



Installation, Operation & Maintenance Instructions

1100-1200°C Chamber Furnaces
models EMF 11/7, CMF 12/7

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

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



1.0 SYMBOLS & WARNINGS

1.1 Switches and Lights

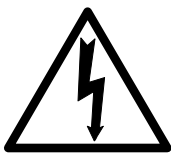


Supply Light: when the furnace is connected to the electrical supply the light in the adjacent switch glows



Heat Light: the adjacent light glows or flashes to indicate that power is being supplied to the elements

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 a furnace may be hot.



DANGER – read any warning printed by this symbol.

2.0 INSTALLATION

2.1 Unpacking & Handling

When unpacking or handling the furnace always lift it by its base. Never lift it by the door. Use two people to unpack and carry the furnace.

Remove any packing material from the door gear and furnace chamber before use.

2.2 Siting & Setting Up

Place the furnace in a well ventilated room, away from other sources of heat, and on a surface which is resistant to accidental spillage of hot materials. Do not mount the furnace on an inflammable surface.

Ensure that there is free space around the furnace. Do not obstruct any of the vents in the case: they are needed to keep the controls and the case exterior cool.

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

If the chimney is supplied unfitted, then fit it through the hole in the top of the furnace case.

If the furnace is to be used to heat substances which emit fumes, then a fume extraction duct of about 150mm inlet diameter may be placed directly above the chimney outlet. Do not make a sealed connection to the furnace chimney as this causes excessive airflow through the chamber and results in poor temperature uniformity.

2.3 Electrical Connections

Connection by a qualified electrician is recommended.

The furnaces covered by this manual require a single-phase A.C. supply with earth (ground). The supply may be Live to Neutral non-reversible, Live to Neutral with reversible plug, or Live to Live.

The voltage or range of voltages on which the furnace may be operated is given on the furnace 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. For fuse data see section 9.1.

This furnace is normally fitted with a supply cable. It may be wired directly to an isolator or fitted with a line plug. *110-120V version: a supply lead is not factory fitted, in which case connection must be made to the supply terminals after temporary removal of the furnace back panel.*

Connect the supply as follows:

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

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

3.0 OPERATION

If the furnace is fitted with a time switch, see also the supplementary manual MS03.

3.1 Operating Cycle

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

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

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

Close the furnace door and adjust the temperature controller: see the separate manual supplied. Unless a time switch is fitted and is *off*, the furnace starts to heat up.

As the furnace heats up the Heat light glows steadily at first and then flashes as the furnace approaches the desired temperature.

To switch off, set the instrument switch to **O**. If the furnace is to be left off, isolate it from the electrical supply.

3.2 General Operating Notes

Heating element life is shortened by use at temperatures close to maximum. Do not leave the furnace at high temperature when not required. The maximum temperature is given on the furnace rating label and on the back page of this manual.

The element life can be reduced by use of non-metallic hearth plates or other non-conducting material covering the hearth. Raise the temperature slowly over the last 300°C, allowing 10 minutes soak at 100°C intervals.

When heating large objects, in particular poor conductors, avoid shielding the thermocouple from the heating elements. The thermocouple is intended to sense the temperature near the heating element, but if a large cold object is placed in the chamber it may record the average temperature of the object and the element, which can lead to overheating of the element. Allow large objects to gain heat at a lower temperature and then adjust the controller setpoint to a temperature close to the desired maximum.

When heating materials which produce smoke or fumes, the chimney must be correctly fitted and unobstructed. Otherwise, soot may accumulate in the chamber and could possibly cause an electrical breakdown of the heating element.

If the furnace is used to heat materials which emit smoke or fumes, regularly heat it up to maximum temperature for one hour without load to burn away the soot.

Materials such as case hardening compounds and other reactive salts may penetrate the furnace chamber lining and attack the wire elements, causing premature failure. Use of a hearth tile may be advisable: please consult our technical department.

3.3 Atmospheres

If an optional gas inlet is fitted there is a label near the inlet saying "INERT GAS ONLY". In practice *inert* or *oxidising* gases may be used, but not combustible or toxic gases. Chamber furnaces are not gas tight, so it should be understood that gas usage may be high, and that the chamber is likely always to contain some air. Residual oxygen levels of 1% are to be expected.

