

# **903 PORTABLE TEMPERATURE TEST UNIT**



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The company is always willing to give technical advice and assistance where appropriate. Equally, because of the programme of continual development and improvement we reserve the right to amend or alter characteristics and design without prior notice. This publication is for information only.

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**EMC INFORMATION**



This product meets the requirements of the European Directive on Electromagnetic Compatibility (EMC) 89/336/EEC as amended by EC Directive 92/31/EEC and the European Low Voltage Directive 73/25/EEC, amended by 93/68/EEC.

The product meets the susceptibility requirements of EN 50082-1, criterion B.

Symbol Identification	Publication	Description
 ISO3864	Caution	(Refer to Handbook)
	IEC 417	Caution, Hot Surface

**ELECTRICAL SAFETY**

This equipment must be correctly earthed.



This equipment is a Class 1 Appliance. A protective earth is used to ensure the conductive parts can not become live in the event of a failure of the insulation.

The protective conductor of the flexible mains cable which is coloured green/yellow **MUST** be connected to a suitable earth.

The blue conductor should be connected to Neutral and the Brown conductor to Live (Line).

Warning: Internal mains voltage hazard. Do not remove the panels.



There are no user serviceable parts inside. Contact your nearest Isotech agent for repair.

Voltage transients on the supply must not exceed 2.5kV.

Conductive pollution, eg. Carbon dust, must be excluded from the apparatus. EN61010 pollution degree 2.

The apparatus has two input connectors for temperature sensors, see Figure 1. These inputs are only suitable for either a thermocouple or resistance thermometer. No other sensor or signal may be connected.

### **ENVIRONMENTAL RATINGS**

Operating Temperature      5-50°C

Relative Humidity            5-95%, non condensing

### **HEALTH AND SAFETY INSTRUCTIONS**

1. Read all of this handbook before use.
2. Wear appropriate protective clothing.
3. Operators of this equipment should be adequately trained in the handling of hot and cold items and liquids.
4. Do not use the apparatus for jobs other than those for which it was designed, ie. the calibration of thermometers.
5. Do not handle the apparatus when it has hot (or cold), unless wearing the appropriate protective clothing and having the necessary training.
6. Do not drill, modify or otherwise change the shape of the apparatus.
7. Do not dismantle the apparatus.
8. Do not use the apparatus outside its recommended temperature range.
9. If cased, do not return the apparatus to its carrying case until the unit has cooled.
10. There are no user serviceable parts inside. Contact your nearest Isotech agent for repair.
11. Ensure materials, especially flammable materials are kept away from hot parts of the apparatus, to prevent fire risk.

### **GUARANTEE**

This instrument has been manufactured to exacting standards and is guaranteed for twelve months against electrical break-down or mechanical failure caused through defective

material or workmanship, provided the failure is not the result of misuse. In the event of failure covered by this guarantee, the instrument must be returned, carriage paid, to the supplier for examination and will be replaced or



repaired at our option.

**FRAGILE CERAMIC AND/OR GLASS PARTS ARE NOT COVERED BY THIS  
GUARANTEE**

**INTERFERENCE WITH, OR FAILURE TO PROPERLY MAINTAIN THIS INSTRUMENT  
MAY INVALIDATE THIS GUARANTEE**

**RECOMMENDATION**

The life of your **ISOTECH** Instrument will be prolonged if regular maintenance and cleaning to remove general dust and debris is carried out.

**We recommend this instrument to be re-calibrated annually.**

Serial No:.....

Date:.....



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**CAUTIONARY NOTE**

ISOTECH PRODUCTS ARE INTENDED FOR USE BY  
TECHNICALLY TRAINED AND COMPETENT PERSONNEL  
FAMILIAR WITH GOOD MEASUREMENT PRACTICES.

IT IS EXPECTED THAT PERSONNEL USING THIS EQUIPMENT  
WILL BE COMPETENT WITH THE MANAGEMENT OF APPARATUS  
WHICH MAY BE POWERED OR UNDER EXTREMES OF TEMPERATURE,  
AND ARE ABLE TO APPRECIATE THE HAZARDS WHICH  
MAY BE ASSOCIATED WITH, AND THE PRECAUTIONS  
TO BE TAKEN WITH, SUCH EQUIPMENT.

