

# Operating Manual

## Dry Block Temperature Calibrator

### JOKER+



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**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 dependant on proper handing, 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



CHARACTERISTICS AND/OR INSTRUCTIONS OF JOKER + WITH RS-232 OUTPUT.

N.B:

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

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# 1 - INTRODUCTION

## ***1.1 - Purpose and summary of instructions***

This manual contains the use and maintenance instructions for:  
**JOKER +**  
**Portable temperature calibrator.**

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 ways of their removal



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

## 2 - SCOPE OF SUPPLY

### 1 - Name:

- Portable Temperature Calibrator **JOKER +**, complete of accessories as listed (reference to paragraph 2.7).

### 2 - Technical data:

Environmental range: temperature  $+10\div 35^{\circ}\text{C}$ , R.H. max. 90%.

- Range : Ambient temp.  $\div +350.0^{\circ}\text{C}$ .
  - Stability :  $\pm 0.1^{\circ}\text{C}$  \*\*.
  - Maximum increase gradient :  $20^{\circ}\text{C}/1'$  (ambient  $\div 200^{\circ}\text{C}$ ) \*\*.
  - Maximum decrease gradient :  $10^{\circ}\text{C}$  max. ( $200\div 25^{\circ}\text{C}$ ) \*\*.
  - Digital indicator : range  $0\div 350^{\circ}\text{C}$ .
  - Display resolution :  $\pm 0.1^{\circ}\text{C}$ .
  - Reading precision :  $\pm 0.4^{\circ}\text{C} \pm 1$  digit \*\*.
  - Switch test : 12 Vcc.
  - ☞ Serial communication RS232 : Optional.
  - Supply : 230V a.c., 50Hz (110/115V by request).
  - Electric protection : 2A fast fuse (4A fuse for 115V models).
  - Thermal protection : Max. temperature thermostat.
  - Software protection : Max. temperature =  $350^{\circ}\text{C}$
  - Power : 300 W.
  - Calibration measurements :  $260\times 230\times 105\text{mm}$  (measurement of case:  $330\times 340\times 175\text{mm}$ )
  - Weight of calibrator : 3,5 Kg (6,3Kg calibrator including travelling-case and accessories)
- Case in metall.
  - Inner parts in Stainless steel and aluminium.
  - Thermostat well in aluminium with a holes  $\varnothing 26$  mm, 150mm dept. Reducer inserts:  $\varnothing 25,7\times 140\text{mm}$ ; dept of holes 125mm.
  - Regulation of the temperature with PID  $\mu$ controller.
  - Cooling with forced ventilation.
  - Dry execution.
  - Socket with main cable and protection fuse.
  - Electromagnetic compatibility : Emission EN50081-1  
Immunity EN50082-2

NOTE: The data marked with \*\* has been recorded at an ambient temperature of  $20^{\circ}\text{C}\pm 3$ , U.R. 20%, voltage  $230\text{V}\pm 10\%$ , with Pt100  $\varnothing 6$  in the block.

### 3 - Service (function):

The portable temperature calibrator **JOKER +** has been designed for:

- Control and calibration of temperature sensors, in laboratory and in field.
- Control of thermostat with visual verification of the alarm or work threshold.
- Thermal test on material.

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

**4 - Quantity:**

- 1 piece

**5 - Constructor:**

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**6 - N° of correspondent catalogue sheet:**

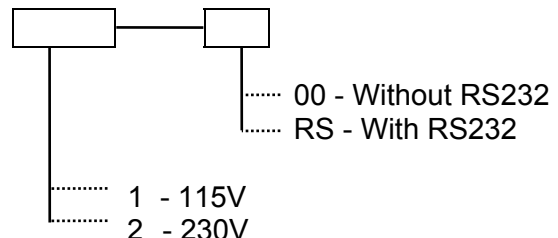
- JOKER+

**7 - List of first equipment accessories:**

- Standard equipment
  - \* **JOKER +** calibrator
  - \* Electric power cable
  - \* Fuse kit
  - \* Thermostat testing circuit connection cables
  - \* Instructions manual
  - \* Calibration certificate traceable to SIT standard
  - \* Tweezers for removing inserts
  - \* Insert with 3 holes (ø4,5-6,5 & 9,5)
  - \* Insert with 2 holes (ø6,5 & 12,5)
  - \* Blank insert
  - \* Travelling-case.
- Accessories on request
  - \* Special inserts available on request
  - \* RS232 output
  - \* RS232 cable
  - \* HD9214 + TP870/1: digital thermometer + PT100

• Ordering code

\* **JOKER +**



- Certification: all the calibrator are supplied with final testing, stability and accuracy certification traceable to national Standard

### 3 - GENERAL RECOMMENDATIONS

→ **ATTENTION**

The  $\mu$ processor regulator has been configured in factory with the parameters suited to work in the respect of the technical specifications.

