. - The thermoregulator (7) is faulty.	- Replace the thermal element. - Replace the thermoregulator.
5	The liquid is not mixed. Differences of temperature inside the bath.	- Magnetic stirring off - Magnetic stir bar dirty - The liquid is exhaust because of too long use at high temperature	- Turn off the calibrator then turn on again and adjust the speed control 6 - Clean the well and the stir bar if dirty, (ref to chapter 7) - Change the liquid
6	The display shows MEMORY FAIL	- RAM error caused by electrical noise	-Replace the card (7) and calibrate the Bath
7	The display shows "internal sensor fail"	- The internal probe(8) is faulty	Replace the probe (8) and calibrate the Bath
8	The temperature does not stop at the value of the point which has been set.	- The supply card (12) is faulty (triac cut off).	- Replace the supply card.
9	The temperature does not decrease to the set value as quickly as it should.	- The supply card is faulty. - The cooling fan (19) is faulty.	- Replace the supply card. - Contact our technical office.

10 - APPENDICES

10.1 - Frontal panel description



EXTERNAL PROBE INPUT
Selectable between Pt100, Pt100 3W, Tc K, Tc S, Tc N, Tc J, Tc E, Tc R type according to the probe you calibrate

REFERENCE PROBE INPUT
Selectable between Pt100, Pt100 3W, Tc K, Tc S, Tc N, Tc J, Tc E, Tc R type according to the probe you calibrate

SWITCH TEST LED
When the led is on the thermostat's contact is closed

HEATING LED
When the led is on the calibrator increase the temperature

DISPLAY 1
It shows the value of the variable temperature or the engineer unit

COOLING LED
When the led is on the calibrator decrease the temperature

DISPLAY 2
- Indication of the value of the set point.
- Indication of the external probe if selected.
- During the program operation it shows the parameter selected by the 'F' kev.

Access to the function menu.
Pressed with the key ▲ it let you enter to the 'Set Up' menu

It increase the value showed on the display 2. If you keep pressed the key "UP" the speed of increase rises

It reduce the value showed on the display 2. If you keep pressed the key "DOWN" the speed of reduce rises

Confirmation of the values

DESCRIPTION OF REGULATOR'S MENU
The calibrator has three menu levels(see image 10.2):
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 typical functions for each calibrator and the calibration procedures.

1st MENU LEVEL

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

- **SP**
  SET POINT: temperature set which the oven has to reach following technical specifications, press the ▲ or ▼ key to adjust the set point and press **E** key to accept new the new value.

- **SP2**
  SET POINT2: temperature set which the oven reaches with the set gradient and the ongoing launched ramp procedure, press the ▲ or ▼ key to adjust the set point and press **E** key to accept new the new value.

- **GRAD**
  GRADIENT: set point variation speed during the change from one temperature value to the SP2 value, press the ▲ or ▼ key to adjust the set point and press **E** key to accept new the new value.
  The set gradient must be negative for descent ramps.
  NOTE: gradient values to be set must be lower than the ones stated in the technical data, at point 2.2 (cooling grad. max.: -7°C/min.; heating grad. max. 18°C/min).

- **RAMP**
  Ramp procedure enabling/disabling.
  Select ON or OFF by the ▲ or ▼ key and press **E** key to accept; the oven will reach the set SP2 temperature with the set gradient, starting from the same temperature as the one with which the ramp has been confirmed. The starting temperature does not depend on the Set Point temperature.
  If a negative ramp is set put the gradient is left positive and/or the SP2 is higher than the current temperature, the little over will not accept the ramp start and an alarm will begin running.
  When the ramp is on, the display will show the word "**Ramp:.....**" followed by the Set Point value on the second line of the text. The Set Point value will reach the speed related to the set gradient.
  When the block temperature reaches the SP2 set temperature, the oven will produce an alarm and the ramp procedure will be automatically set off; the SP2 value will be considered as the new set point value and the oven will be steadily set at that temperature.
  During the ramp process, the derivative parameter will not be considered.

  RAMP PROCEDURE EFFECTIVE EXAMPLE
  Let's say that the set temperature is the ambient one and that it is necessary to reach 400°C with a gradient of 2°C/min.
  - Press the **F** key and set **SP2** to 400°C using the ▲ or ▼ keys. Press the **E** key to accept.
  - Press the **F** key and set **GRAD** to 1°C/min using the ▲ or ▼ keys. Press the **E** key to accept.
  - Press the **F** key and set **RAMP** to **ON** using the ▲ or ▼ keys. Press the **E** key to accept.
    After pressing the E key to confirm the ramp start, the oven temperature will ascend with the set slope. 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.