## **INTRODUCTION**

The 903 series consists of two models, the B and the S. Both models have been designed to be rugged and easily maintained.

By using a proprietary plug-in controller the total electronics package can be replaced in a few minutes. As can be seen from the parts list, remarkably few components have been used, each of which are easily removed and replaced. Both models have a temperature range of 50 to 650 °C.

### **903 B (Fig.1)**

This model provides an isothermal enclosure (metal block) in which thermometers and thermostats can be calibrated by comparison, either with the temperature indicated on the temperature controller or for greater accuracy against a separate standard thermometer mounted in the metal block.

### **903 S (Fig.2)**

The S is again similar to the B but this unit has the addition of a digital temperature indicator. The indicator is independent from the controller and is configured to operate with a Type N Thermocouple.

The 903 Series represents the third generation of a twelve year development program. During which many customer improvement suggestions have been incorporated into the models. Such suggestions have generally arisen from technical queries posed by equipment users, therefore please consult with us if at all unsure with any aspect of our equipment.

The 903 models are part of a range of portable calibrators designed and made by Isotech. Please contact us if you require more information about our other products.

## **UNPACKING AND INITIAL INSPECTION**

Our Packing Department uses custom designed packaging to send out your unit, but as accidents can still happen in transit, you are advised, after unpacking the unit, to inspect it for any sign of shipping damage, and confirm that your delivery is in accordance with the packing note. If you find any damage or that part of the delivery is missing notify us or our agent, and the carrier immediately. If the unit is damaged you should keep the packing for possible insurance assessment.

## **ELECTRICITY SUPPLY**

Before connecting to the electricity supply please familiarise yourself with the parts of the handbook relevant to your model.

Your unit's supply voltage requirement is specified on a plate on the base of the instrument along with the serial number. All 903 instruments will work on an electricity supply frequency of 50Hz or 60Hz.

The unit's electricity supply cable is colour-coded as follows:-

<b><u>COLOUR</u></b>	<b><u>FUNCTION</u></b>
Green/yellow	Earth (Ground)
Brown	Live (line)
Blue	Neutral

Please ensure that your unit is correctly connected to the electricity supply.

Ensure the unit is isolated from the supply when checking or replacing the 3.15A fuse in the holder on the base of the unit.

### **INITIAL TESTING**

This unit was tested before despatch to you but please check its operation as outlined below.

After connecting the 903 to the electricity supply, the temperature controller display will show the temperature of the block and the last set-point value. The S controller and indicator both go through a self-test sequence first. The fan should be heard running.

Change the set-point to 60°C and observe that the block temperature rises and settles to this value. For the S; place a thermometer in an insert in the block and connect it to the indicator. Confirm that the indicator agrees within  $\pm 2^\circ\text{C}$  of the controller.

Your unit should have performed as described above and can now be used for calibration.

If any problems or faults arise during these tests please contact us or our agents for help and advice.

### **IMPORTANT NOTICE**

The controller's function settings should not normally require any changes from what they have been set at.

### **903 BASIC (B) AND SITE (S)**

### **MAINTENANCE**

Turn the electricity supply off before attempting any cleaning operation.

The only major moving parts is the fan. It has sealed-for-life bearings. Depending on the environment in which it is used, periodic cleaning of the fan and the inside of the case is recommended. Cleaning may be accomplished by the use of a small dry paint brush.

The instrument should be periodically checked to ensure it is in good order both mechanically and electrically.

### **THE BASIC WORKINGS OF THE 903**

The purpose of the 903 models is to provide an adjustable isothermal enclosure for calibration purposes.

The isothermal enclosure consists of a fixed heater block into which an insert can be placed. Items for calibration are placed in suitably drilled holes in the insert. The replaceable inserts enable a variety of items to be calibrated.

The heater block houses a heater and the control sensor used by the temperature controller to sense the block temperature. To obtain and maintain a required temperature the controller varies the power to the heaters via a solid state relay.

A fan runs continuously and keeps the electronics cool.

### **OPERATING PROCEDURES**

The following operating procedures have been written for one of the two models as indicated by the Procedures heading. However the procedure may be common to the other models and in such cases the relevant models are indicated in brackets.