3.4 Operator Safety

The furnace incorporates a safety switch which interrupts the heating element circuit when the door is opened. This prevents the user touching a live heating element, but also prevents the furnace from heating up if the door is left open. The operation of this switch should be checked periodically – see section 5.1.2.

Avoid burns: furnace surfaces can be hot. Before you remove a hot object from the furnace make sure you have a safe place to put it down..

3.5 Power Adjustment

The furnace control system incorporates electronic power limiting, but in these models the power limit is set to 100%. Where appropriate the power limit parameter DPH is accessible to the operator, but it should not generally be altered.

The power limit may be set to a lower limit if the furnace is to be used at a low temperature only: this may give better control stability. It may set to zero to permit demonstration of the controls without the heating elements taking power; to resume heating reset it to its standard value.

Rarely, in the case of uncommon voltages (e.g. outside the range 220-240V or the 3-phase equivalent), the power limit parameter may be set to a value other than 100%. Do not increase the value to 100%. See section 9.2 for details of any power limit settings.

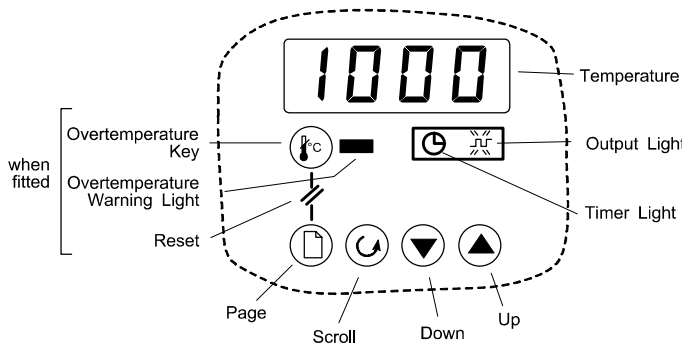
4.0 CONTROLLER OPERATION

The controller normally fitted to this furnace is the Carbolite 201 made by Eurotherm.

If any other controller is fitted, then a separate manual is supplied.


If a time switch is fitted, then a separate manual is supplied.

4.1 201 – Basic Features





Note: on the 201 display the letters *m* and *w* look like *n* and *u*. In these instructions the letters are described as *m* and *w*.

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 201 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 Stopping and Starting Control

It is possible to stop and start the controller without altering the setpoint. Press Scroll  until the legend *m-A* (manual/auto) appears. In the 201, manual means “off” and auto means “on”. Press Down  or Up  once to show the current on/off state: *mAn* for off, and *AuLo* for on. Press  or  to change between manual and auto (off and on) as required.

Note that timer modes 1 & 3 set the controller to *mAn* at the end of the timing period. If the controller unexpectedly does not control it may be in manual mode, possibly as the result of previous use of the timer function.

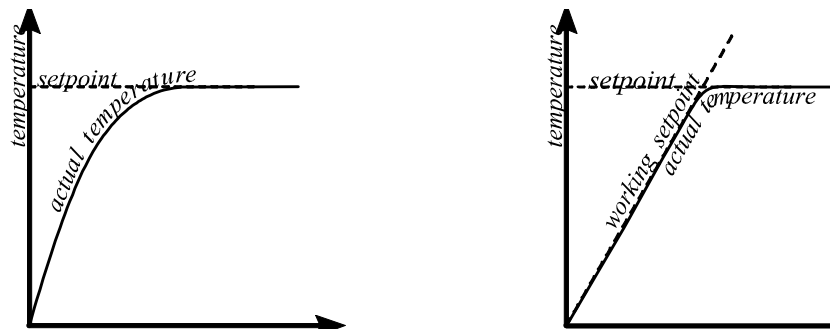
4.5 Altering the Ramp Rate

It is possible to limit the rate of heating by setting a ramp rate only if the timer feature is not in use. To enable direct setting of the ramp rate, first ensure that the *StAtE* parameter and *dwEll* parameter are both set to *OFF* (see sections 4.8 and 4.9).

