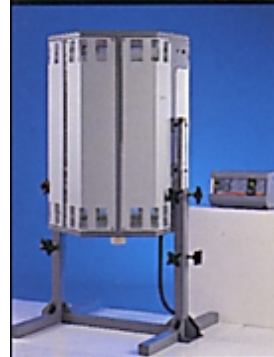


Rotary Reactor Furnace



complete temperature control



CARBOLITE®

Introduction

The Carbolite Rotary Reactor Furnace was developed by the Imperial College of Science and Technology, London and is designed for laboratory scale calcination and the production of high temperature reactions in a wide range of materials.

The Rotary Reactor combines all the advantages of the fluo-solid (fluidised bed) furnace and the rotary kiln by providing both a controlled atmosphere and at the same time agitation of powdered solids. Additionally, the unit overcomes the problems of long reaction times experienced by combustion in a muffle furnace or under flowing gases in a static tube.

Although originally designed for calcining colliery spoils at temperatures up to 1000°C, other applications include:

- calcining arsenical gold ores under neutral and oxidising atmospheres to remove sulphur and arsenic;
- analysis of sulphur in ores and metallurgical slags;
- as a low temperature rotary vacuum drier to remove organic solvent from oxide pigment materials;
- roasting sulphide ores to convert them to oxides;
- determination of silica content of rice husks;
- low temperature calcination of limestone and dolomite.

General Features

Constructed of zinc coated steel, the case is finished in a stoved epoxy coating, providing a durable finish. For maximum heat transfer and excellent temperature uniformity, high quality resistance wire elements are used. A positive break switch isolates power to the long-life resistance wire elements whenever the heating chamber is open. A removable exhaust box is provided for occasional cleaning and removal of condensates.

The rotating fused silica reaction tube is fluted on the internal surface to ensure good mixing and uniform exposure of the particles to the atmosphere. The material is heated by radiation through the silica tube and the smooth internal profile allows easy loading, unloading and cleaning with minimal powder loss. Oscillation of the reaction tube is provided by an electric

motor with variable speed control. Gas tight connections ensure the vessel is sealed.

An adjustable gas flowmeter with a 30mm scale, calibrated for N₂, is supplied as standard. Single or multiple flowmeters for different gases are available as options. The hinged heated chamber design allows easy access for removal and insertion of the quartz vessel. Atmosphere enters the quartz vessel through a flexible silicon rubber tube. The outlet end of the quartz vessel extends into a stainless steel exhaust box. A single gasket seal surrounding the quartz tube prevents atmosphere leakage. A gas outlet port in the exhaust box may be piped to an extraction system.

A wide range of microprocessor based temperature controllers and programmers is available.



Specification Details

Model		HTR 11/75		HTR 11/150	
Maximum Temperature		1000°C			
Internal Vessel Dimensions (mm)		Ø75 x 100		Ø150 x 200	
External Furnace Dimensions (mm)	Lid Position	Down	Up	Down	Up
	(H)	480	800	540	950
	(W)	1140	1140	1300	1300
	(D)	550	680	690	900
Vessel capacity (grams)		120		950	
Maximum power (W)		1500		3000	
Holding power at 1000°C (W)		950		400	
Supply Voltage (single phase)		220/240V			
Heat up time to 100°C below maximum temperature without charge and gas flow (minutes)		11		21	
Cooling time: 1000°C to 300°C with lid open (minutes)		8			
Approximate weight (kg)		40		95	
Oscillation frequency		1-8 per minute			
Rotation angle (each direction)		315°			

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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

The Carbolite 201 is a three term 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. A bright clear display of the measured temperature is provided by large LEDs which are located behind a wipe clean membrane panel. The setpoint is displayed and adjusted by pressing either the raise or lower button.

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.

Eurotherm 2408 CP

The Eurotherm 2408 CP contains the same features as the 2416 CC, but 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.

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 facility is 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.



Communications Software

IPSC communicates with one programmer at a time 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.

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.

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.

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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