- **RIS. 0.1/0.01**
  Display reading resolution; Press the ▲ or ▼ key to select 0,1 or 0,01 and press **E** key to accept.

- **SW. ON**
  Switch on; displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" is closed.

- **SW. OFF**
  Switch off; it displays the temperature at which the thermostat connected to the terminals "SWITCH TEST" is open. The value is reset each time the power supply fails or by pressing the two "▲ ▼" keys at the same time. The value is updated every time that the contact closing is detected.

- **SENSOR (OFF/EXT/REF/EXT+REF)**
  This parameter allows enabling the reading of sensors on the auxiliary inputs:
  OFF no input is enable to read the sensors' value.
  EXT the four terminals of the input EXT are enabled to read the sensor tied to them, whose value is indicated at the bottom of the Display.
  REF the four terminals of the input REF are enabled to read the sensor tied to them, whose value is indicated at the bottom of the Display.
  EXT+REF the eight terminals of inputs 1 and 2 are enabled to read the sensors tied to them, whose value is indicated at the bottom of the Display.

2nd MENU LEVEL

PRESS THE **F** + ▲ KEYS AT THE SAME TIME TO ACCES THE SECONDARY MENU.
PRESS THE **F** KEY TO STEP THROUGH THE MENU.
PRESS THE "**F** + ▲ KEYS AT THE SAME TIME OR WAIT FOR ABOUT 20 SECONDS TO COME BACK THE PRIMARY MENU

- **P.B.**
  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.

- **T.I.**
  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

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

- **EXT SENSOR TYPE: J, R, S, N, K, E, Pt100, Pt100 3wires**
  This parameter allows selecting the kind of sensor read by the display and connected to the four Ext. terminals.(item 6.4.1)

- **Units °C/°F/K**
  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. Par. 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.

- **REF SENSOR TYPE: J, R, S, N, K, E, Pt100, Pt100 3wires**
  This parameter allows selecting the kind of sensor read on the display and connected to the four REF. Sensor terminals.(item 6.4.1)

- **KEY**
  This is the key to step the third menu level. Press ▲ or ▼ key to set the number recorded in the " **ACCESS KEY** parameters at the third menu level, and press "**F**" + ▲keys at the same time (*it is not necessary to confirm the choice by pressing the E key*) to step to the third menu level. The acceptable values are from 1 to 99: **the default set value is 2. If you lost the access key remember that it is possible to have the number by reading the register 13 (item 10.3)**

3rd MENU LEVEL

MENU THAT CAN BE SELECTED BY PRESSING THE "**F** + ▲" KEYS AT THE SAME TIME WHEN THE **KEY** PARAMETER IS REACHED AT THE SECOND LEVEL AND WHEN THE SET VALUE CORRESPONDS TO THE RECORDED ONE.
PRESS THE **F** KEY TO STEP THROUGH THE MENU.
PRESS THE "**F** + ▲ KEYS AT THE SAME TIME OR WAIT FOR ABOUT 20 SECONDS TO COME BACK THE PRIMARY MENU

- **ACCESS KEY**
  Access key; numerical value from 1 to 99 that enables passing to the third parameter level. **The default value is 2**

- **BAUD RATE**
  Data transmission speed from the computer. Values are from 2400 to 19200 **(default value is 9600).**

- **ADDRESS**
  Communication address. The value of this parameter is necessary to communicate from the computer to many instruments. The admitted values are from 1 to 32 and once the value is set by using the ▲ or ▼ keys it is necessary to confirm the choice by the **E** key

- **S/N**
  Equipment serial number. It is set by the manufacturer and cannot be changed by the user.

- **Board S/N**
  Serial number of the board. It is set by the manufacturer and cannot be changed by the user.

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

- **MIN. SET.**
  Minimum value of the Set Point. It is set by the manufacturer and cannot be changed by the user.

- **WAIT**
  initial waiting procedure. If the value "**0**" is set, when it is started up, the calibrator immediately run to the last set point value chosen after turning off. If the value "**1**" is set, when it is started up, the calibrator goes on the waiting position and the **SP** flash. It is necessary to press any key in order to move it from the waiting position and to choose the desired Set Point value. It is possible to set the WAIT value only by the serial communication.

- **REV. SOFTWARE**
  Internal software's release number.