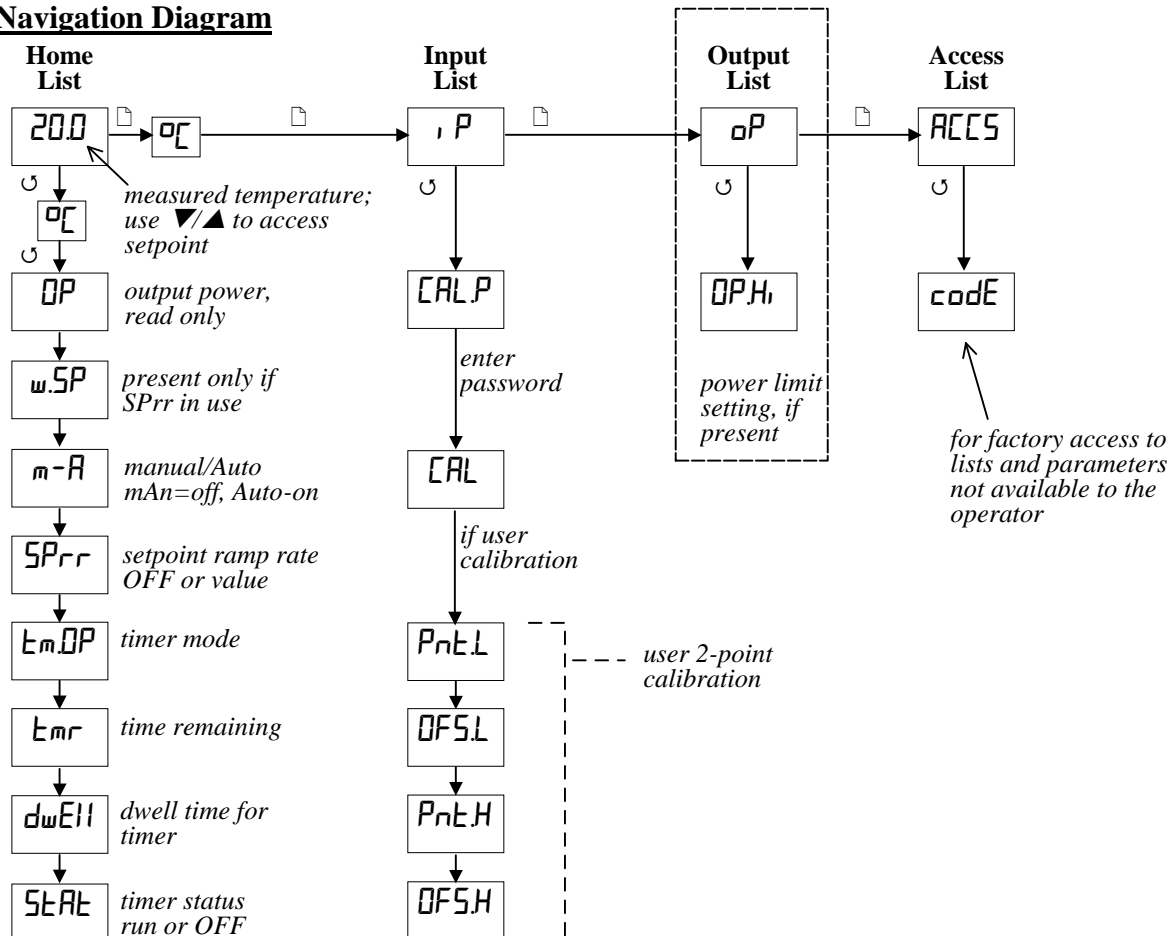
Press Scroll \curvearrowright until the legend *SPrr* (SetPoint ramp rate) is displayed. Use Down \blacktriangledown or Up \blacktriangle to display and adjust the value.

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 \blacktriangledown or \blacktriangle .

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).



