Installation, Operation & Maintenance Instructions

Block Baths & Thermoblock

MBB & THM

This manual is for the guidance of operators of the above Carbolite products and should be read before the unit is connected to the electricity supply.

CONTENTS

This manual should supply all the information required for safe and trouble-free operation. Information on controller operation is included.

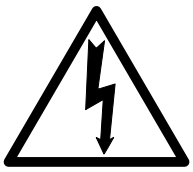
If a non-standard temperature controller is fitted then a separate manual for the controller is supplied. Please read the controller manual before operating the oven.

SYMBOLS & WARNINGS

1.1 Switches and Lights

Supply Light: when the oven is connected to the electrical supply the light in the adjacent switch glows

1.2 Warning Symbols



DANGER of electrical shock– read any warning printed by this symbol.

DANGER – hot surface. Read any warning printed by this symbol.
WARNING: all surfaces of an oven may be hot.

DANGER – read any warning printed by this symbol.

2.0 INSTALLATION

2.1 Unpacking & Handling

Lift the unit by its base and remove any packing. Place on a level surface.

2.2 Siting & Setting Up

Ensure that the unit is placed in such a way that it can be quickly switched off or disconnected from the electrical supply - see below.

The Thermoblock unit may be used complete with aluminium blocks (if supplied); alternatively the blocks nay be removed and the unit filled, for example, with sand.

The Block Bath models are supplied complete with integral aluminium blocks. They have a separate control box, to be connected by the two linking cables.

2.3 Electrical Connections

Connection by a qualified electrician is recommended.

The unit is manufactured for use on a single phase supply, which may be Live to Neutral non-reversible, Live to Neutral reversible or Live to Live.

The voltage or range of voltages on which the unit may be operated is given on the product rating label. Check that the supply voltage is compatible with the voltage on the label, and that the current capacity is sufficient for the amperage on the label, before connection to the supply.

The supply cable may be wired directly to an isolator or fitted with a line plug; supply-rated fuses are internally fitted.

The supply point must be within reach of the operator and must incorporate either an isolating switch which operates on both conductors single phase or a quickly removable plug.

Connect as follows. The supply MUST incorporate an earth (ground).

			supply type	
supply	**Terminal label**	**Cable colour**	*Live-Neutral*	*Reversible or Live-Live*
1-phase	L	Brown	to live	to either power conductor
	N	Blue	to neutral	to the other power conductor
	PE	Green/Yellow	to earth (ground)	to earth (ground)

1.3 Caution

⚠ Block Baths: DO NOT connect the block bath supply cable directly to the main electrical supply. It MUST be connected to the control box. Using the unit without controlled power could result in it burning out.

3.0 OPERATION

3.1 Operating Cycle – Thermoblock

If the unit is fitted with a digital controller, then you may disregard the hydraulic thermostat instructions; read section 3.2 for operation instructions.

The temperature is controlled by a hydraulic thermostat. The thermostat knob is marked with arbitrary numbers and should initially be set by trial and error. Turn the knob clockwise and set it initially to setting "4". The block starts to heat up. Note that the amber "HEATER" lamp is illuminated. As the thermoblock approaches the set temperature the heater lamp switches on and off.

Refer to the temperature indicated on a thermometer inserted into the block and adjust the thermostat knob up and down as required. Always allow the block temperature to stabilise for at least half an hour after making any temperature adjustments.

Make a note of the thermostat knob settings required for any particular temperature so that the block may be quickly set up in future. Although the thermostat is not calibrated it does have good repeatability such that the same setting always gives the same temperature in the block.

Remember that the block stays hot for a long time after the thermoblock has been switched off. The top surface should be protected to prevent people touching it.

3.2 Operating Cycle – Block Bath

The unit is fitted with a combined Supply light and Instrument switch. The light is on whenever the unit is connected to the supply. The switch cuts off power to the controllers.

Connect the unit to the electrical supply. The Supply light should glow.

Operate the instrument switch to activate the temperature controller; the **O** position is off, the **I** position on. The controller becomes illuminated and go through a short test cycle.

Adjust the temperature controller – see section 4.0.

