

FB-06

# GENERAL PURPOSE CHAMBER *furnaces*



*complete  
temperature  
CONTROL*

TO SUIT A  
WIDE RANGE OF  
APPLICATIONS

MAXIMUM  
TEMPERATURE OF  
1300°C

RAPID HEATING  
VERSIONS

FRONT AND TOP  
LOADING

COMPREHENSIVE  
SAFETY FEATURES

NUMEROUS  
OPTIONS

CHOICE OF  
CONTROL SYSTEMS

**CARBOLITE**®



## outstanding features

Our range of general purpose laboratory chamber furnaces can be used for a wide variety of applications and in many different sectors of industry and research.

It is impossible to define all the uses which are suited for the models highlighted in this brochure, but typical applications include:

- Heat treating - hardening, tempering and annealing
- Thermal aging processes
- Ignition tests
- Firing of ceramic materials
- Enamelling, bonding, fusing and sintering
- Non ferrous melting
- Decomposition in chemical analysis
- Digestion of samples
- Gravimetric analysis
- High temperature curing and debonding

Whilst all furnaces are fitted with a chimney or exhaust vent, we do not recommend that they are used for ashing where significant amounts of carbon and other combustible volatiles are emitted. Furnaces may sometimes be damaged by chemical attack as a result of corrosive atmospheres generated by the process. Examples include low melting point metal oxides (eg lead, sodium and potassium) fluxes, hardening salts, sulphur compounds and halides.

Where applicable, modified designs can be offered to protect the furnace from chemical attack. If you are uncertain, please discuss your application with us.

### **S**tylish and sturdy

Both the inner and outer case are constructed from zinc coated steel, the outer being finished in two tone, hard wearing stoved epoxy/polyester coating

### **P**ositive break safety switch

Activates isolation of the chamber from all power lines when the door is opened

### **C**onvection cooling

The double skinned construction promotes convected air flow for a cool outer case

### **C**hamber exhaust vent

Promotes the extraction of fumes from the chamber generated by the process

### **S**olid state control

Zero voltage switching and rapid cycle time for smooth and reliable control

### **D**igital temperature control

The control module houses a range of digital instrumentation for precise temperature and process control

### **D**oor action

On the CWF, RWF and GPC furnaces, a vertical counterbalanced door mechanism keeps the hot door insulation away from the operator when the door is opened. The VCF has a parallel door mechanism - easily operated with one hand - which also ensures the hot insulation radiates away from the operator, in this case downwards

### **O**ptions

- Gas safety systems
- Overtemperature protection
- Flowmeters
- Viewing ports (glazed or unglazed)
- Stands
- Chart recorders
- Gas tight retorts
- Gas inlets
- Temperature indicators
- Spares kits
- Tables
- Load thermocouple access



## CWF furnaces

These furnaces integrate the best of traditional and modern materials to produce an outstanding combination of performance and reliability.

The unique concept for this furnace is the heating module - with one situated on either side of the chamber. Each heating module consists of a high quality alumina based hard wearing element carrier, housing a free radiating coiled wire element. With the use of graded winding, the elements compensate for heat loss and optimise temperature uniformity within the chamber. The furnaces reach working temperature quickly and efficiently.

Hard wearing refractories around the chamber entrance and in the chamber base provide excellent resistance to everyday wear and tear, whilst secondary low thermal mass insulation ensures maximum thermal efficiency.

Service is aided by the removable instrument panel and easy access to the element modules and thermocouple through the rear of the case.

Chamber sizes are 5, 13 and 23 litres with maximum temperatures of 1100°C, 1200°C and 1300°C.



<b>Model: CWF</b>	5 litre	13 litre	23 litre
<b>Max Temp (°C)</b>	1100 1200 1300	1100 1200 1300	1100 1200 1300
<b>Internal Dimensions (mm)<sup>(1)</sup></b>	(H) (W) (D) 135 140 250	200 200 325	235 240 400
<b>External Dimensions (mm)<sup>(3)</sup></b>	(H) (W) (D) 585 375 485	655 435 610	705 505 675
<b>Max. Power (W)</b>	2400	3100	7250
<b>Holding Power<sup>(1)</sup> (W)</b>			
<b>Model 1100°C</b>	700	1300	1900
<b>Model 1200°C</b>	850	1550	2250
<b>Model 1300°C</b>	1000	1800	2500
<b>Nominal Heat Up Time<sup>(4)</sup> (mins)</b>			
<b>Model 1100°C</b>	30	55	40
<b>Model 1200°C</b>	35	65	45
<b>Model 1300°C</b>	40	80	55
<b>Uniform Envelope<sup>(1)(2)</sup> (mm)</b> H x W x D (±5°C)			
<b>Model 1100°C</b>	85 x 90 x 110	120 x 120 x 185	155 x 165 x 285
<b>Model 1200°C</b>	85 x 90 x 125	120 x 120 x 200	155 x 165 x 325
<b>Model 1300°C</b>	85 x 90 x 150	120 x 120 x 225	155 x 165 x 340
<b>Temperature Sensor</b>			
<b>Model 1100°C</b>	Type K thermocouple		
<b>Model 1200°C</b>	Type R thermocouple		
<b>Model 1300°C</b>	Type R thermocouple		
<b>Net Weight (kg)</b>	30	47	68

<sup>(1)</sup> - Measured at 100°C below maximum temperature, based on 240v supply, with empty chamber.