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

→ **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.

**- Position of the probe:**

To obtain the best result, follow the advises:

- Measure the diameter of the probe being checked.
- Use the reduction insert; check that the diameter of the hole is at least 0.5mm bigger than the diameter of the probe (fig.1).
- Avoid using holes that are too accurate and do not force the probes into the insert.
- Put the insert in the equaliser block only at ambient temperature, using the tweezers; revolve the insert a little to win the force of contrast of the spring.
- Put 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 liquid otherwise the probe could break.

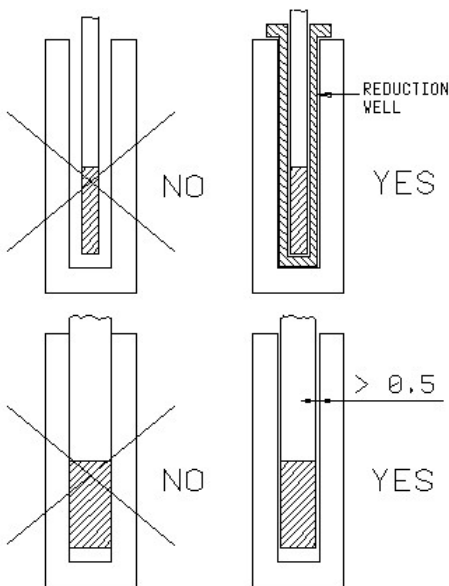


Fig.1

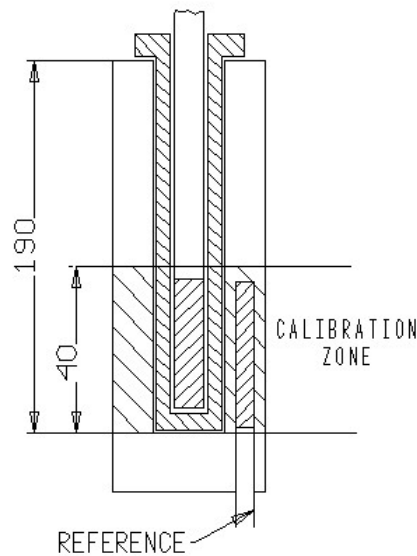


Fig.2

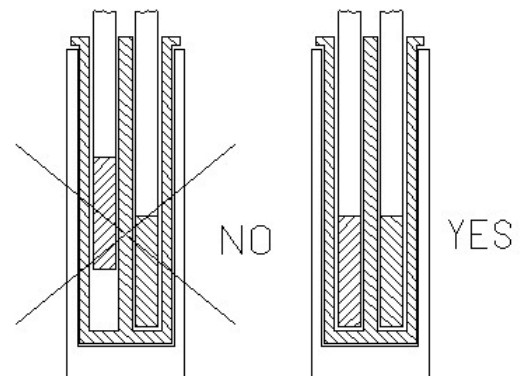


Fig.3

**- Advises:**

- The temperature difference is proportional to the difference between the diameter of the probe and the diameter of the hole.
- 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 transducers with special execution, call our technical office and ask for equaliser blocks 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 thermostat 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 frontal 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.



- Never put any type of liquid inside the block.
- Don't change absolutely the configuration parameters.

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

- Max. temperature safety thermostat (14) to disconnect the heating system.
- Protection grid to avoid any contact with the internal oven.
- Protection fuses (3)
- Ground conductor.

### Suggest:

- Don't put anything on the top of the calibrator.
  - Don't put fuel objet near the calibrator.
  - Never put any type of liquid inside the calibration block.
- ..... use common sense any time.

## 5 - PREPARATION OF OPERATION



- Remove the calibrator from the carrying case and place it on a flat surface.
- Make sure that the fan on the bottom of the calibrator runs free.
- Make sure that the instrument has been correctly earthen.
- Supply the oven with line 230V, 50Hz (110 or 100V for special models) + earth, 6A.
- **Do not connect any voltage higher than 5V to the input 4**
- 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 transporter and a claim must be made.

#### 5.1.2 - Positioning the calibrator

Position the calibrator in a safe clean place.