- **SENSOR TYPE**
  It indicates the type of the internal probe.

- **STAB:**
  It indicates the swinging value of the temperature, which has been set to see on the Display the symbol of the oven ÷ steadiness. The symbol light on when the temperature is stable for over 6 minutes.

Cal_chnl:
Chooses the channel to be calibrated. It can assume three values: INT, EXT, REF. Press the ▲ or ▼ key to select INT, EXT or REF and press E key to accept

- **P1:**
  First Calibration point. Press the ▲ or ▼ key to set the value read with the standard thermometer and press E key to accept

- **P2:**
  Second Calibration point. Press the ▲ or ▼ key to set the value read with the standard thermometer and press E key to accept.

- **CAL: INT (Y/N):**
  This writing can have three different configurations.
  CAL: INT (Y/N) if Cal_chnl is set on INT
  CAL: EXT (Y/N) if Cal_chnl is set on EXT
  CAL: REF (Y/N) if Cal_chnl is set on REF
  Press the ▲ or ▼ key to set Yes or Not and press E key to accept.

EXAMPLE OF RE-CALIBRATION

The appliance can have a complete or partial re-calibration yearly or when chosen by the user.
Calibration can be carried out using CALIBRA ED200 software or directly on the keyboard of the appliance.
The calibration of the INTERNAL probe is done by adjusting the internal probe at two points of the range using a standard thermometer.
The calibration of the EXTERNAL and the REFERENCE inputs is done by adjusting the inputs of the controller at two points of the range using a mV/ohm standard generator.
The calibration is possible only by setting the temperature in °C.

CALIBRATION OF THE **INTERNAL PROBE**
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 precision greater than that of the appliance and then to follow the instructions:

1. Insert the standard thermometer probe in the temperature bath or in the most suitable hole of the calibrator.
2. Choose two calibration points depending on the appliance range or the field where one wishes to carry out calibration. For example the points 0 and 120°C are recommended for the QUARTZ.
3. Set the first calibration point and wait for the appliance to be stable (see symbol **÷)**
4. Enter the third menu level (see instructions) and select Cal_chnl= INT. Press E to confirm.
5. Press F to select P1, press the ▲ or ▼ key to set the value read with the standard thermometer and press **E** Key to accept**.** Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
6. Return to the first menu level and set the second set point. Then wait for the appliance to be stable (see symbol **÷).**
7. Enter the third menu level (see instructions) and select P2, press the ▲ or ▼ key to set the value read with the standard thermometer and press **E** Key to accept. Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
8. Select **CAL: INT** set **Y**es and confirm by pressing **E** key . Calibration begins. The procedure takes a few seconds, at the end of which there is a Beep.

CALIBRATION OF THE **EXT** + **REF** INPUTS with a signal calibrator

The purpose of the re-calibration is to correct the EXT and REF inputs error together.
To calibrate the two inputs, it is necessary to have a Pt100 calibrator and/or a thermocouples calibrator depending on what is to be calibrated.
Calibration of the EXT input automatically reproduces the same calibration on the REF input:

