

**RHF – High Temperature Chamber Furnaces**

The RHF range of silicon carbide heated high temperature chamber furnaces comprises four chamber sizes, each available with three maximum operating temperatures of 1400 °C, 1500 °C and 1600 °C.

Robust construction and high quality elements provide rapid heating rates (typically reaching 1400 °C in under 40 minutes) and a long reliable working life.

**Standard features**

- 1400 °C, 1500 °C or 1600 °C maximum operating temperature
- 3, 8, 15 or 35 litre chamber volumes
- Silicon carbide heating elements provide long life and are able to withstand the stresses of intermittent operation
- Carbolite 301 PID controller with single ramp to setpoint & process timer
- Hard wearing refractory brick door surround and silicon carbide hearth
- Low thermal mass insulation for energy efficiency & rapid heating & cooling



RHF 15/3

**Options** (specify these at time of order)

- Over-temperature protection (recommended to protect valuable contents & for unattended operation)
- A range of sophisticated digital controllers, multi-segment programmers and data loggers is available. These can be fitted with RS232, RS485 or Ethernet communications (see pages 88-91)



RHF 16/35

### Power supplies for silicon carbide furnaces

A characteristic of the control systems used with silicon carbide elements results in a power supply which will be larger than expected eg RHF 14/3 at 4500 W =

- Single phase / 200 – 240 V / 30 A or
- 2 phase / 380 – 415 V / 15 A per phase.

Please see the specification table for power supply details.

### Technical data

Model	Max temp (°C)	Heat-up time (mins)	Dimensions: Internal H x W x D (mm)	Dimensions: External H x W x D (mm) H (door open)	Volume (litres)	Holding power (W)	Max power (W)	Thermocouple type	Weight (kg)	Power supply		
										Volt	Phase	Ampere per phase
RHF 14/3	1400	33	120 x 120 x 205	655 x 435 x 610 (905) (Bench-top)	3	1900	4500	R	42	200 – 240	single phase	30
										380 – 415	2 phase + N	15
RHF 14/8	1400	22	170 x 170 x 270	705 x 505 x 675 (990) (Bench-top)	8	3200	8000	R	64	200 – 240	single phase	50
										380 – 415	2 phase + N	25
RHF 14/15	1400	35	220 x 220 x 310	810 x 690 x 780 (1105) (Bench-top)	15	2900	10000	R	125	200 – 240	single phase	62
										380 – 415	3 phase + N	22
										200 – 220	3 phase delta	38
RHF 14/35	1400	38	250 x 300 x 465	885 x 780 x 945 (1245) (Bench-top)	35	6000	16000	R	179	380 – 415	3 phase + N	35
										200 – 220	3 phase delta	60
										440 – 480	3 phase no N	35
RHF 15/3	1500	45	120 x 120 x 205	655 x 435 x 610 (905) (Bench-top)	3	2000	4500	R	46	200 – 240	single phase	36
										380 – 415	2 phase + N	18
RHF 15/8	1500	40	170 x 170 x 270	705 x 505 x 675 (990) (Bench-top)	8	3500	8000	R	61	380 – 415	3 phase + N	17.5
										200 – 220	3 phase delta	30
										200 – 208	3 phase delta	38
										380 – 415	3 phase delta	17.5
RHF 15/15	1500	46	220 x 220 x 310	810 x 690 x 780 (1105) (Bench-top)	15	3000	10000	R	125	200 – 240	single phase	75
										380 – 415	3 phase + N	25
										230 – 240	3 phase delta	43
RHF 15/35	1500	46	250 x 300 x 465	885 x 780 x 945 (1245) (Bench-top)	35	6200	16000	R	178	380 – 415	3 phase + N	35
										200 – 240	3 phase delta	60
										380 – 415	3 phase no N	35
										440 – 480	3 phase + N	35
RHF 16/3	1600	42	120 x 120 x 205	655 x 435 x 610 (905) (Bench-top)	3	2300	4500	R	42	200 – 240	single phase	36
										380 – 415	2 phase + N	18
										200 – 240	3 phase delta	30
RHF 16/8	1600	35	170 x 170 x 270	705 x 505 x 675 (990) (Bench-top)	8	4000	8000	R	61	380 – 415	3 phase + N	18
										220 – 240	3 phase delta	29
										200 – 208	3 phase delta	34
										380 – 415	3 phase no N	18
										440 – 480	3 phase no N	18
RHF 16/15	1600	58	220 x 220 x 310	810 x 690 x 780 (1105) (Bench-top)	15	3500	10000	R	140	200 – 240	single phase	73
										380 – 415	3 phase + N	25
										200 – 240	3 phase delta	42
										440 – 480	3 phase + N	25
RHF 16/35	1600	113	250 x 300 x 465	1530 x 900 x 1020 (1885) (Floor-standing)	35	7000	16000	R	270	380 – 415	3 phase + N	40
										220 – 240	3 phase delta	62
										380 – 415	3 phase no N	37
										440 – 480	3 phase + N	40

