

## High Temperature Horizontal Tube Furnace - HTRH

### General Information

The Carbolite Gero high temperature tube furnaces HTRH can be used horizontally up to 1800 °C.

The high-grade insulation materials guarantee low energy consumption and high heating rates due to their low thermal conductivity. The insulation and molybdenum disilicide (MoSi<sub>2</sub>) heating elements are installed in the rectangular housing. The heating elements are vertically hanging and can be replaced easily. At higher temperatures and in the presence of oxygen, MoSi<sub>2</sub> develops an oxide (SiO<sub>2</sub>) layer, which protects the heating elements against further thermal or chemical corrosion.

Three-zone tube furnaces (HTRH-3) can achieve better temperature uniformity than single-zone versions. In these models each zone is equipped with a dedicated thermocouple and controller, which is especially useful to preheat gases required for reactions inside the system.

The HTRH tube furnaces do not include an integral work tube. The work tube must be selected as an additional item. The work tube length is dependent on the application and will vary if used with or without modified atmosphere or vacuum.



### Standard features

- 1800 °C maximum operating temperature
- Programmable 3216P1 controller
- 3-zone models fitted with 1 x programmable 3216P1 and 2 x 3216CC end zone controllers, with retransmission of setpoint
- Over-temperature protection
- Accepts work tubes with outer diameters up to 100 mm for use with modified atmosphere
- Accepts work tubes with outer diameters up to 200 mm for use in air
- Heated lengths of 100, 250, 300 or 600 mm
- Low thermal mass ceramic fibre insulation
- Vertically hanging, high quality MoSi<sub>2</sub> heating elements
- Rectangular housing with holes for convection cooling
- Available with 1 - 3 heating zones
- Furnace comes with separate control box with 3 m cable, plug and socket

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

- A range of sophisticated digital controllers, multi-segment programmers and data loggers is available. These can be fitted with RS232, RS485 or Ethernet communications
- A range of additional work tubes is available in a variety of materials
- Insulation plugs & radiation shields are strongly recommended for high temperature vertical tube furnaces to prevent heat loss & improve uniformity
- Modified atmosphere and vacuum assemblies are available
- Vacuum packages with a choice of rotary vane pump or turbomolecular

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pump are available for furnaces with tube inner diameters of 60 mm and above

- Oxygen sensor for inert gas packages

### Technical Specifications

#### HTRH \_\_/40/100

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	40
Heated length (mm)	100
Max temp (°C)	1600
Dimensions: External H x W x D (mm)	510 x 390 x 420
Furnace weight (kg)	45
Tube length for use in air (mm)	380
Tube length for use with modified atmosphere (mm)	915
Control module dimensions H x W x D (mm)	480 x 560 x 500
Control module weight (kg)	50
Uniform length $\pm 5^\circ\text{C}$ (mm)	50
Max power (W)	2200

#### HTRH \_\_/40/250

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	40
Heated length (mm)	250
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	510 x 420 x 540
Furnace weight (kg)	45
Tube length for use in air (mm)	530
Tube length for use with modified atmosphere (mm)	1065
Control module dimensions H x W x D (mm)	480 x 560 x 500
Control module weight (kg)	50
Uniform length $\pm 5^\circ\text{C}$ (mm)	125
Max power (W)	3600

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/40/500

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	40
Heated length (mm)	500
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	510 x 420 x 790
Furnace weight (kg)	60
Tube length for use in air (mm)	780
Tube length for use with modified atmosphere (mm)	1275
Control module dimensions H x W x D (mm)	850x 560 x 500
Control module weight (kg)	90
Uniform length $\pm 5^{\circ}\text{C}$ (mm)	250
Max power (W)	8000

### HTRH \_\_/70/150

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	70
Heated length (mm)	150
Max temp (°C)	1600, 1700
Dimensions: External H x W x D (mm)	620 x 520 x 450
Furnace weight (kg)	65
Tube length for use in air (mm)	440
Tube length for use with modified atmosphere (mm)	975
Control module dimensions H x W x D (mm)	480 x 560 x 500
Control module weight (kg)	60
Uniform length $\pm 5^{\circ}\text{C}$ (mm)	75
Max power (W)	4500