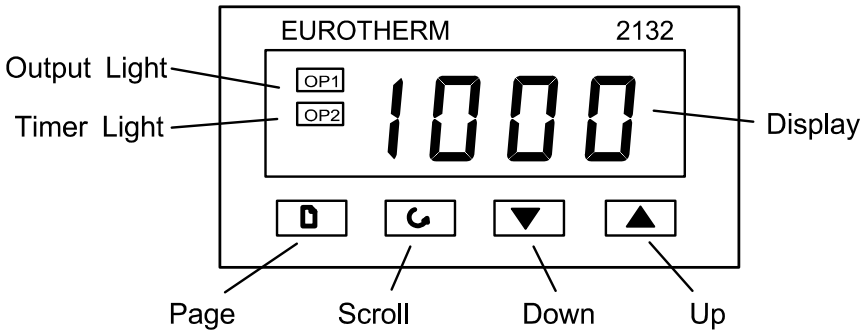
The unit starts to heat up according to the controller set point. Allow about half an hour for the unit to stabilise after it has reached the set temperature.

To switch the unit off, set the Instrument switch to off. If the unit is to be left off, isolate it from the electrical supply.

4.0 CONTROLLER OPERATION

If a digital controller other than 2132 is fitted, see the separate manual.

4.1 Eurotherm 2132



When switched on, the controller lights up, goes through a short test routine, and then displays the measured temperature and starts to control. The output light glows or flashes as heating occurs.

The **Page** key 🗋 allows access to parameter lists within the controller; most lists and parameters are hidden and cannot be accessed by the operator because they contain factory-set parameters which should not be changed.

A single press of the page key 🗋 displays the temperature units, normally set to °C; further presses reveal the lists indicated in the Navigation Diagram in section 4.6.

The **Scroll** key ↺ allows access to the parameters within a list. Some parameters are display-only; others may be altered by the operator. Some parameters only appear in appropriate circumstances – for example, working setpoint does not appear if setpoint ramp rate is Off.

A single press of the scroll key ↺ displays the temperature units; further presses reveal the parameters in the current list indicated in the Navigation Diagram.

To return to the Home list at any time, press Page 🗋 and Scroll ↺ together, or wait for 45 seconds.

The **Down** ▼ and **Up** ▲ keys are used to alter the setpoint or other parameter values.

4.2 Basic Operation

Normally no operator action is required other than entering the setpoint, as the 2132 starts to control on being switched on, as described above.

4.3 Altering the Setpoint

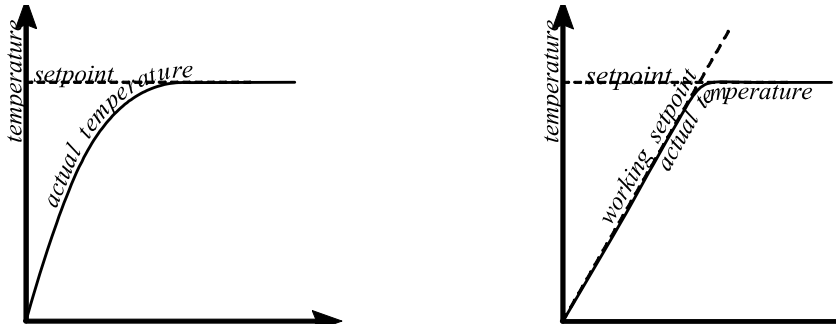
With the display at "home", showing the measured temperature, press Down ▼ or Up ▲ once to display the setpoint; press again or hold down to adjust it. The display returns to the measured temperature when no key is pressed for 0.5 seconds.

4.4 Altering the Ramp Rate

It is possible to limit the rate of heating by setting a ramp rate. Press Scroll ↺ until the legend SPrr (SetPoint ramp rate) is displayed. Use Down ▼ or Up ▲ to display and adjust the value.

The ramp rate sets the maximum rate of heating or cooling in degrees per minute. A value of OFF cancels the ramp rate, allowing heating and cooling at the maximum rate. When this feature is in use, there is a "working setpoint" which can be viewed at any time by scrolling to w.SP and pressing ▼ or ▲.

Fig 1 and fig 2 indicate the possible difference between running without and with a ramp-to-setpoint value (depending on the load and the value used).