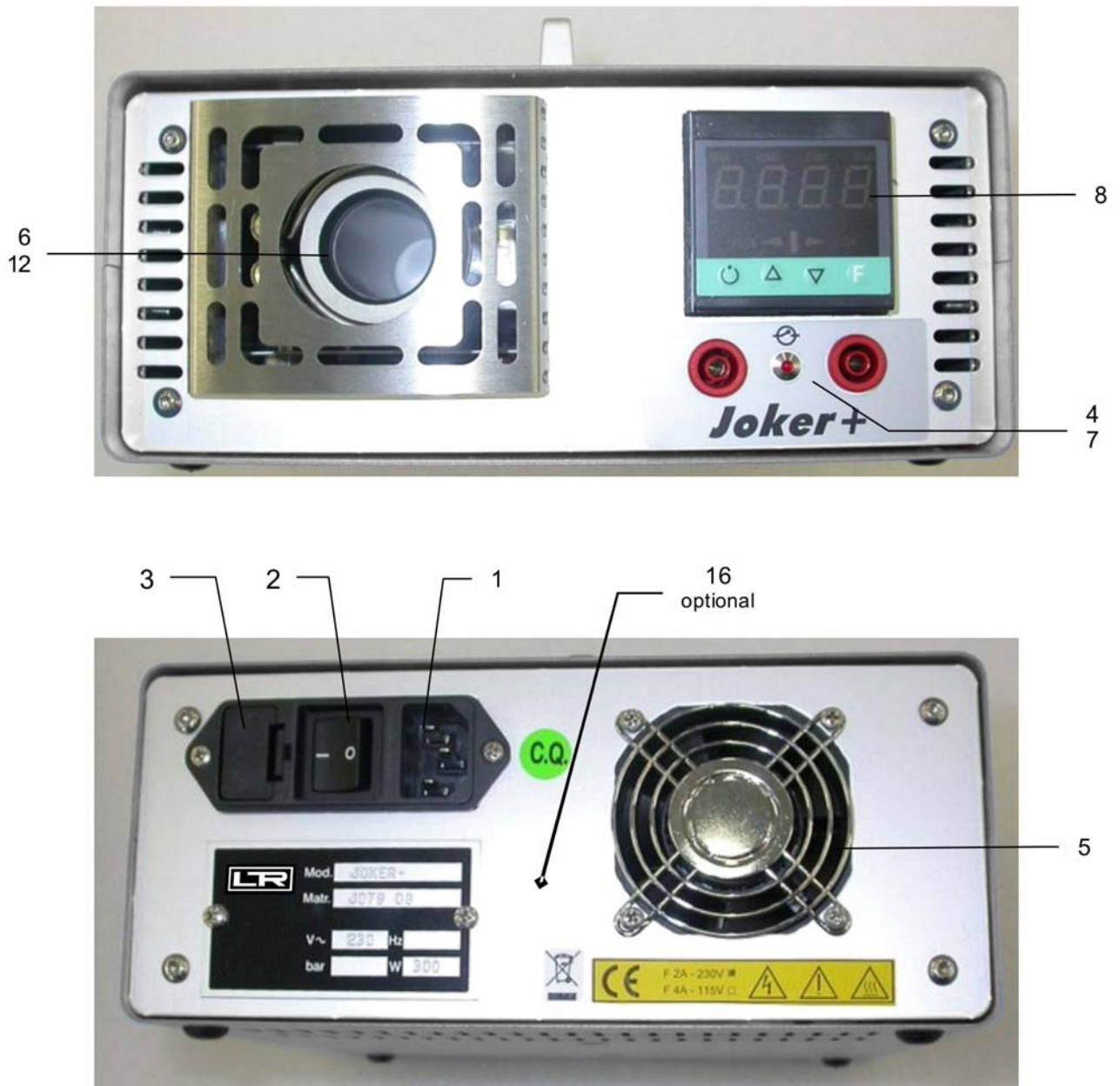
**\*\*DANGER:** The calibrator is suitable for operating at high temperatures with the consequent danger of fire. Keep it away from any type of inflammable materials and never put any type of liquid inside the block (reference to paragraph 4).

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

#### 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 (1mm<sup>2</sup>). Make sure that the plant is earthen correctly before switching the instrument on.



## COMMANDS LIST

POS.	DESCRIPTION
1	SUPPLY SOCKET
2	MAIN SWITCH
3	PROTECTION FUSES
4-7	SWITCH TEST
5	FAN
6	THERMOSTAT WELL
8	MICROPROCESSOR REGULATOR
12	REDUCTION INSERT
16	RS-232 (OPTIONAL)

## 6 - OPERATION PROCEDURE

### 6.1 - Operation description

The **JOKER +** calibrator consist of thermostat well in aluminium with a hole  $\varnothing 26$  capable to holding reducer insert of various configurations so that it can be adapter to the diameters of the test sensors.

A heater element heats the thermostat well and the electronic  $\mu$ controller checks and regulates the temperature.

The fan mounted in the rear side generates a constant air flow that reduces the temperature of the case.

The calibrator is software protected: the operator can't set the temperature over  $350^{\circ}\text{C}$ ; is also provided of safety thermostat that switch off the oven in case of over temperature.