<sup>(2)</sup> - Uniformity graphs available on request.

<sup>(3)</sup> - All external measurements are taken with the door closed and include the chimney.

<sup>(4)</sup> - To 100°C below maximum temperature with empty chamber.

# C O N T R



# RWF furnaces

These furnaces are designed for light to medium duty applications where rapid thermal response is a primary requirement.

Powerful, free radiating coiled wire elements are held firmly in the sides and roof of the chamber, which is constructed from rigidised low thermal mass insulation. A hard, dust-free, ceramic hearth provides a robust base for the furnace charge. This combination of high power and low thermal mass gives a heat up time from ambient to 1100°C in as little as 10 minutes, whilst rapid cooling can be induced by opening the furnace door during cool down. Other performance criteria are not compromised, with temperature uniformity, efficiency and control precision remaining excellent.

Chamber sizes are 5, 13 and 23 litres with maximum temperatures of 1100°C and 1200°C.



Model: RWF	5 litre	13 litre	23 litre
Max. Temp (°C)	1100 1200	1100 1200	1100 1200
Internal Dimensions (mm)	(H) 130 (W) 160 (D) 250	(H) 195 (W) 210 (D) 325	(H) 220 (W) 260 (D) 400
External Dimensions (mm) <sup>(3)</sup>	(H) 585 (W) 375 (D) 485	(H) 655 (W) 435 (D) 610	(H) 705 (W) 505 (D) 675
Max. Power (W)	2750	5000	9100
Holding Power <sup>(1)</sup> (W)			
Model 1100°C	680	1200	1800
Model 1200°C	820	1450	2100
Nominal Heat Up Time <sup>(4)</sup> (mins)			
Model 1100°C	10	11	13
Model 1200°C	12	13	15
Uniform Envelope <sup>(1)(2)</sup> (mm) H x W x D (±5°C)			
Model 1100°C	80 x 110 x 150	115 x 130 x 225	140 x 180 x 275
Model 1200°C	80 x 110 x 175	115 x 130 x 235	140 x 180 x 300
Temperature Sensor			
Model 1100°C	Type K thermocouple		
Model 1200°C	Type R thermocouple		
Net Weight (kg)	28	45	65

<sup>(1)</sup> - Measured at 100°C below maximum temperature, based on 240v supply, with empty chamber.

<sup>(2)</sup> - Uniformity graphs available on request.

<sup>(3)</sup> - All external measurements are taken with the door closed and include the chimney.

<sup>(4)</sup> - To 100°C below maximum temperature with empty chamber.

**O L**





# GPC furnaces

These furnaces offer the large capacity and robust construction required for general workshop use, together with the performance capabilities and case style of our smaller laboratory models.

Traditional hard wearing refractory materials used for the chamber entrance and hearth plate provide good resistance to accidental damage and a solid support for heavier furnace loads.

Free radiating coiled wire elements supported in open grooves, together with low thermal mass insulation, typically power these furnaces to working temperature in approximately 40 minutes, and provide efficient and reliable operation.

Removable instrument and back panels allow good service access to the case interior, whilst heating element coils are easily and quickly replaced through the door opening.

Chamber sizes are 36 and 65 litres, with maximum temperatures of 1200°C and 1300°C.



Model: GPC		12/36	12/65	13/36	13/65
Max. Temp (°C)		1200	1200	1300	1300
Internal Dimensions (mm)	(H)	250	280	250	280
	(W)	320	390	320	390
	(D)	450	595	450	595
External Dimensions (mm) <sup>(3)</sup>	(H)	810	885	810	885
	(W)	690	780	690	780
	(D)	780	945	780	945
Max. Power (W)		9000	14000	9000	14000
Holding Power (W)		2700	3500	3200	4100
Nominal Heat Up Time <sup>(4)</sup> (mins)		37	40	47	45
Uniform Envelope <sup>(2)</sup> (mm) (at 1200°C ±5°C)	(H)	170	200	170	200
	(W)	240	310	240	310
	(D)	375	520	375	520
Temperature Sensor	Type R thermocouple				
Net Weight (kg)		120	165	120	165

<sup>(2)</sup> - Uniformity graphs available on request. Based on 240v supply.

<sup>(3)</sup> - All external measurements are taken with the door closed and include the chimney.

<sup>(4)</sup> - To 100°C below maximum temperature with empty chamber.

# VCF furnaces

These furnaces are top loading and particularly suited for applications involving tall crucibles and heavy components.

The coiled resistance wire elements are embedded in robust panels of cast refractory and line the four sides of the chamber ensuring even heat transfer to the load. Elements are not placed in the bottom of the chamber where they may be damaged by spillage. The elements are easily replaced by removal from the top of the furnace.