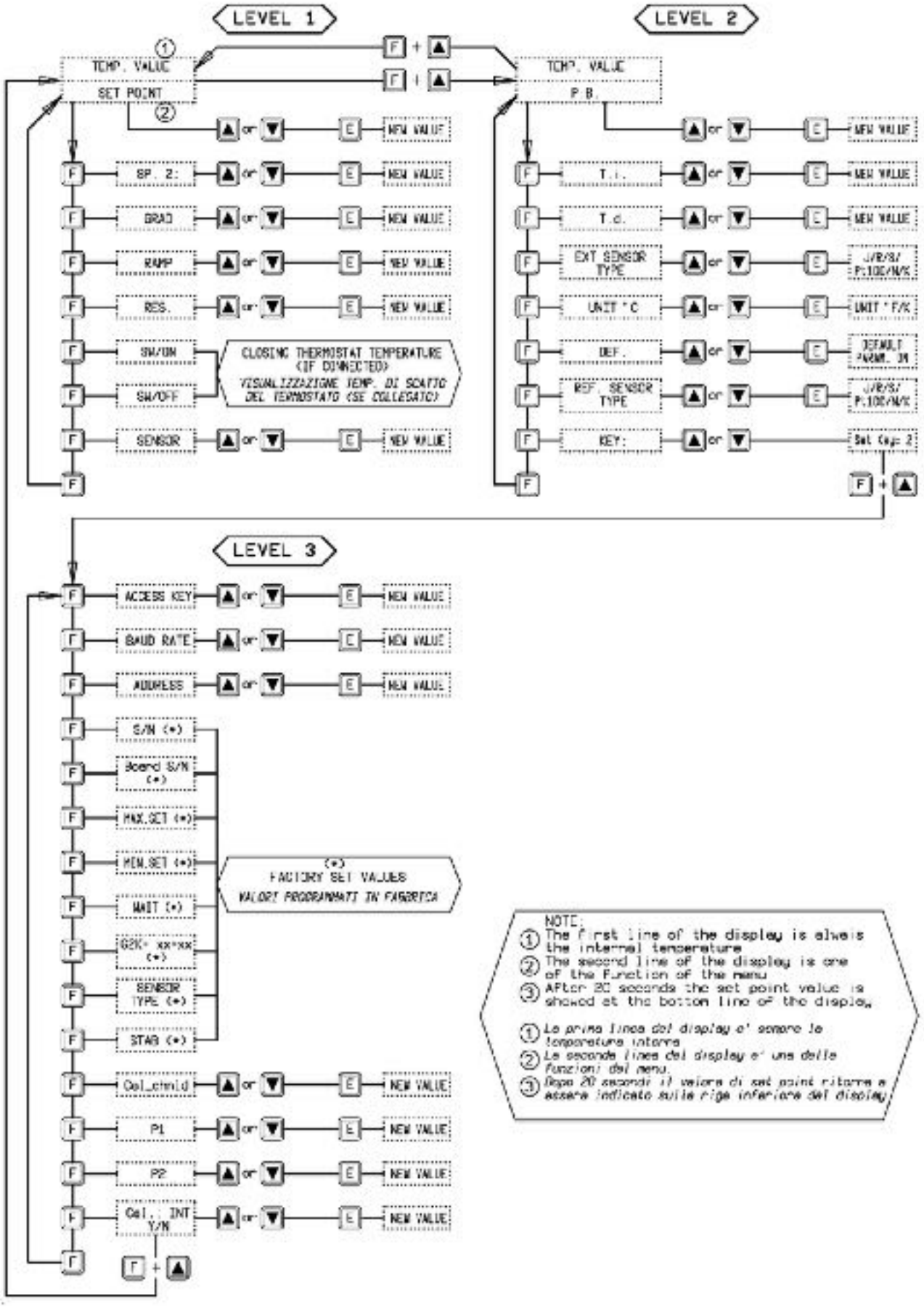
1. On the second menu level, select the type of EXT input to calibrate (Pt100, Tc K, Tc J, Tc N,Tc E, TcR, Tc S) following the instructions in the manual. Press E key to confirm.
2. Enter the third menu level (see instructions) and press the ▲ or ▼ key to set Cal_chnl= **EXT**. Press E to accept.
3. Choose two calibration points depending on the appliance range or the field where one wishes to carry out calibration. (For example 0 and 450°C for PT100, 200 and 800°C for the thermocouples).
4. Connect the signal generator to the EXT input, generating the first calibration value. See the instructions for the connection.
5. Select P1 and press the ▲ or ▼ key to set the first value (for example 0°C). Press E Key to confirm. Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
6. Generate the second calibration value with the signal generator. See the instructions for the connections.
7. Select P2 and press the ▲ or ▼ key to set the second value (for example 450°C). Press E Key to confirm. Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
8. Select **CAL: EXT** Set **Y**es and confirm pressing E Key. The procedure takes a few seconds. At the end there is a Beep.

CALIBRATION OF THE **REF** INPUT with a with probe connected

This operation adapts the value indicated by the REF input to the value indicated by the probe connected to it, compensating its errors.
To carry out the calibration it is necessary to connect the probe to the REF terminals and to have a standard thermometer

1. Connect the probe to the **REF** input following the instructions in the manual.
2. Insert the probe in the suitable hole in the appliance.
3. Insert the standard thermometer in the appliance.
4. Set the first calibration point and wait for the appliance to be stable (see symbol **÷)**
5. Enter the third menu level (see instructions) and select Cal_chnl= **REF**. Press E key to accept.
6. Select P1 and press the ▲ or ▼ key to set the value read with the standard thermometer. Press E key to accept. Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
7. Return to the first menu level and set the second set point. Then wait for the appliance to be stable (see symbol **÷).**
8. Enter the third menu level (see instructions), select P2 and press the ▲ or ▼ key to set the value read with the standard thermometer. Press E Key to accept. Confirmation is indicated by the symbol * which appears on the display after about 5 seconds.
9. Select **CAL: REF** Set **Y**es and confirm pressing E Key. Calibration begins. The procedure takes a few seconds. At the end there is a Beep.