### 6.2 - Description of instrument

#### 6.2.1 - Thermoregulator

The thermoregulator (8) is a PID microprocessor which can be set from 0 to  $350^{\circ}\text{C}$ . The upper display shows the measured value while the lower one displays the input set point value (this state is defined as "normal display mode"). For further specifications and methods of use, see the paragraph 10.1 concerning the thermoregulator.

#### 6.2.2 - Main switch

The main switch (2) is found on the rear of the instrument; it is fitted with a socket for the voltage cable, a main switch and two fuses: 2A for 230V mod. & 4A for 115V models.

Note: use only fuses F. 6,3x32mm. All the electrical part is found below the main switch.

#### 6.2.3 - Carrying handle

The calibrator is fitted with a multi-position carrying handle which makes it possible to operate in various position from horizontal to vertical.

#### 6.2.4 - Heating resistance

The resistance is stainless steel made; the max. power is 300W and it can reach temperatures approaching  $400^{\circ}\text{C}$ . 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.

#### 6.2.5 - Thermostat well & inserts

Thermostat well in aluminium a hole  $\varnothing 26\text{mm}$ , capable of holding reducer inserts of various configurations. The function of this block is to uniformity the temperature on calibration zone.

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

#### 6.2.6 - Temperature sensors

The temperature sensor used for the reading and thermoregulation is a  $\text{PT}100\Omega$  probe; the probe is inserted directly into the thermostatic well so as to supply a temperature value close to the real value in the block.

#### 6.2.7 - Safety thermostat

The calibrator is supplied with max. temperature safety thermostat (14) that disconnect the heating system for damage of thermoregulation system or for damage of cooling fan (5).

In case the thermostat intervenes make reference to chapter 9 - typical faults -.

### 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 (8):**

Make reference to the temperature value of the display (8) (fig.5).

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

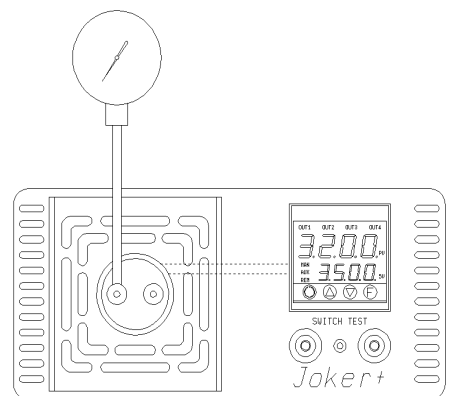


Fig. 5

#### **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. 1-2-3-6).

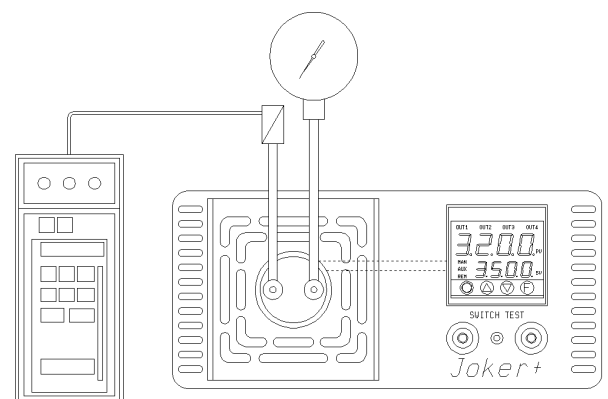


Fig.6

Before any calibrations follow the general recommendation:

- Switch on the calibrator with the main switch (2); waiting for the end of self-test procedure.
- 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 equaliser block: reference to chapter 3. (fig 1-2).
- Set the required temperature value on the display:

- ◇ Press F to adjust the Set Point.
- ◇ Press the ▲ key to increment the set point value.
- ◇ Press the ▼ key to decrement the set point value.
- ◇ The input value is confirm automatically after 30 seconds.

- If the temperature is lower or higher then the Set Point the red led is on, when the temperature is equal to the set point the green led is on.
- Wait for the stabilisation of the oven before starting any calibration.
- 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 thermostatic well.

We suggest to insert one primary standard with SIT certificate in the  $\varnothing 6.5$  hole of the thermostatic well; 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 and wait for the cooling.

### 6.3.1 – Optional – using of thermoregulator with RS232

#### Models with serial RS232:

- 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.
  - ◇ The input value is confirm automatically after 30 seconds.
- Wait for the stabilisation of the oven before starting any calibration.
- For different calibration point, regulate the set point at the new temperature and wait for the stabilisation.

#### **FUNCTION KEY 'F'**

**F** function key allow access to **AL1, AL2, AL3, OUT P**; the value of AL1 is factory set to 1.0: AL1 control the status ON-OFF of the inside fan, DO NOT MODIFY THIS VALUE. AL2, AL3 are disabled. OUT P shows the power output value. Press F to return to normal status.