The door contains a simple vent to help remove fumes from the chamber.



The temperature controller is recessed into the furnace housing - and is inclined upwards ensuring the display is clearly visible. Push button operation allows precise, repeatable setting and the digital display gives a clear indication of both actual furnace temperature and set-point.

Model: VCF		12/5	12/10	12/23	12/100
Max. Temp (°C)		1200	1200	1200	1200
Internal Dimensions (mm)	(H)	260	365	450	600
	(W)	155	180	250	410
	(D)	130	155	200	410
External Dimensions (mm)	(H)	660	765	850	1100
	(W)	530	555	600	930
	(D)	405	430	500	950
Max. Power (W)		2500	3000	6000	15000
Holding Power <sup>(1)</sup> (W)		900	1200	2500	6000
Nominal Heat Up Time <sup>(4)</sup> (mins)		102	138	125	150
Temperature Sensor	Type R thermocouple				
Net Weight (kg)		50	60	130	200

<sup>(1)</sup> - Measured at 100°C below maximum temperature with empty chamber, based on 240V supply.

<sup>(4)</sup> - To 100°C below maximum temperature with empty chamber.

The platinum/platinum 13% Rh Type R thermocouple gives a stable output over a long life and is located in a protective ceramic sheath in a corner of the chamber where it is unlikely to be accidentally damaged.

Chamber sizes are 5, 10, 23 and 100 litres, with a maximum temperature of 1200°C.



# temperature control systems

A choice of control systems is available including controllers which simply heat up the furnace and hold at one temperature indefinitely and more complex programming systems. Access to parameters is simple and easy to understand and is customised to present only those parameters which need to be viewed or adjusted.

## Carbolite 201 Controllers

The 201 is a three term PID microprocessor controller with the facility of an adjustable single ramp rate to set point, either up or down. It is a high precision instrument exclusive to Carbolite and is jointly designed by Eurotherm and ourselves. This partnership allows us to offer a high performance controller with minimal overshoot at an economical cost.

The measured temperature is provided by large LED's located behind a wipe clean membrane panel. The setpoint is displayed and adjusted by pressing either the raise or lower button.



## Communications Software

IPS communicates with the programmer and allows data logging. It also shows a graph of furnace temperature and set point on the computer screen and allows storage of programs on disc, and easy editing and error free downloading to the furnace programmer.

## Eurotherm 2416 CC

The Eurotherm 2416 CC is an advanced setpoint programming temperature controller with eight segments, any of which can be a ramp, step or dwell. It is housed in a compact 1/16 din size measuring 48 x 48mm.

It provides precise control with the advanced PID control algorithm giving stable 'straight-line' control of the process. Power feedback is used to stabilise the output power and hence the controlled temperature against supply voltage fluctuations. The controller continually corrects for drift and this gives high stability and rapid response to process changes.



## Other Options

Additional control systems can be supplied and they include cascade control, multi-segment programmers and process timers. The Carbolite 201 controller is also available with an integral process timer. When the working setpoint is reached, a timed period starts and can either end with an audible alarm or to switch off the power at the end of the time period.

## Eurotherm 2408 CP

The Eurotherm 2408 CP contains the same features as the 2416 CC, but with 16 segments and is housed in a 1/8 din size measuring 48 x 96mm high. The larger case allows for more options including storage of up to 20 separate programmes.



## Standard Electrical Supply

When ordering, always quote the model, controller and the preferred type of electrical supply from the list. Please indicate the frequency (50 or 60 Hertz) and number of phases. For 3-phase supplies (where applicable), please state whether a neutral is available (if so, please quote both the phase-to-phase and the phase-to-neutral voltages, eg 380.220V). Typical single phase voltages are 100, 110, 200, 208, 220, 240 and 254V. 3-phase voltages **without** neutral are typically 220, 380, 415 and 440V. 3-phase voltages **with** neutral are typically 220/127, 380/220, 415/240 and 440/254.

## Overtemperature Protection

An independent overtemperature protection system may be justifiable to protect expensive heating elements or valuable furnace contents. Where the Carbolite 201 controller is the main controller, an overtemperature protection option can be integrated into the same display panel and incorporates an independent power supply and control circuit. When required with other main controllers, a separate Eurotherm 2132 digital controller is fitted. This unit is housed in a compact 1/32 din size measuring 24 x 48mm wide. The additional control unit uses a separate thermocouple and operates a contactor to shut down the furnace in the event of the set temperature being exceeded.



## Note

As a result of continuous product development, we reserve the right to change specifications and illustrations. In the unlikely event of one of our standard products not meeting your requirements, we have the capability to design and manufacture a unit specifically tailored to meet your needs. Carbolite manufactures in compliance with the relevant safety standards to BS EN 61010-1: 1993 & 61010-2-010: 1995. All products carry the CE mark which indicates compliance with all relevant European safety directives; ie Low Voltage Directive and ElectroMagnetic Compatibility directive.



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