4.6 Navigation Diagram



4.7 Operation With the Timer

The 201 can be used as a process timer allowing timed heating or timed delay, according to the options in the table. There are 5 timer modes, but 2 of them are affected by whether the setpoint ramp rate feature is being used, making 7 entries in the table. The table also shows the status of the Timer Light on the 201. A visual impression of the different modes is given in fig 3.

timer mode	description	timer light
mode 1 <i>Timed dwell and switch off</i>	The timer starts timing when the actual temperature is within 1°C of the setpoint. At the end of the timing period, control switches off (i.e. goes into Manual) to allow cooling, and <i>End</i> flashes on the display.	On while temperature is reaching setpoint. On during the timing period. Off from the end of the timing period.
mode 2 <i>Timed dwell and stay on</i>	The timer starts timing when the actual temperature is within 1°C of the setpoint. At the end of the timing period, control remains on, maintaining the setpoint temperature, and <i>End</i> flashes on the display.	On while temperature is reaching setpoint. On during the timing period. Off from the end of the timing period.
mode 3, with <i>SPrr</i> off <i>Time from cold and switch off</i>	The timer starts timing immediately. At the end of the timing period, control switches off (i.e. goes into Manual) to allow cooling, and <i>End</i> flashes on the display.	On during the timing period. Off from the end of the timing period.
mode 3, with <i>SPrr</i> active <i>Dwell from working setpoint and switch off</i>	The timer starts timing when the working setpoint is within 1°C of the setpoint. At the end of the timing period, control switches off (i.e. goes into Manual) to allow cooling, and <i>End</i> flashes on the display.	On during the timing period. Off from the end of the timing period.
mode 4, with <i>SPrr</i> off <i>Time from cold and stay on</i>	The timer starts timing immediately. At the end of the timing period, control remains on, maintaining the setpoint temperature, and <i>End</i> flashes on the display.	On during the timing period. Off from the end of the timing period.
mode 4, with <i>SPrr</i> active <i>Dwell from working setpoint and stay on</i>	The timer starts timing when the working setpoint is within 1°C of the setpoint. At the end of the timing period, control remains on, maintaining the setpoint temperature, and <i>End</i> flashes on the display.	On during the timing period. Off from the end of the timing period.
mode 5 <i>Delayed switch on</i>	The timer starts timing immediately, and control starts at the end of the timing period. There is no "END" condition in this mode.	On during the timing period. Off from the end of the timing period.

4.8 Setting the Timer Mode

Scroll to tmOP ; use \blacktriangledown or \blacktriangle to view and alter the mode. The mode shows as OPE.1 to OPE.5 .

It is not possible to alter the mode while the timer is running; if the mode cannot be altered, scroll to the SETE parameter and set its value to OFF .

4.9 Setting the Time Period

Method 1

Scroll to tmr (time remaining). Use \blacktriangledown or \blacktriangle to view the remaining time; the units are always in minutes. Use \blacktriangledown and \blacktriangle to set or alter the time. Setting tmr automatically activates the timer; the $m-A$ parameter changes to AUTO and the SETE parameter changes to run.

Note that the tmr display shows \square (zero) during the last minute of timing, and also shows \square when the time has expired. The timer light indicates whether timing is still in progress.

Method 2

Scroll to dwELL , and use \blacktriangledown and \blacktriangle to set the timing duration. The advantage of method 2 is that dwELL need only be set once if repeated use of the same time period is required.

Scroll to SETE , and use \blacktriangledown or \blacktriangle to set the parameter value to RUN . This copies the dwell time into tmr and activates the timer as in method 1.

4.10 Running with the Timer

Once the timer is activated by method 1 or 2 above, the control sequence depends on the timer mode, as previously given in the table. Fig 3 gives another representation of the timer action.