## 6.4 - Use of the function

### 6.4.1 - Switch Test

You can test the operating point of the thermostats by the 'SWITCH TEST' function (4÷7).

- Put the thermostat in the most suitable hole of the insert (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) will come on when the thermostat electric contact works.
- Set the test temperature lower to the operating temperature of the thermostat: the lamp (7) will come on when the thermostat electric contact works.

### ☞ 6.4.2 - Serial communication (optional)

For PC control use the serial communication RS-232 (16) (references fig.7)

With RS-232 you can read and/or change the operative parameters, for example: set point, external probe, slope rate etc..

Contact our technical office for the communication protocol instruction.

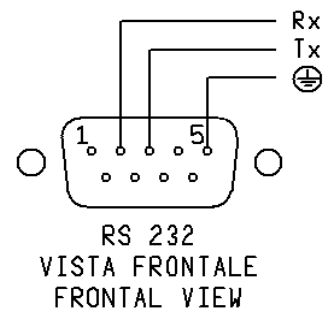


Fig.7



The external PC must be conform to the IEC950 standard.

## 6.5 - Re-calibration procedure

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.

## 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



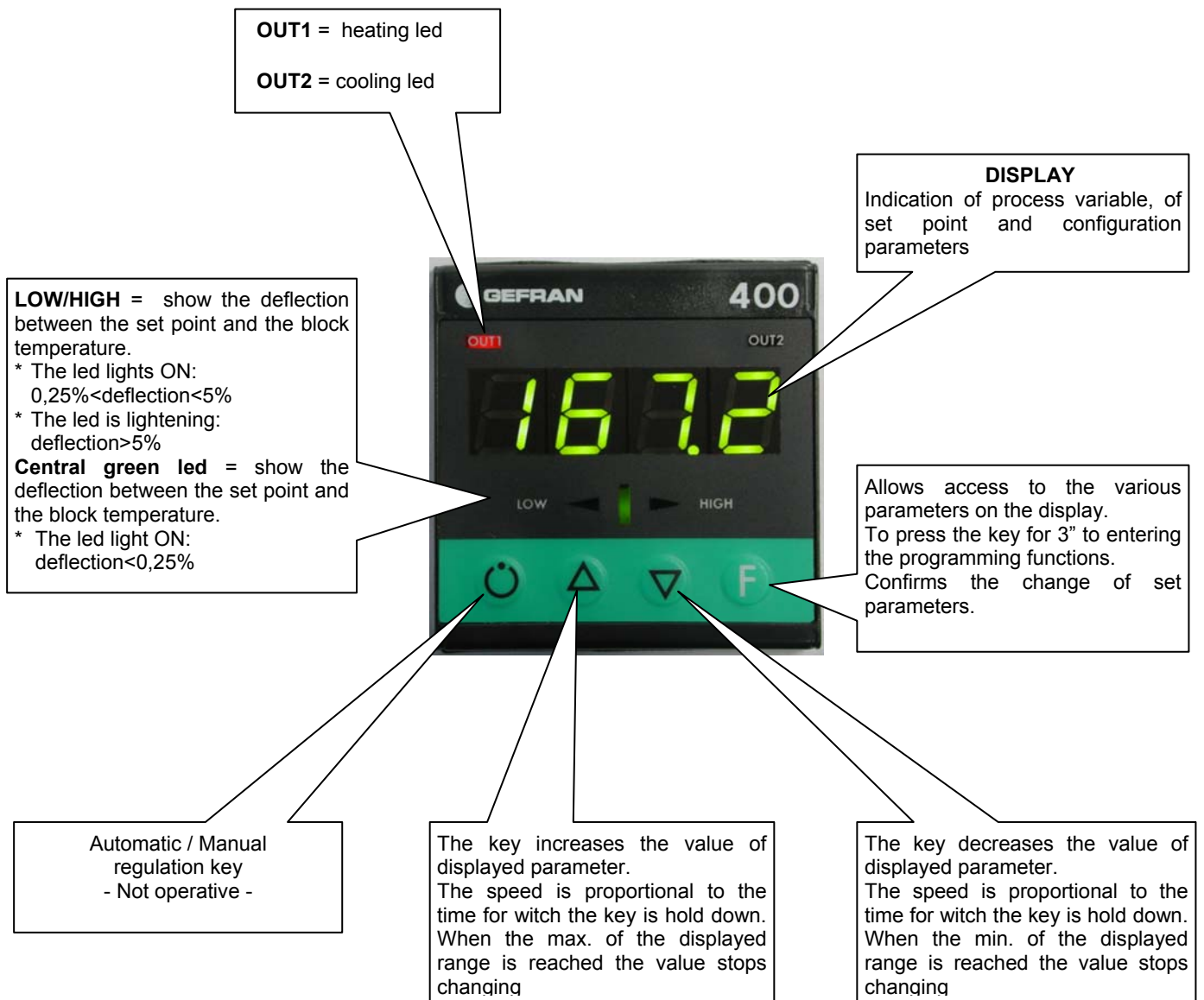
Before carrying out these operations the instrument must be disconnect from the electricity supply and the thermostat well must be at ambient temperature.