10.2 - Microprocessor regulator: control description



10.3 - Communication Protocol Rs232/C

General characteristics:

Baud Rate: *9600* Parity: *No*

N. Bit: *8* Bit of stop: 1

The communication runs in half duplex way which means that is transmission and reception could not be contemporaneously present.
The regulator replies only after receiving command; it never replies itself.
The command and reply are ASCII character string, as detailed forward. The communication program will be able to convert ASCII to decimal to extract numeric values. The default address is 1.
Baud rate: 2400, 4800, 9600 e 19200 baud, the Default value is 9600; the other parameters are standard.

VARIABILES AVAILABLE IN READING	
0	Set point
1	Ramp ON/OFF
2	Set point 2
3	Gradient
4	Resolution
5	Prop. Band
6	Integral time
7	Derivative time
8*	**Sensor input selection**
9	Title
10***	**Units (°C/°F/K)**
13	Access key
14	Baud rate
15	Address
16	Serial number
18	Mx. set point
19	Min. set point
21	Wait ON/OFF
22	Switch on temperature
23	Switch off temperature
24	Version
25**	**Ext. Sensor type**
26**	**Ref. Sensor type**
28	Stability range
29	Symbol of steadiness
100	Temperature
105	Ext. temperature
106	Ref. temperature

VARIABILES AVAILABLE IN WRITING	
0	Set point
1	Ramp ON/OFF
2	Set point 2
3	Gradient
4	Resolution
5	Prop. band
6	Integral time
7	Derivative time
8*	**Sensor input selection**
9	Title
10***	**Units (°C/°F/K)**
13	Access key
15	Address
25**	**Ext. Sensor type**
26**	**Ref. Sensor. type**

*

8* Sensor input selection	
1	Correspond to the INTERNAL probe
2	Correspond to the INTERNA+EXT probe
3	Correspond to the INTERNA+REF probe
4	Correspond to the INTERNA+EXT +REF probe

**

25/26 Ext. Sensor type/ Ref. Sensor type**	
0	Correspond to the Pt 100 4 wires
1	Correspond to the N thermocouple
2	Correspond to the K thermocouple
3	Correspond to the J thermocouple
4	Correspond to the R thermocouple
5	Correspond to the S thermocouple
6	Correspond to the Pt100 3 wires
7	Correspond to the E thermocouple

***

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

* the variable 8 is available only for the models SOLAR-2I-X; the value of the variable corresponds to the table.
** the variable 25/26 is available only for the models SOLAR-2I-X; the value of the variable corresponds to the table.
*** the value of the variable 10 corresponds to the table.

Each commands string are ASCII character succession.
First is $ character; the next must indicate the instrument address (default 1) and than is the command (4 characters).
Possibility:

RVAR (data reading)
WVAR (data writing)

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

DATA READING:

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

Each characters means:

$	beginning of message
1	instrument address
RVAR	reading command
0	number of the variable to read (see the table of the "VARIABILES" 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.

Command to read the temperature of an external probe (index 25):

Example 2) reading of the EXT sensor (105 variable):

the command string is: **$1RVAR105_<cr>**
the response string is: ***1_123,4** (123,4 is only for example)
The character <cr> concludes the message.

The response does not include the measure unity, to read the unity read the variable 10:
the command string is: **$1RVAR10_<cr>**
the response string is: ***1_0 for °C**
the response string is: ***1_1 for °F**

DATA WRITING:

FLOAT VARIABLES

For writing you use the command WVAR.

Examples 1) writing of the Set point to 132,5°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 "VARIABILES" on the previous pages).

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

Each characters means:

$	**beginning of message**
1	instrument address
WVAR	writing command
0	number of the variable to read (see the table of the "VARIABILES" 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 "VARIABILES" on the previous pages).