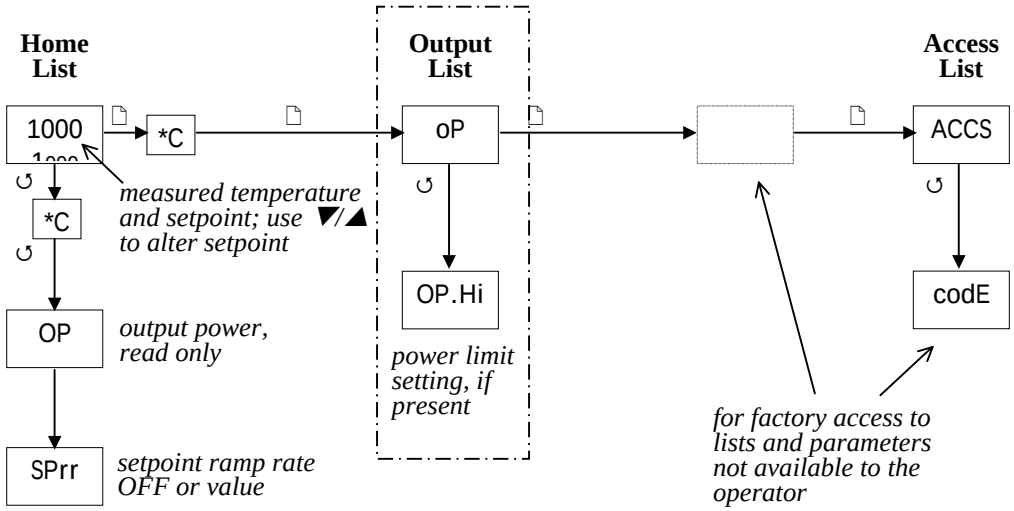


4.5 Overtemperature System – Block Bath

The block bath uses a deviation high alarm in the controller to isolate the elements in the event of the measured temperature exceeding the setpoint by a predetermined amount. If the overtemperature condition occurs, a red fault light shows.

If an overtemperature condition occurs, it must be reset before heating can restart. Press **Page** 🗋 and **Scroll** ↺ together to reset.

4.6 2132 Navigation Diagram



5.0 MAINTENANCE

5.1 General Maintenance

No routine maintenance is required other than the occasional replacement of consumable items.

The outer surface may be cleaned with a damp cloth. Do not clean with organic solvents. Avoid allowing water to enter the base of the unit.

5.2 Calibration (digital controller)

After prolonged use the controller and/or thermocouple could require recalibration. This would be important for processes which require accurate temperature readings. A quick check using an independent thermocouple and temperature indicator should be made from time to time to determine whether full calibration is required.

For a quick check of the temperature shown by the control thermocouple and oven controller, a portable temperature indicator and probe thermocouple may be used. Carbolite can supply these items.

Depending on the controller, the controller manual may contain calibration instructions.

5.3 After Sales Service

Carbolite's service division (Thermal Engineering Services) has a team of Service Engineers capable of repair, calibration and preventive maintenance of furnace and oven products at our customers' premises throughout the world. We also sell spares by mail order. A telephone call or fax often enables a fault to be diagnosed and the necessary spare part despatched.

Each furnace has its own record card at Carbolite. In all correspondence please quote the serial number, model type and voltage given on the rating label of the furnace. The serial number and model type are also given on the front of this booklet when supplied with a furnace.

To contact Thermal Engineering Services or Carbolite see the back page of this manual.

5.4 Recommended Spares Kits

Carbolite can supply individual spares, or a kit of the items most likely to be required. Ordering a kit in advance can save time in the event of a breakdown. Please enquire for information on a suitable kit for this model.

When ordering spares please quote the model details as requested above.

5.5 Power Adjustment (MBB models)

The furnace control system incorporates electronic power limiting, but in these models the power limit parameter OP.Hi is normally set to 100%. It may be inaccessible to the operator.

In the case of special voltages or special element configurations the power limit parameter may be set to a value other than 100%. Do not increase the value to 100%. See any additional sheet supplied for details of any power limit settings.

Occasionally the power limit is set to zero to permit demonstration of the controls without the heating elements taking power. In this case the power limit is accessible to the operator and may safely be reset to its standard value.

6.0 REPAIRS & REPLACEMENTS

6.1 Safety Warning – Disconnection from Supply

Always ensure that the oven is disconnected from the supply before repair work is carried out.