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"> <li>- The fuse (3) is cut off.</li> <li>- The power cable is cut off.</li> <li>- The main switch is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the fuses.</li> <li>- Replace the power cable with a similar one.</li> <li>- Replace the cup socket (1-3)</li> </ul>
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"> <li>- There is a short circuit in the supply card (9).</li> <li>- The main switch is faulty.</li> <li>- There is a short circuit in the heating element.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the input card.</li> <li>- Replace the cup socket.</li> <li>- Contact our technical office.</li> </ul>
3	The control panel is working properly but the temperature does not increase.	<ul style="list-style-type: none"> <li>a) The thermoregulator (8) is not generating a signal.</li> <li>b) The heating element (11) is cut off.</li> <li>c) The supply card (9) is faulty</li> <li>d) The safety thermostat (14) has been triggered.</li> </ul>	<ul style="list-style-type: none"> <li>a) Replace the thermoregulator.</li> <li>b) Contact our technical office.</li> <li>c) Replace the supply card (9).</li> <li>b) Reference to fault description N.10</li> </ul>
4	The display indicates a different temperature from the one measured in the block.	<ul style="list-style-type: none"> <li>- The thermal element (10) is faulty.</li> <li>- The thermoregulator (8) is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the thermal element.</li> <li>- Replace the thermoregulator.</li> </ul>
5	The temperature does not stop at the value of the point which has been set.	<ul style="list-style-type: none"> <li>- The supply card is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the supply card.</li> </ul>
6	The temperature does not decrease to the set value as quickly as it should.	<ul style="list-style-type: none"> <li>- The thermoregulator (9) is faulty.</li> <li>- The cooling fan (5) is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the thermoregulator.</li> <li>- Replace the fan after checking if it working properly.</li> </ul>
7	The display indicates '-Sbr'	<ul style="list-style-type: none"> <li>- The RTD100 (12) is cut off or is in short circuit.</li> <li>- The temperature regulating card is faulty.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the probe.</li> <li>- Replace the temperature regulating card.</li> </ul>
8	The temperature doesn't fall to the right temperature.	<ul style="list-style-type: none"> <li>- The fan (5) is damaged.</li> <li>- Connection cut off.</li> </ul>	<ul style="list-style-type: none"> <li>Check if there is tension at the fan; if the circuit is active replace the fan.</li> </ul>
9	The lamp (7) doesn't light at command of thermostat; the switch-test circuit doesn't work.	<ul style="list-style-type: none"> <li>- The lamp (7) is cut off.</li> <li>- The control card is damage</li> </ul>	<ul style="list-style-type: none"> <li>Check and replace the damage part.</li> </ul>