INTEGER VARIABLES

We have just shown the procedure for the writing of a float data.
The variables 1, 4, 8, 10, 25, 26 have two or more states (for example, the resolution by tenth or hundredth of °C) and to activate them it is necessary to assign to the variable number the number corresponding to that one which should be set, according to the table indicated below:

1	Ramp	ON = **1**	OFF = **0**		
4	Resolution	0.1°C = **0**	0.01°C = **1**		
8	Sensor input selection	INT = **1**	INT+EXT = **2**	INT+REF = **3**	INT+EXT+REF = **4**
10	Units	°C = **0**	°F = **1**	K=**2**	
25	Ext. Sensor type	**0** = Pt 100	**1** = Tc N	**2** = Tc K	**3** = Tc J **4** = Tc R
		5 = Tc S	**6** = Pt 100 3 wires		**7**= Tc E
26	Ref. Sensor type	as for the variable 25			

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

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

Example 2: the variable 8 corresponds to the activation of the sensor reading which can be connected to the bushes of the external inputs. If you want to read the thermocouple K connected to the Ref. input, you should set the variable 26 to the number corresponding to the type of sensor which you want to read (2 for the thermocouple K) and then set the variable 8 to 3.
the command strings are: **$1WVAR26_2<cr>** **$1WVAR8_3<cr>**

Do likewise for the other variables.

10.4 - Standard equipment spare parts list

PLB 150-XX-X

(Reference number referring to the enclosed drawings).

POS.	DESCRIPTION	SPARE PARTS CODE
1-3	MAIN SOCKET	3SCH28366
3	2,5A PROTECTION FUSE (for 230V model) 3.15A PROTECTION FUSE (for 115V model)	3OMGSF520225 3OMGSF520231
4	SWITCH TEST PLUG-IN	3B&BPAN10A
5	RS 232	4MRCRS232
6	MOTOR SPEED CONTROL + ø14 HANDLE	3RSC410362 + 2RSC499977
7	MICROPROCESSOR + DISPLAY FAN REGULATION CARD	4ED20048 4ED10063
8	PT100	3D2124
9	MIXER MOTOR	3PPSVD12708
11	CAP	2D1715
12	POWER SUPPLY CARD	4PRMPGIUS20
14	SAFETY VALVE	2ELSSFV1038
15	AUXILIARY INPUT CARD	4ED20011
16	MAGNETIC STIR BAR	2FLC601012545
18	ELECTRIC POWER CABLE	3NEP5942AW
19	FAN Ø 120MM	3PPS-4312-179
20	FAN Ø 82 MM	3PPS-8412NG

10.5 - Declaration of conformity and check report

The declaration of conformity CE is at the end of the English manual, the test report is included with the calibrator

10.6 - Drawing and wiring diagram

The drawings are at the end of the English manual

11 ADDENDUM

11.1 Instructions relative to the use of the metal insert

The Fluid 100 may use a pierced metal insert instead of the calibration liquid.
The adequately pierced insert allows the introduction of the temperature sensors; the insert's dimensions are the following:

diameter: 64,5mm
height: 170mm

The span of time needed to reach the reserved Set Point considerably increase whereas the metal insert is used: we hereby report some sample values.

Comparative Table between Liquid and Insert

LIQUID	**TEST***	ALUMINUM INSERT
-13@ta=20°C	Minimum Temp. °C	-13@ta=20°C
30'	Descent Time +20/-10°C	47'
34'	Ascent Time from -14 to 110°C	45'
38'	Ascent Time from +20 to 121°C	44'
30'	Ascent Time from 110 to 125°C	42'
30'	Descent Time from121°C to 20	37'

* The times are detected when the calibrator has activated the stability symbol.

Assembly of the metal insert:

For the replacement of the liquid with the metal insert, proceed as provided for in Chapter 8, following the dismantling instructions until the extraction of the Teflon shaft that shakes the liquid. Extract the shaft using the specific tool and thus accurately clean the tank with blotting paper prior to introducing the insert. (picture 1)
Subsequently follow the standard instructions for use, reducing the agitator's rotary speed to the minimum.
To recover the use with the liquid, proceed in a reverse manner.

1) Extraction of the Teflon shaft

Eurotron Instruments (UK) Ltd
Unit 13 Riley Close
Royal Oak Industrial Estate
Daventry, NN11 8QT, England

"Declaration of conformity"

Eurotron Instruments (UK) Ltd
Unit 13 Riley Close, Royal Oak Industrial Estate, NN 11 8QT, Daventry (United Kingdom)

Declares that the: **PORTABLE LIQUID BATH MODEL PLB 150 TS and PLB 150 TC**

are conforms with the requirements of the following European directive:

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

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

- EN 61000-6-3 emission.
- EN 61000-6-2 immunity.
- EN 61010-1/61010-2-010 safety requirements for electrical equipment