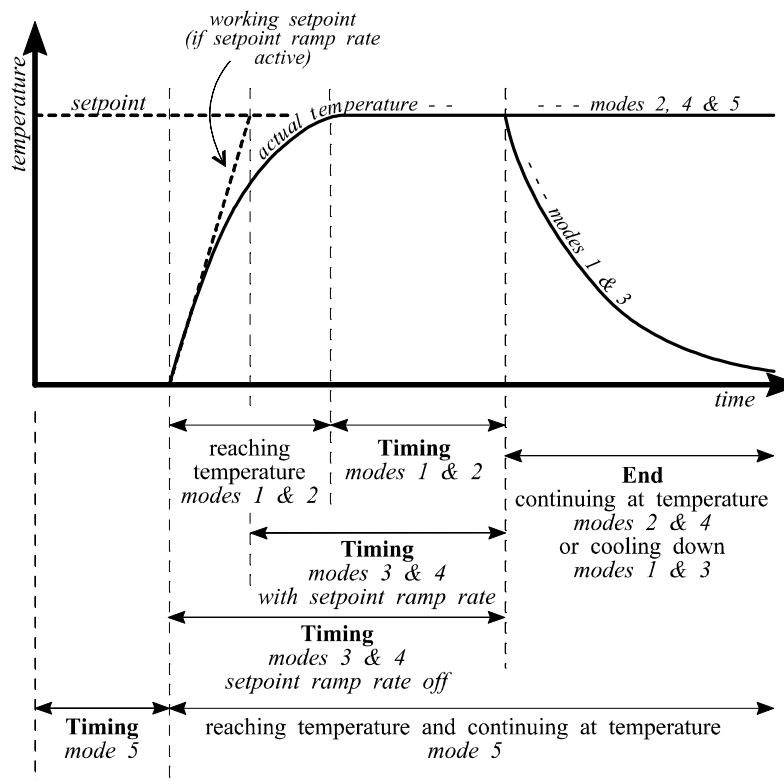


fig 3 - timer modes

4.11 Stopping the Timer

To stop the timer at any time while it is running, change the *SEt* parameter to *OFF*. This is the same as reducing *tmr* to zero. The controller then acts as though it has reached the end of the time period.

4.12 End of Time Period

Modes 1 and 3: heating stops at the end of timing; the *m-A* parameter changes to *mAn*.

Modes 2 and 4: heating continues at the end of timing; the *m-A* parameter remains at *Auto*.

Mode 5: heating starts at the end of the timing period; the *m-A* parameter remains at *Auto*.

In modes 1 to 4 the alarm message *End* flashes on the display at the end of timing; the *SEt* parameter remains at run.

In mode 5 there is no *End* message; the *SEt* parameter changes to *OFF* at the end of timing.

4.13 Cancelling the Alarm

To acknowledge (cancel) the *End* alarm, press Page and Scroll together; the *SEt* parameter changes to *OFF*.

Alternatively the alarm may be cancelled by directly changing the *SEt* parameter from *run* to *OFF*.

4.14 User Calibration

The controller is calibrated for life at manufacture against known reference sources, but there may be sensor errors or other system errors. User calibration allows compensation for such errors, and the 2132 allows for a user 2-point calibration. This setting is password protected to avoid accidental alteration.

Page to *P*, scroll to *CALP*, and use Up ▲ to alter the password. The password is *3*. If the correct password is entered, the display shows *PASS*. Scroll to *CAL* and use ▼ or ▲ to observe the setting *FACT* (factory values, as manufactured) or *USER* (user values). Change to *USER*.

NOTE: before checking the calibration of the controller, or of the complete system, remember to reset the 2132 to factory calibration values by setting the *CALP* parameter to *FACT*.

To enter a user calibration, scroll to each of the following parameters in turn and set the desired values.

Pnt.L low temperature for which an offset is to be entered

OFF.L offset value for the low temperature

Pnt.H high temperature for which an offset is to be entered

OFF.H offset value for the high temperature

Example: the controller reads 3°C low at 400°C, and 5°C low at 1000°C. The parameter values should be *Pnt.L*=400, *OFF.L*=3, *Pnt.H*=1000, *OFF.H*=5.

Negative or positive values can be entered: if the controller is reading high, negative offsets would be appropriate.

Fig 4 gives a graphical representation of the 2-point calibration.

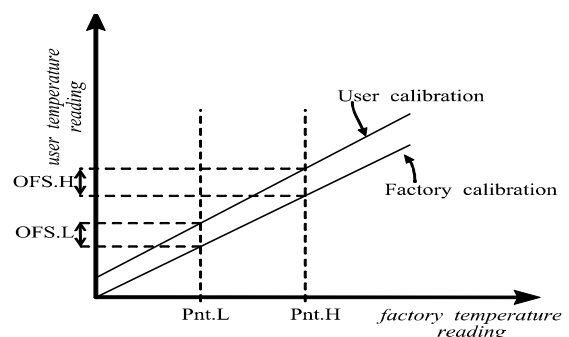


fig 4 - 2-point calibration

5.0 MAINTENANCE

5.1 General Maintenance

Preventive rather than reactive maintenance is to be preferred. The type and frequency depends on furnace use: the following are recommended.