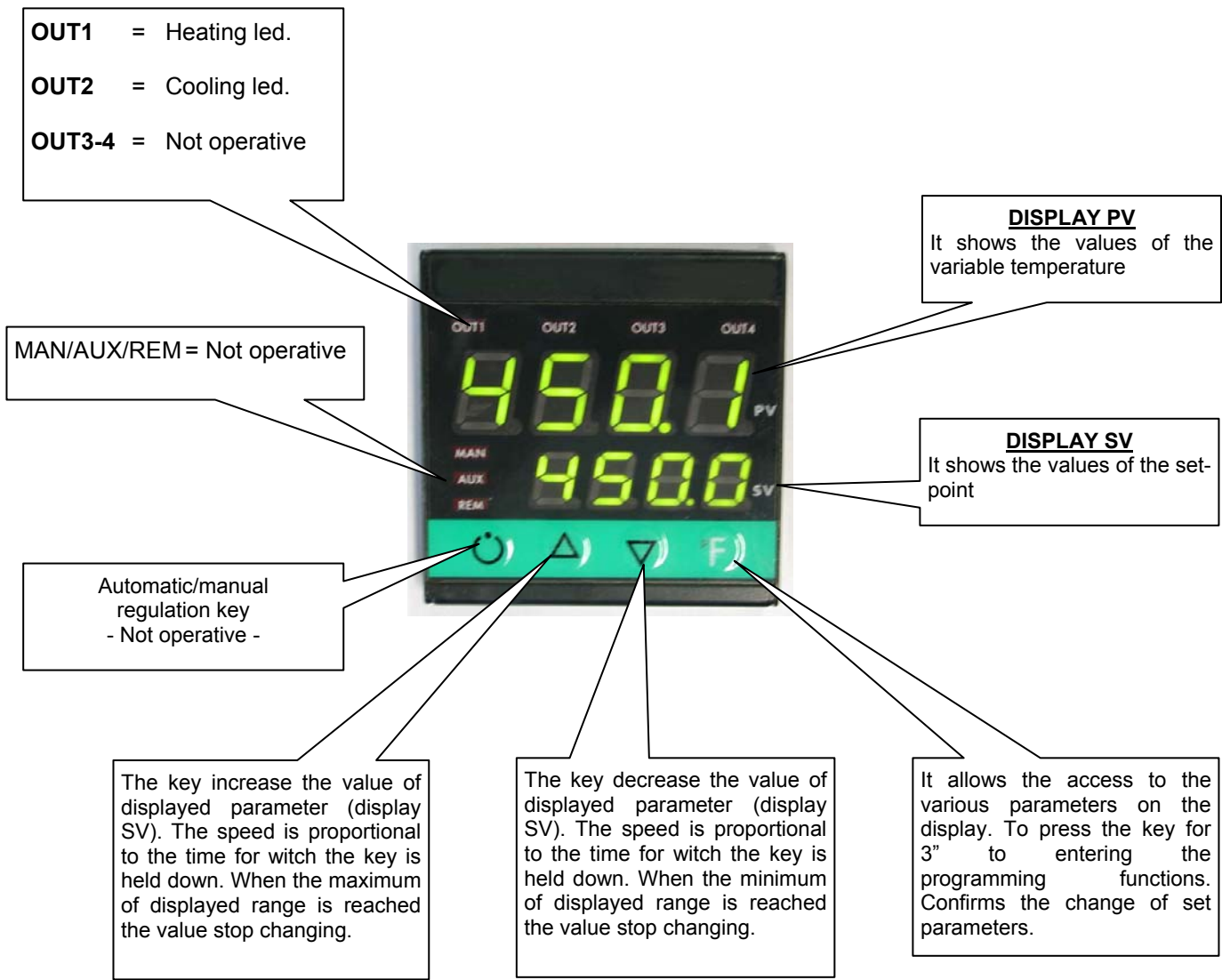
<b>N°</b>	<b>FAULT DESCRIPTION</b>	<b>FAULTY COMPONENT OR FUNCTION</b>	<b>METHOD FOR REMOVAL</b>
10	The safety thermostat is working and the temperature is different of $\pm 20^{\circ}\text{C}$ respect the set point	a) The Heating led (out1) is switch off: the electronic card (9) is damaged.  b) The electrical fan (5) is damaged.  c) The Heating led (out1) is switch on: the thermoregulator (8) is damaged.	a-b) Replace the fan (5) or the supply card (9) after checking if it working properly.  c) Replace the thermoregulator.

## 10 - APPENDICES

### 10.1 - Microprocessor regulator: description of the functions



### 10.1.1 - Microprocessor Gefran800 model: description of the function



**10.2 - Spare part list 230V model**

(Reference number relevant to the annexed drawings)

<b>POS.</b>	<b>DESCRIPTION</b>	<b>CODE</b>
1-3	CUP SOCKET (+ 2A FILTER)	3SCHCD2411
3	2A PROTECTION FUSES	3FEMAVS2A
3.1	VDR-391 – ø20	3MRC20D391
4	SWITCH TEST PLUG IN	3B&BPAN10A
5	FAN mod. 12V / ø60mm	3PPS-612M
6	THERMOSTAT WELL	2DC279
7	SWITCH TEST LED	3MRC105750
8	MICROPROCESSOR REGULATOR	4GFR400DR1
☞ 8.1	REGULATOR WITH RS232	4GFR800DRR
9	SUPPLY CARD	4ITA01796DS
10	RTD 100Ω PROBE	3DC297
11	HEATER ELEMENT	3DC150
12	INSERTS WITH DIFFERENT DRILLING	2DC486-001 + 2DC486-002 + 2DC486-006
13	TWEEZERS FOR REMOVING INSERTS	2DC535
14	MAX. TEMPERATURE SAFETY THERMOSTAT	3RSC2282513
☞ 16	RS-232	4MRCRS232
17	MICROPROCESSOR REGULATOR RS232 MODEL	4GFR800DR232