**i** Please note:

- Maximum continuous operating temperature is 100°C below maximum temperature
- Heat up time is measured to 100°C below max, using an empty chamber
- Holding power is measured at continuous operating temperature

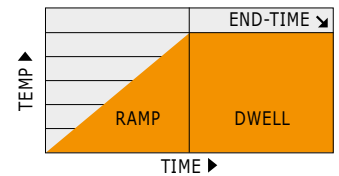
88 Temperature Control Options

## 301 Standard controller

The 301 PID controller has a large display mounted behind a smooth wipe-clean membrane and offers a single ramp to set point. It includes a 99 hour process timer which can be programmed for a timed delay at the start of the process or used as a countdown timer.



**The 301 provides precise PID** (Proportional Integral Derivative) control meaning that ramp rates and set points are very closely followed.



### Options

#### 301 Over-temperature control

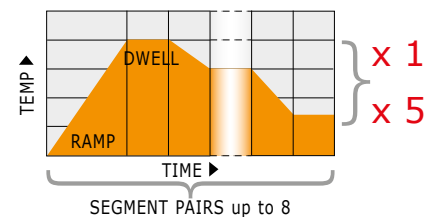
This option offers a variable set point to protect either the chamber or the load. Selection of this option provides an additional independent thermocouple and protection circuit which is fully integrated into the 301 controller. Whilst all Carbolite products are designed to fail safe in the event of a controller malfunction, over-temperature protection is strongly recommended for unattended operation or where valuable loads are to be processed.



## Programmable controllers

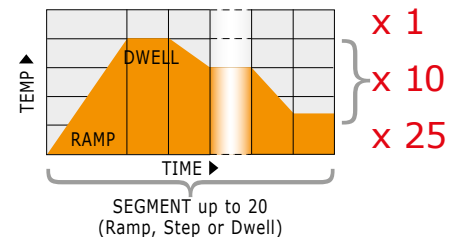
### 3216P1 & 3216P5

These controllers offer programmable control using up to 8 segment pairs, each segment comprising a ramp followed by a dwell; the dwell may be set to zero time. The 3216P5 can also store and retrieve up to 5 separate programs.



### 3508P1, 3508P10 & 3508P25

These controllers offer programmable control in which 20 segments may be set as ramp, step or dwell and may also be configured to control relays or logic outputs. The 3508 series provide a comprehensive information display. If precise temperature control is required over a wide range of temperatures, the 3508 series allows the use of multiple PID terms (gain scheduling). This feature is not enabled as standard, but can be activated on request. The 3508P10 and 3508P25 can also store and retrieve 10 and 25 programs respectively.



### Options

#### Over-temperature control



This has a variable set point to protect either the furnace, oven or the load. If the main controller is from the 3216 or 3508 series this is provided by the addition of an independent 2132 controller. Whilst all Carbolite products are designed to fail safe in the event of a controller malfunction, over-temperature protection is strongly recommended for unattended operation or where valuable loads are to be processed.