5.1.1 Cleaning

Soot deposits may form inside the furnace, depending on the process. At appropriate intervals remove these by heating as indicated in section 3.2.

The furnace outer surface may be cleaned with a damp cloth. Do not allow water to enter the interior of the case or chamber. Do not clean with organic solvents.

5.1.2 Safety Switch

The door switch operation mentioned in 3.4 should be checked periodically to ensure that heating elements are isolated when the door is opened. In normal conditions the safety arrangement should outlast the furnace, but it could be affected by rough handling, a corrosive environment or work materials, or exceptional frequency of use.

A qualified electrician should check that the supply to the heating elements is cut, with and without power being on, when the door is open partially and fully; it is important that isolation is not just marginally achieved. The check is best made on the element terminals after removal of the furnace back: probing the element surface inside the furnace could be inconclusive because of surface oxidation. Note that all live supply wires of a 3-phase supply, and both live and neutral of a 1-phase supply, should be isolated when the door is opened.

5.2 Calibration

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

See also the instructions for calibrating the controller, in section 4.14.

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.

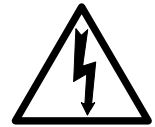
Each kit comprises one thermocouple, one sheath, one solid state relay, one door insulation piece, and one heating element.

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

6.0 REPAIRS & REPLACEMENTS

6.1 Safety Warning – Disconnection from Supply

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



6.2 Safety Warning - Refractory Fibrous Insulation

This furnace 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 furnace 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

EMF: The 201 controller is fitted inside the furnace base, which can be separated from the top by removal of six screws.

CMF: The 201 controller is fitted to the back of the control panel, which can be separated from the base by removal of two screws.

 Before handling the controller: **wear an anti-static wrist strap** or otherwise avoid any possibility of damage to the unit by static electricity.

See the instructions supplied with the replacement controller.

6.4 Solid-state Relay Replacement

Disconnect the furnace from the supply and remove the furnace back panel.

Make a note of the wire connections to the solid state relay, and disconnect them.

Remove the solid state relay from the base panel.

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

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 Thermocouple Replacement

Disconnect the furnace from the supply, and remove the furnace back panel.

Make a note of the thermocouple connections. The negative leg of the thermocouple is marked blue. Compensating cable colour codings are:

<i>negative</i>	<i>positive (type K)</i>	<i>positive (type R)</i>
white	green	orange

Disconnect the thermocouple from its terminal block and withdraw the thermocouple.

Bend the metal tag, or remove the screw, to release the thermocouple sheath, withdraw the sheath, and shake out any fragments of thermocouple.

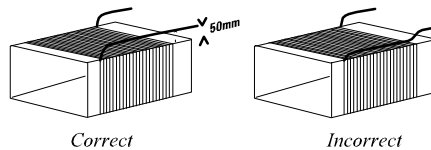
Re-assemble with a new thermocouple observing the colour coding, ensuring that the thermocouple is not twisted as it is being inserted and that the metal tag is bent back, or the screw refitted, to grip the sheath.

6.6 Element Replacement



See section 6.2- *wearing a face*

The heating chamber is formed by heating wire on to a refractory event of failure, the whole "wound" be replaced.



mask is recommended.
winding resistance
muffle former. In the
muffle" assembly must

Disconnect the furnace from the supply and remove the furnace back panel. Pull the chimney out of the top of the furnace.

Make a note of the wiring connections; see the section above which refers to the thermocouple colour coding.

Unfasten the electrical connections to the inner chamber (brick-box) and remove the thermocouple (see thermocouple replacement instructions). Undo the screws which hold the brick-box mounting bracket to the furnace case.

Withdraw the brick-box through the back of the case.

Remove the brick-box lid and top insulating board, noting how it is assembled and observing the position of the heating element wires (or "tails").