**Spare part list 115V model**

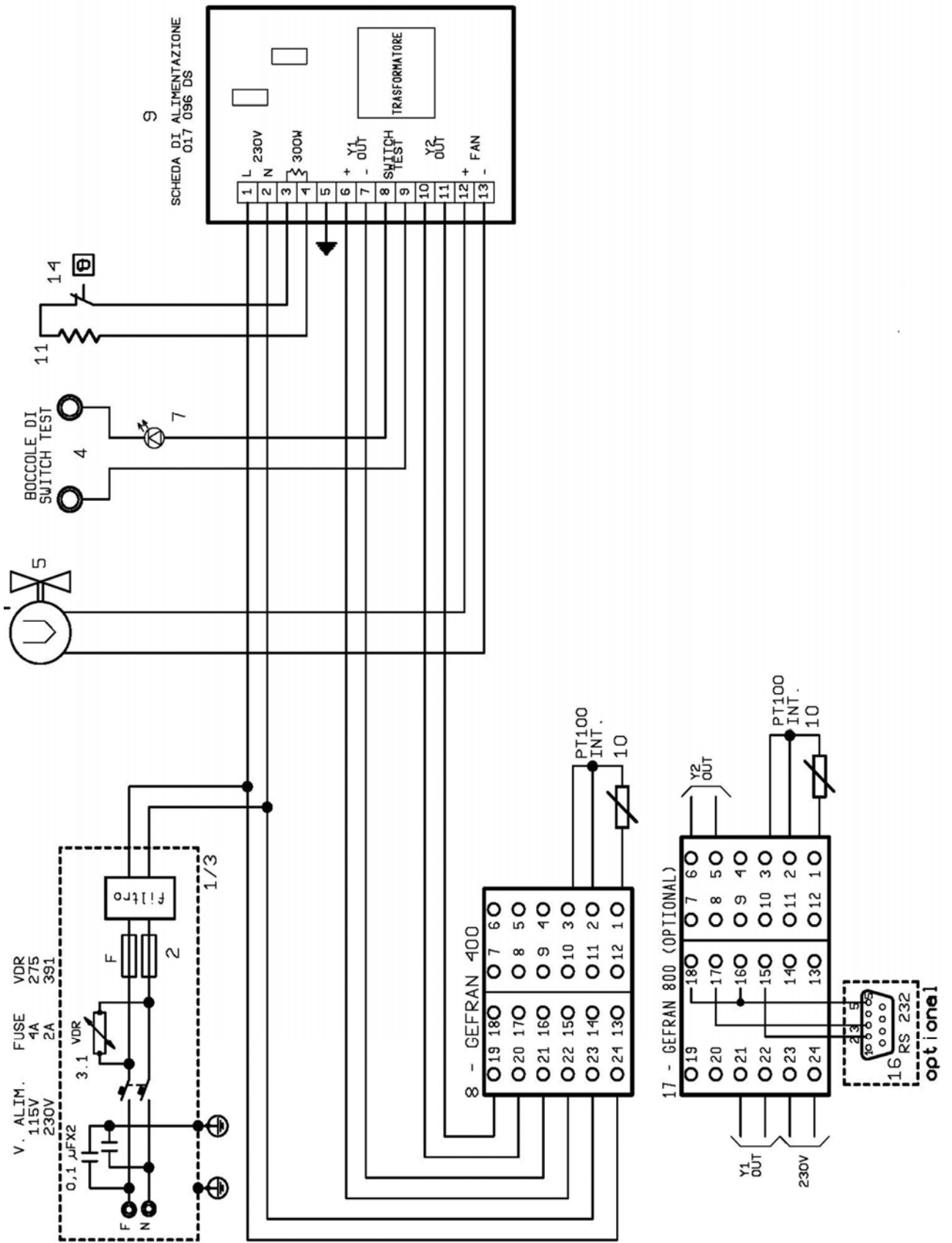
<b>POS.</b>	<b>DESCRIZIONE</b>	<b>CODICE</b>
3	4A PROTECTION FUSES	3FEMAVS4A
3.1	VDR-271 – ø20	3MRC20D271
9	SUPPLY CARD (modify for 110 / 115V models)	4ITA01796DS

**10.3 - 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

**10.4 - Drawing and wiring diagram**

The drawings are at the end of the English manual



## "Declaration of conformity"

DRUCK & TEMPERATUR Leitenberger GmbH  
Bahnhofstr. 33  
D-72138 Kirchentellinsfurt / GERMANY

Declares that the: **PORTABLE TEMPERATURE CALIBRATOR MOD. JOKER+**

is conforms with the requirements of the following European directive:

- Low voltage directive 73/23/EEC amended by 93/68/EEC
- EMC directive 89/336/EEC

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  
26. July 2007



[www.druck-temperatur.de](http://www.druck-temperatur.de)

[www.LR-Cal.de](http://www.LR-Cal.de)

[www.leitenberger.de](http://www.leitenberger.de)