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

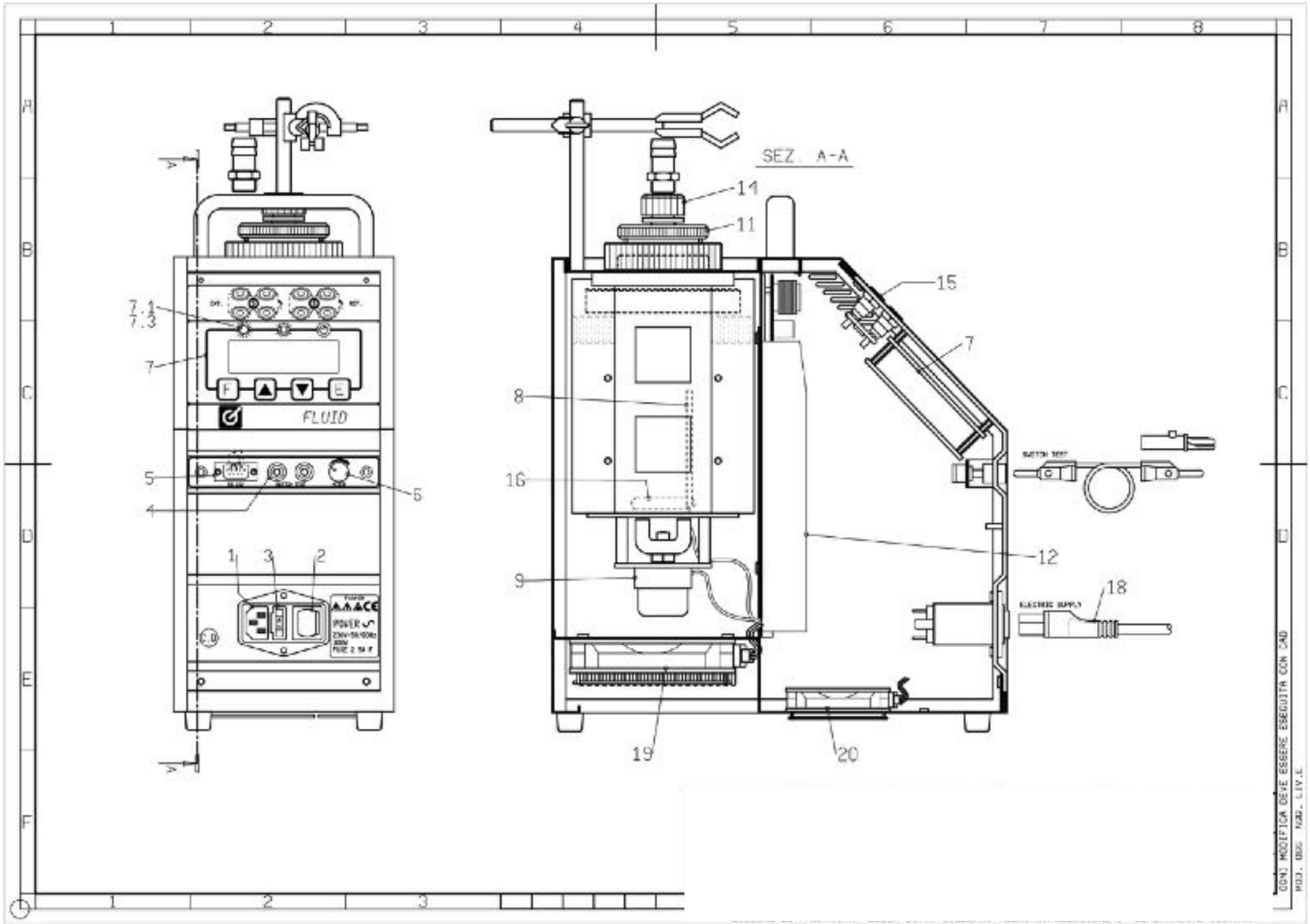
Eurotron Instruments (UK) Ltd
Massimiliano Moltrasio