Remove sufficient insulation to allow access to the heating element. Check and replace damaged insulation.

Fit the new heating element, ensuring that the tails are separated from the element by at least 25 mm (preferably 50mm) of insulation.

Complete the fitting of the insulation and refit the lid. Do not use any cement unless supplied by Carbolite, as other types may chemically attack the heating element.

Refit the brick-box by reversing the above procedures.

Replace the thermocouple and remake the electrical connections.

Replace the back panel and reconnect the electrical supply.

Switch the furnace ON and heat to 900°C without interruption, and then soak for 1 hour. Some smoke may be observed during this process, which should be carried out in a well ventilated area.

Check that the furnace is controlling properly to rule out the possibility that previous element failed because of a fault in the control circuit.

6.7 EMF Door Plug Replacement



See section 6.2 - wearing a face mask is recommended.

Lower the furnace door to the open position.

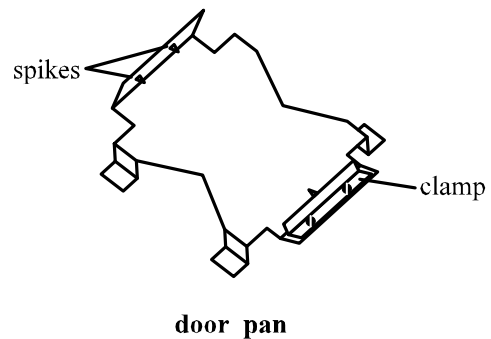
Remove the two bolts or pan-head screws and remove the clamp.

Remove the old door plug.

Position the new plug centrally on the door pan, sliding it towards the furnace to locate the bottom of the plug on the spikes.

Refit the clamp.

When first heating the furnace after a replacement, ensure that the ventilation is good: emission of some fumes may be expected.



6.8 CMF Door Plug Replacement

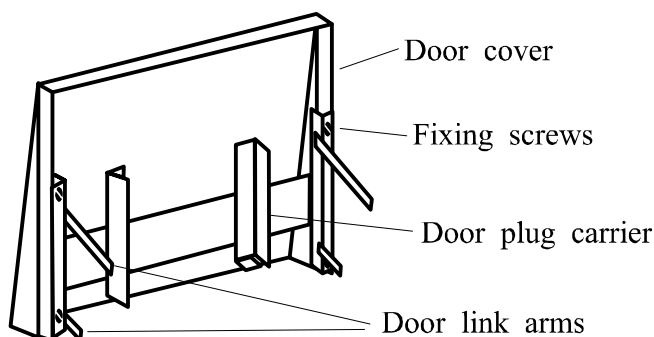
Lift the furnace door to the open position and remove the door cover from the plug carrier assembly (see sketch).

Remove the old door plug by sliding it upwards out of its carrier.

Slide the new plug into the carrier assembly making sure that the plug is the correct way up (fig. b).

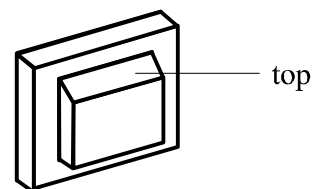
Refit the door cover.

When first heating the furnace after a replacement, ensure that the ventilation is good: emission of some fumes may be expected.



Door

(seen from the back)



Door Plug

6.9 Fuse Replacement

Fuses are marked on the circuit diagram (section 8.0) with type codes, e.g. F1, F2. A list of the correct fuses is given in section 9.1. *Fuse types F2 and F3 may not be fitted on this furnace.*

If any fuse has failed, it is advisable for an electrician to check the internal circuits.

Replace any failed fuses with the correct type. For safety reasons do not fit larger capacity fuses without first consulting Carbolite.

The fuses are near the cable entry point, and access is by removal of the back panel.