## Eurotherm nanodac™

### Recorder & PID controller

In this configuration the nanodac™ combines precision PID temperature control, with a fully functional data logger. The full colour display can be changed to display text in English, French, German, Italian or Spanish.

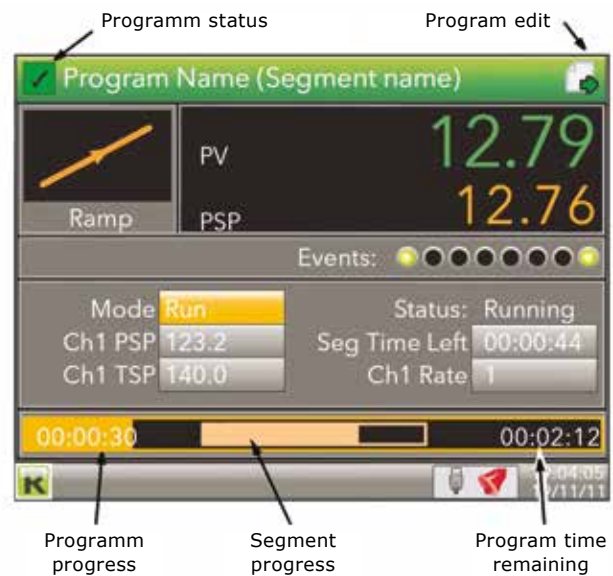
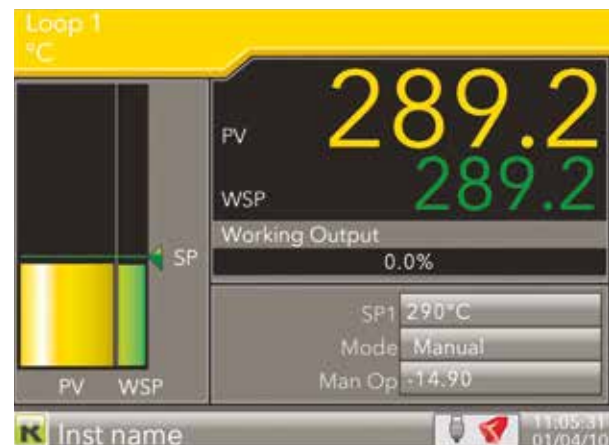
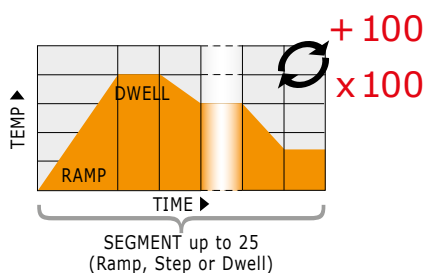
Data is continuously logged into either CSV (comma separated variable) or securely to UHH (Eurotherm Hydra History) files. Data can be archived onto a USB flash drive or via Ethernet to a networked server. Up to 4 channels can be recorded, with up to 14 virtual channels that can be set to record trends, alarms, communications or mathematical functions such as totals or averages.

Logged files can be opened and displayed on a PC, in chart form, using Eurotherm Review Lite software.

### Recorder & PID programmable controller

This controller offers programmable control in which 25 segments may be set as a ramp, step or dwell and may also be configured to control relay or logic outputs. It stores and retrieves 100 programs.

Additional programs can be saved to, and retrieved from, a networked server via a USB flash drive or Ethernet. The action of up to 3 relays, or logic outputs, can be linked to a program segment; this can be used to switch on external devices such as gas solenoid valves and audible alarms. Note that some configurations may require additional components.



In this configuration the nanodac™ can hold up to 100 programs

## RS232, RS485 and Ethernet communications

- RS232 allows a single controller to communicate with a single computer
- RS485 allows multiple controllers to communicate with a single computer
- Both require, but do not include, suitable PC based software (eg iTools) and connection cables
- 301 controller – RS232 is only available when ordered with over-temperature option (RS485 is not available with the 301 controller)
- 3216 and 3508 series controllers both have the option to add RS232 or RS485 communications
- Ethernet communication is supplied as standard with the nanodac™ controller and is optional in the 3508 series