Please note:-

No oils, greases or powders should be introduced into the 903 or its inserts.

## **OPERATION**

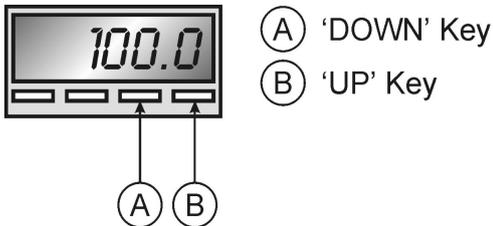
### **Altering the Block Temperature, (Setpoint)**

1. Switch the unit on. The power switch is located on the power entry module, front panel.



**NOTE:** Do not switch the unit off until the block has cooled. Preferably below 100°C but not above 350°C or damage to the controller may occur.

2. The controller will briefly show its software version before displaying an indication of the block temperature.



3. Momentarily press either the UP or DOWN key once to display the setpoint (desired temperature).
4. To alter the value press and hold the UP key to raise the value or the DOWN key to lower the value.
5. The display will return to show the nominal block temperature when no key is pressed for 0.5 second.



The other controller functions are hidden from the operator. The values are pre-set and should not be changed.

**ALTERING THE TEMPERATURE INDICATOR (S MODEL ONLY)**

A suitable temperature sensor may be placed into the insert and connected to the indicator to allow traceable temperature calibration. The front panel has a connector for a type N thermocouple.



**NOTE** - Only one sensor may be connected at a time or the display will read incorrectly. Only connect a temperature sensor to the connectors.

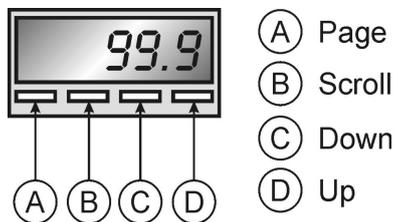
When supplied with a sensor Isotech configure the controller appropriately.

- i. Calibration offsets are programmed into the indicator.
- ii. The sensor type is configured.

Normally no adjustment is needed.

Should you wish to reconfigure the sensor type or calibration offsets the procedures are listed.

- 1. To alter the calibration offsets



- i. Press the PAGE (A) key until the display shows

ACCS

- ii. Press the SCROLL (B) key, the display shows

CodE, then  
PASS

- iii. Press the SCROLL key, display changes to show

Goto

Press the UP key until the display reads

FULL

- iv. Press the scroll key, display shows

PASS

Press PAGE key until display shows

IP

- v. Press the SCROLL key until CAL.P, press the up key twice then down key once to enter the code "O". The display will show PASS then CAL.P. Pressing the SCROLL key will show the calibration data, Pnt.L, OfS.L, Pnt.H, and OfS.H in turn. The actual values are shown by pressing the UP key once. The values may be modified using the UP and DOWN keys.

- vi. To leave this level press the PAGE key until the display shows

ACCS

Press the SCROLL key, the display changes to

CODE

Press the UP key, the display change to

PASS

Press the SCROLL key, the display changes to

GO TO

Press the UP key to "OPER" and the display will revert to GO TO, wait 15 seconds and the display will revert to normal mode.

**NOTE:**

The indicator is display only. If the procedure is not carried out correctly then the display may read strangely but no damage can occur.

**DETERMINING THE CALIBRATION DATA**

- Pnt.L            This is the point at which the OfS.L (Low Point Calibration Offset) correction is applied. It would normally be set to the lowest calibration temperature.
- Pnt.H            This is the point at which the OfS.H (High Point Calibration Offset). It would normally be set to the highest calibration temperature.
- OFS.L            Offset, in display units at the low calibration point Pnt.L.
- OFS.H            Offset in display units at the high calibration point Pnt.H.

**NOTE:**            The two point calibration is used to calibrate the indicator at two points and apply a straight line between them.

A single low point calibration applies a fixed offset over the range.