Director 

TEST AND REPORTS FROM:
CENTRO MISURE RADIOELETTRONICHE P.M.M. IN DATA 07/03/2000 and CENTRO SIT N°08/E

ENTE EMITTENTE: QUALITÀ

Data:: 29/06/2005
Revision 13/04/2010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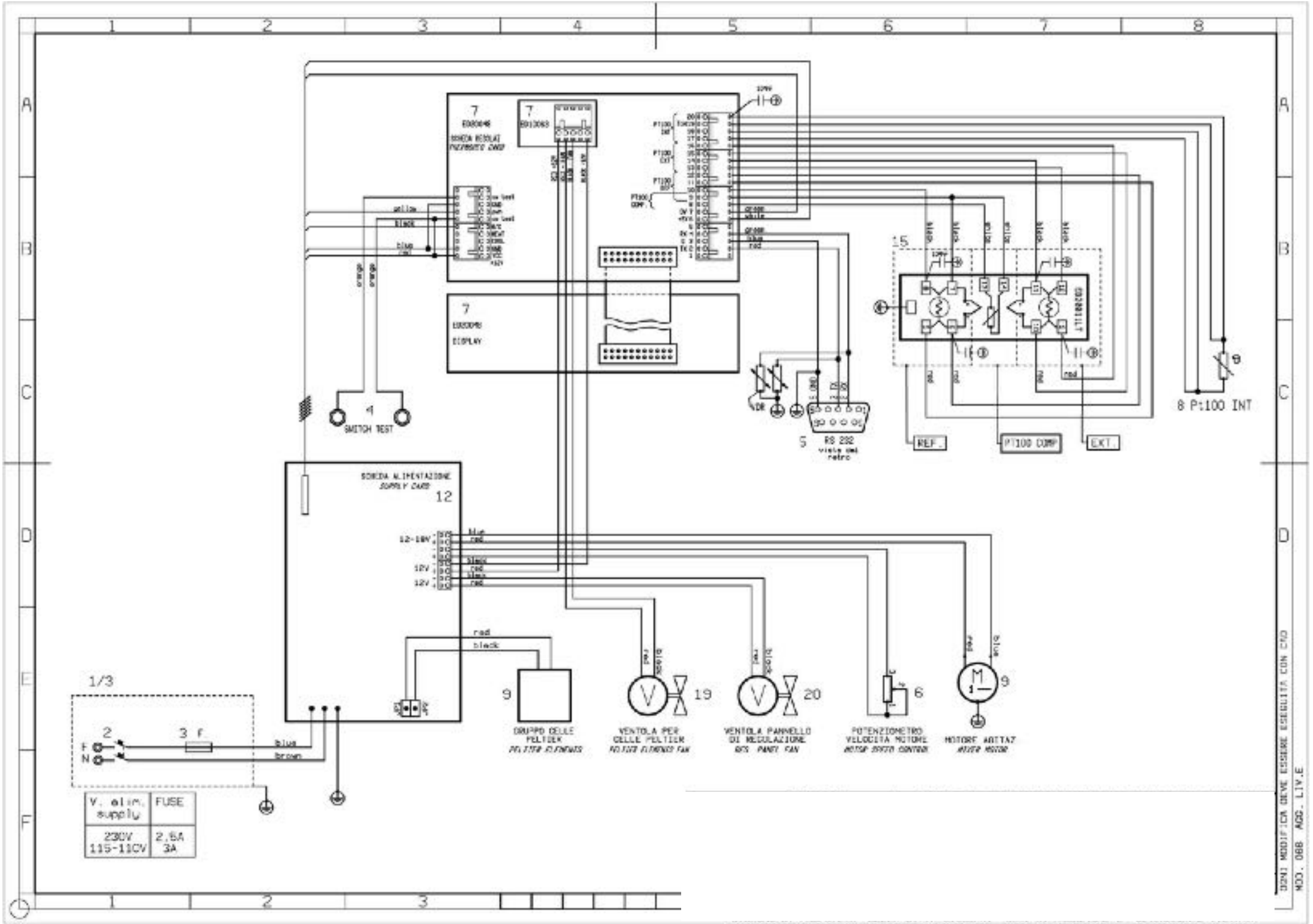
SCHEDA REGOLAT.
SCHEDA ALIMENTAZIONE
SUPPLY CARD
DISPLAY
SWITCH TEST
RS 232
PT100 INT
REF.
PT100 COMP
EXT.
GRUPPO CELLE PELTIER
VENTOLA PER CELLE PELTIER
VENTOLA PANNELLO DI REGOLAZIONE
POTENZIOMETRO VELOCITA MOTORE
MOTORE AGITAZ
V. alim. supply
FUSE
230V 115-110V
2,5A 3A
blue
brown
red
black
DIMENSIONI DEVE ESSERE ESEGUITA CON CAD
MOD. 088 AGG. LIV.E