6.2 Safety Warning - Refractory Fibrous Insulation

This oven contains refractory fibres in its thermal insulation. These materials may be in the form of fibre blanket or felt, vacuum formed board or shapes, mineral wool slab or loose fill fibre.

Normal use of the oven does not result in any significant level of airborne dust from these materials, but much higher levels may be encountered during maintenance or repair.

Whilst there is no evidence of any long term health hazards, we strongly recommend that safety precautions are taken whenever the materials are handled.

Exposure to dust from fibre which has been used at high temperatures may cause respiratory disease.

When handling fibre always use an approved mask, eye protection, gloves and long sleeved clothing.

Avoid breaking up waste material. Dispose of waste fibre in sealed containers.

After handling rinse exposed skin with water before washing gently with soap (not detergent). Wash work clothing separately.

Before commencing any major repairs we recommend reference to the European Ceramic Fibre Industry Association Bulletin No. 11 and the UK Health and Safety Executive Guidance Note EH46.

We can provide further information on request. Alternatively our service division can quote for any repairs to be carried out at your premises or ours.

6.3 Temperature Controller Replacement

2132, 2416, 2408 etc.: Ease apart the two lugs at the side; grip the instrument and withdraw it from its sleeve; push in the replacement.

6.4 Solid-state Relay Replacement

Identify and remove the appropriate panel. Make a note how the wires are connected to the solid state relay, and disconnect them.

Remove the solid state relay from the plate to which it is fixed.

Replace and reconnect the solid state relay ensuring that the heat-conducting thermal pad is sandwiched between the relay and the base panel or aluminium plate. Alternatively a thin layer of white, heat-conducting silicon paste may be applied between the new relay and the plate.

The new solid state relay contains a built-in MOV which protects it from short periods of excess voltage. If the old relay had a separate disc-shaped "MOV" connected between the high voltage terminals of the old relay, discard the old MOV.

Replace the removed panel.

6.5 Elements and Temperature Sensors

Should any of these components fail, please contact Carbolite for instructions.

6.6 Fuse Replacement

Supply fuses are mounted on the EMC filter units. These are accessed by removing the nearest panel to the cable entry on the control compartment.

Take care not to disconnect the wires leading from the EMC filter without first recording their positions: they must be reconnected to the correct terminals.

7.0 FAULT ANALYSIS

A. Oven Does Not Heat Up

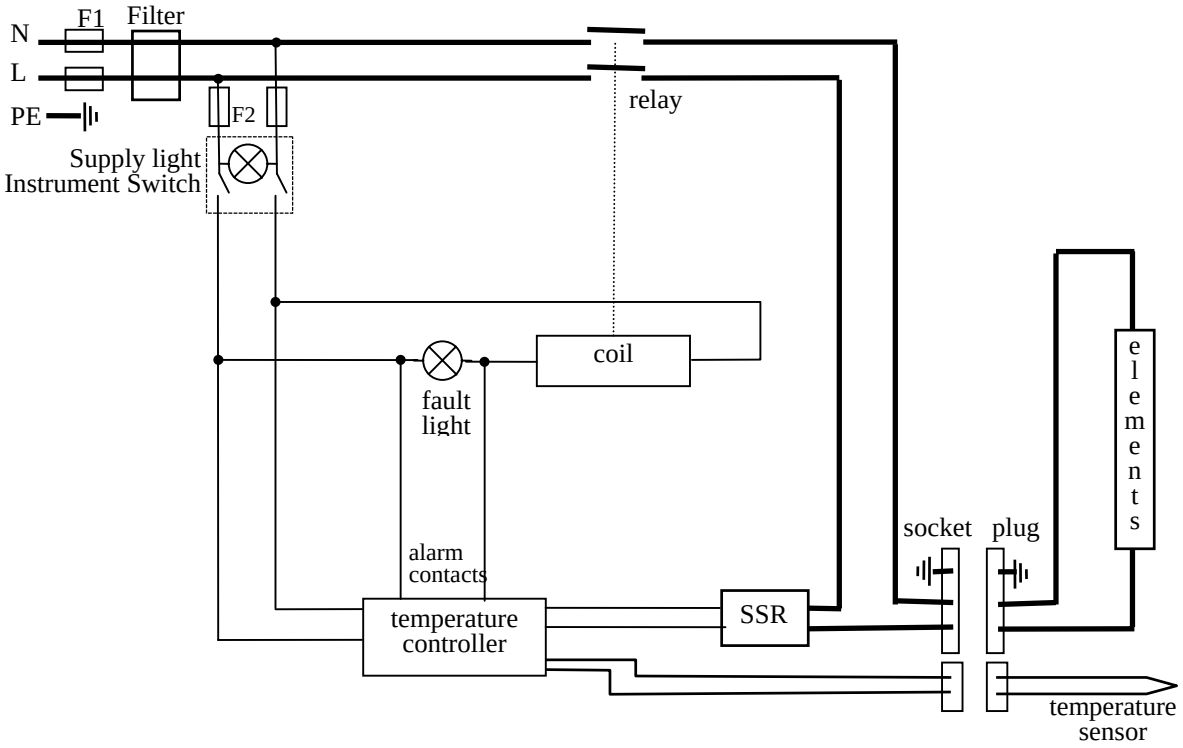
1.	The **SUPPLY** light is **OFF**	→	No power from the supply	→ Check the fuses in the supply line
2.	The **SUPPLY** light is **ON**	→	The controller shows **a very high temperature** or a code such as S.br	→ The thermocouple has broken or has a wiring fault
		→	The controller shows a **low temperature**	→ The SSR could be failing to switch on due to internal failure, faulty logic wiring form the controller, or faulty controller
		→	There are no lights glowing on the controller	→ The controller may be faulty or not receiving a supply due to a faulty switch or a wiring fault