**903 BASIC (B) AND SITE (S)**

**CALIBRATION USING THE TEMPERATURE INDICATED ON THE CONTROLLER**

1. Visually inspect the 903 for any damage it may have sustained since it was last used. Insert the required metal insert into the furnace block.
2. Connect the 903 to a suitable power supply and set the controller to the required temperature.
3. Place the thermometer for calibration into a suitable hole in the metal insert and wait for the temperature to stabilise.
4. When the temperature indicated by the controller and the output of the thermometer are both stable, record three sets of readings over a period of about six minutes. Check that these readings are consistent and then calculate their average values.
5. If the 903 has itself been calibrated, correct the average values accordingly. If there is no calibration, use an uncertainty figure of  $\pm 0.5\%$  of full scale for the temperature indicated by the controller.
6. Reset the controller and/or repeat the calibration for another thermometer.
7. When the calibration is complete, reset the controller to  $0^{\circ}\text{C}$  and wait until the unit has cooled to below  $400^{\circ}\text{C}$  before moving the 903 to a new location.

**903 BASIC (B) AND SITE (S)**

**CALIBRATION USING A STANDARD THERMOMETER WITH EXTERNAL INDICATION**

1. Visually inspect the 903 for any damage it may have sustained since it was last used. Insert the required metal insert into the furnace block.
2. Connect the 903 to a suitable power supply and set the controller to the required temperature.
3. Place the thermometer(s) for calibration and the standard thermometer into suitable holes in the metal insert; wait for the temperature to stabilise. See appendix 7 and 8 for a suitable digital indicator.
4. When the temperature indicated by the controller and that of the other thermometers are stable, record three sets of readings over a period of about six minutes. Check that these readings are consistent and use their average values for the final calibration figures.
5. Reset the controller and/or repeat the calibration for another thermometer.
6. When the calibration is complete, reset the controller to 0°C and wait until the unit has cooled to below 400°C before moving the 903 to a new location.

**903 SITE (S)**

**CALIBRATION USING A STANDARD THERMOMETER AND THE INTERNAL INDICATOR**

1. Visually inspect the 903 for any damage it may have sustained since it was last used. Insert the required metal insert into the furnace block.
2. Connect the 903 to a suitable power supply and set the controller to the required temperature.
3. Place the thermometer(s) for calibration into a suitable insert in the metal block and wait for the temperature to stabilise, connect the standard thermometer to the indicator via the miniature plug and socket.
4. When the temperature indicated by the controller and that of the other thermometers are stable (see specification for typical values) record three sets of readings over a period of about six minutes. Check that these readings are consistent and use their average values for the final calibration figures.
5. If the 903 has been calibrated, correct the figures accordingly. If there is no calibration, use an uncertainty figure of  $\pm 1\%$  for the temperature shown by the standard thermometer and indicator.
6. Reset the controller and/or repeat the calibration for another thermometer.
7. When the calibration is complete, reset the controller to 0°C and wait until the unit has cooled to below 400°C before moving the 903 to a new location.