7.0 FAULT ANALYSIS

A. Furnace Does Not Heat Up

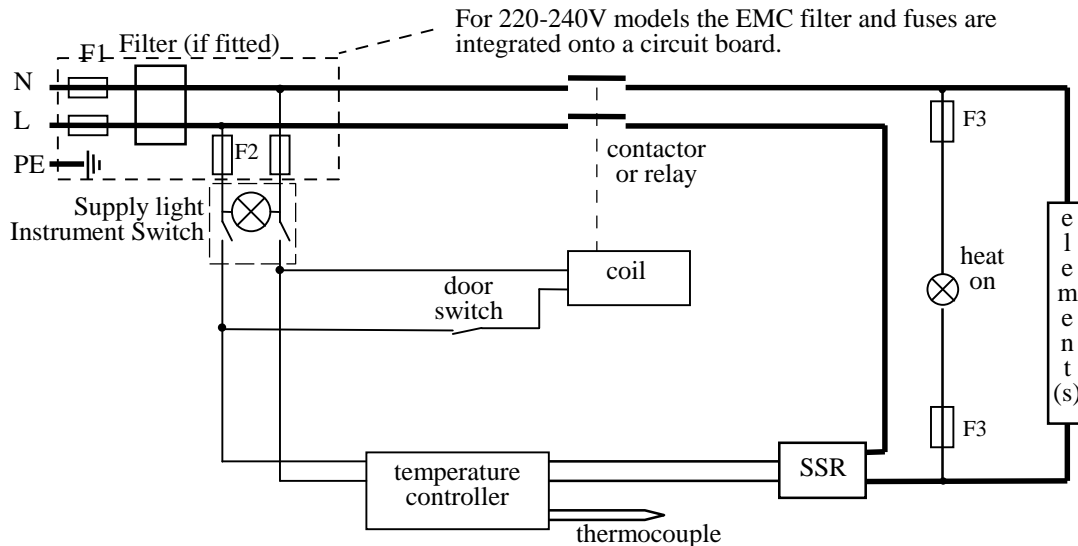
- | | | | |
|----|-------------------------------------|--|--|
| 1. | The HEAT light is ON | → The heating element has failed | → Check also that the SSR is working correctly |
| 2. | The HEAT light is OFF | The controller shows a very high temperature or a code such as S.br | → The thermocouple has broken or has a wiring fault |
| | | The controller shows a low temperature | → The door switch(es) (if fitted) may be faulty or need adjustment |
| | | | → The contactor (if fitted) may be faulty |
| | | | → The SSR could be failing to switch on due to internal failure, faulty logic wiring from the controller, or faulty controller |
| | | There are no lights glowing on the controller | → The SUPPLY light is ON → The controller may be faulty or not receiving a supply due to a faulty switch or a wiring fault |
| | | | → The SUPPLY light is OFF → Check the supply fuses and any fuses in the furnace control compartment |

B. Furnace Overheats

- | | | | |
|----|---|---|--|
| 1. | The HEAT light goes OFF with the instrument switch | → 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 heating chamber |
| | | | → The thermocouple may be mounted the wrong way round |
| | | | → The controller may be faulty |
| 2. | The HEAT light does not go off with the instrument switch | → The SSR has failed "ON" | → Check for an accidental wiring fault which could have overloaded the SSR |

8.0 CIRCUIT DIAGRAM

NOTE – models before mid-2002: in some models two door switches were fitted directly in the element circuit, instead of a single switch and contactor.



Note that in 110-120V models there may be two EMC filters fitted in parallel.

9.0 FUSES & POWER CONTROL

9.1 Fuses

F1-F3: Refer to the circuit diagram.

220-240V models.

- F1* Supply fuses: 12.5 Amp, 32mm x 6mm, type F.
- F2* Instrument circuit fuses: 20mm x 5mm glass, 2 Amps type F.

110-120V models.

- F1* Supply fuses: 25 Amp, GEC safeclip type NS25 (normally not fitted, unless a supply cable is also fitted).
- F2* Instrument circuit fuses: 20mm x 5mm glass, 2 Amps type F.

9.2 Power Control

The furnaces covered by this manual are designed for 100% power.

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)			Approx. Capacity (l)	Door Type
			H	W	D		
<i>Chamber furnaces heated by resistance wire wound onto refractory muffles.</i>							
EMF 11/7	1100°C	3	120	175	320	7	drop down
CMF 12/7	1200°C	3	120	175	320	7	lift up

10.2 Environment

The furnaces 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.

www.carbolite.com

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15/1/03

EMF, CMF