B. Oven Overheats

1.	Oven only heats up when the instrument switch is **ON**	→	The controller shows a **very high temperature**	→ The controller is faulty
		→	The controller shows a **low temperature**	→ The thermocouple may have been shorted out or may have been moved out of the oven
				→ The thermocouple may be mounted the wrong way round
				→ The controller may be faulty
2.	Oven heats up when the instrument switch is **OFF**	→	The SSR has failed "ON"	→ Check for an accidental wiring fault which could have overloaded the SSR

8.0 CIRCUIT DIAGRAM

8.1 Block Bath



9.0 FUSES

The supply fuses in all 220-240V models are 32mm x 6mm type F, fitted on board the internal EMC filters.

There may be variations from the table below because of special customer requirements.

Model	phases	Volts	Supply Fuse
MBB251	1-phase	220-240	7A
MBB252	1-phase	220-240	5A
MBB253	1-phase	220-240	5A or 7A
MBB451	1-phase	220-240	10A
MBB452	1-phase	220-240	10A
MBB453	1-phase	220-240	10A
THM	1-phase	220-240	5A

10.0 SPECIFICATIONS

Carbolite reserves the right to change specifications without notice.

10.1 Models Covered by this Manual

MODEL	Max. Temp. (°C)	Max. Power (kW)	Chamber Size (mm) H	W	D
Thermoblock Heater Module					
THM	250	0.25	100	300	100
Aluminium Blocks for above					
AB1 *(1 off)*			100	300	100
AB2 *(2 off)*			100	150	100
AB3 *(3 off)*			100	100	100
Metal Block Baths					
MBB251	250	2.5	100	200	300
MBB252	250	2.5	200	100	300
MBB253	250	2.5	300	100	200
MBB451	450	3	100	200	300
MBB452	450	3	200	100	300
MBB453	450	3	300	100	200

10.2 Environment

The ovens contain electrical parts and should be stored and used in indoor conditions as follows:

temperature: 5°C - 40°C

relative humidity: maximum 80% up to 31°C decreasing linearly to 50% at 40°C

The products covered in this manual are only a small part of the wide range of ovens, chamber furnaces and tube furnaces manufactured by Carbolite for laboratory and industrial use. For further details of our standard or custom built products please contact us at the address below, or ask your nearest stockist.

Carbolite, Parsons Lane, Hope,
Hope Valley, S33 6RB, England.
Telephone: (01433) 620011
Int: +44 1433 620011
Facsimile: (01433) 621198
Int: +44 1433 621198
E-mail: enquiry@carbolite.co.uk