**FIGURE 1**

**903 B**

PANEL LAYOUT AND FUNCTIONS

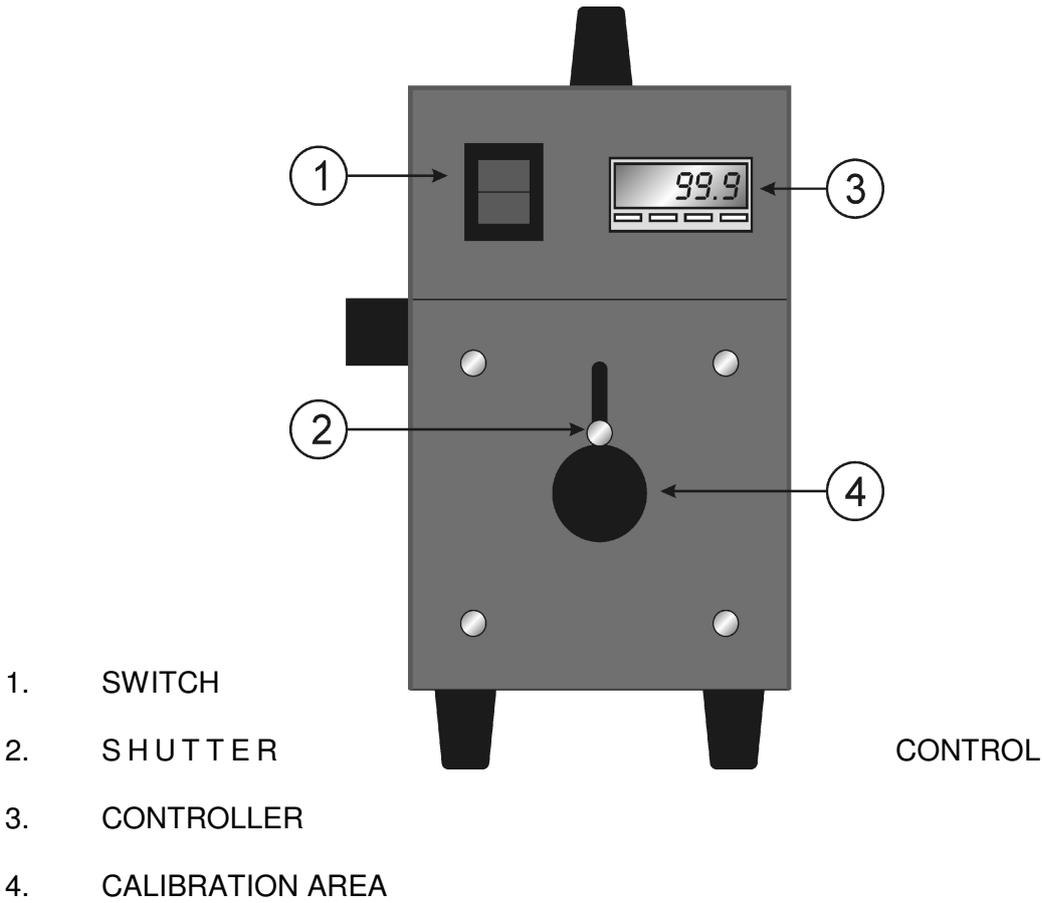
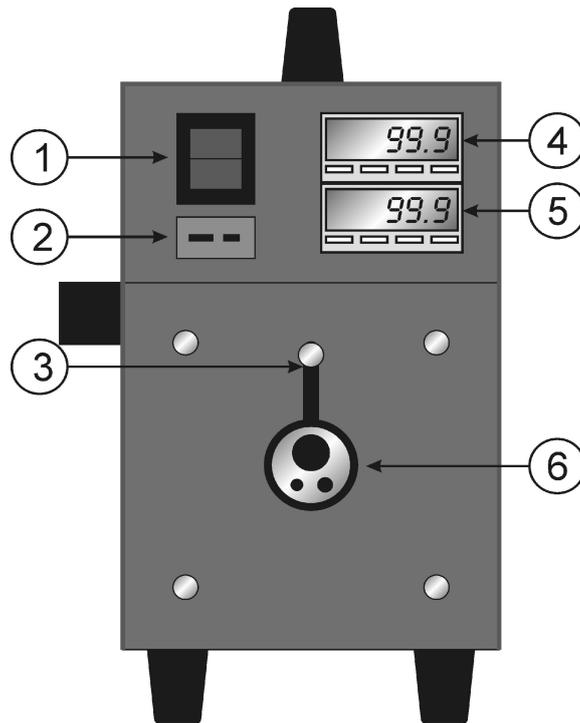


FIGURE 2

903 S

PANEL LAYOUT AND FUNCTIONS



1. SWITCH
2. T/C SOCKET
3. SHUTTER CONTROL
4. CONTROLLER
5. INDICATOR
6. CALIBRATION AREA

**903 BASIC (B) AND SITE (S)**

**TROUBLE SHOOTING**

**TEMPERATURE UNSTABLE**

Controller has incorrect parameters set; reset to standard. Check the electricity supply is stable.

**UNIT FAILS TO HEAT**

Check controller is set correctly. If the output indicator on the controller is lit the relay should operate the heaters. If the output indicator stays off it is likely the controller is set incorrectly.

**CONTROLLER DISPLAY UNUSUAL**

Error or system message, consult Isotech.

**HEATERS FAIL ON**

If the temperature of the block increases rapidly with the controller output staying off the relay and sensor are suspect. Do not use the unit, contact Isotech or your agent.