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/70/300

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	70
Heated length (mm)	300
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 520 x 590
Furnace weight (kg)	65
Tube length for use in air (mm)	580
Tube length for use with modified atmosphere (mm)	1115
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	60
Uniform length $\pm 5^\circ\text{C}$ (mm)	150
Max power (W)	6400

### HTRH \_\_/70/600

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	70
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 520 x 890
Furnace weight (kg)	90
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	1415
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length $\pm 5^\circ\text{C}$ (mm)	300
Max power (W)	8000

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/100/150

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	100
Heated length (mm)	150
Max temp (°C)	1600
Dimensions: External H x W x D (mm)	620 x 520 x 450
Furnace weight (kg)	75
Tube length for use in air (mm)	440
Tube length for use with modified atmosphere (mm)	975
Control module dimensions H x W x D (mm)	480 x 560 x 500
Control module weight (kg)	60
Uniform length $\pm 5^{\circ}\text{C}$ (mm)	75
Max power (W)	4800

### HTRH \_\_/100/300

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	100
Heated length (mm)	300
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 520 x 590
Furnace weight (kg)	900
Tube length for use in air (mm)	580
Tube length for use with modified atmosphere (mm)	1115
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length $\pm 5^{\circ}\text{C}$ (mm)	150
Max power (W)	7500

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/100/600

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	100
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 520 x 890
Furnace weight (kg)	140
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	1415
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length ±5°C (mm)	300
Max power (W)	10900

### HTRH \_\_/150/300

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	150
Heated length (mm)	300
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	670 x 570 x 590
Furnace weight (kg)	120
Tube length for use in air (mm)	580
Tube length for use with modified atmosphere (mm)	--
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length ±5°C (mm)	
Max power (W)	8000

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/150/600

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	150
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	670 x 570 x 890
Furnace weight (kg)	140
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	--
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length ±5°C (mm)	
Max power (W)	12000

### HTRH \_\_/200/300

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	200
Heated length (mm)	300
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	720 x 620 x 590
Furnace weight (kg)	140
Tube length for use in air (mm)	580
Tube length for use with modified atmosphere (mm)	--
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length ±5°C (mm)	
Max power (W)	10000

## High Temperature Horizontal Tube Furnace - HTRH

### HTRH \_\_/200/600

Number of heated zones	Single zone
Max outer diameter accessory tube (mm)	200
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	720 x 620 x 890
Furnace weight (kg)	180
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	--
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	90
Uniform length $\pm 5^\circ\text{C}$ (mm)	
Max power (W)	12000

### HTRH-3 \_\_/70/600

Number of heated zones	Three zone
Max outer diameter accessory tube (mm)	70
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 890 x 520
Furnace weight (kg)	120
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	1415
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	180
Uniform length $\pm 5^\circ\text{C}$ (mm)	350
Max power (W)	8000



## High Temperature Horizontal Tube Furnace - HTRH

### HTRH-3 \_\_/100/600

Number of heated zones	Three zone
Max outer diameter accessory tube (mm)	100
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	620 x 890 x 520
Furnace weight (kg)	120
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	1415
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	180
Uniform length ±5°C (mm)	350
Max power (W)	10900

### HTRH-3 \_\_/150/600

Number of heated zones	Three zone
Max outer diameter accessory tube (mm)	150
Heated length (mm)	600
Max temp (°C)	1600, 1700, 1800
Dimensions: External H x W x D (mm)	670 x 890 x 570
Furnace weight (kg)	180
Tube length for use in air (mm)	880
Tube length for use with modified atmosphere (mm)	--
Control module dimensions H x W x D (mm)	850 x 560 x 500
Control module weight (kg)	180
Uniform length ±5°C (mm)	350
Max power (W)	12000

#### Please note:

- Heat up rate when using a ceramic work tube must be limited to 5 °C/min
- The power supply is based on 200 – 240 V for 1 phase and 380 – 415 V for 3 phase power
- Minimum uniform length in horizontal furnace with insulation plugs fitted at 100 °C below max. temperature
- Maximum continuous operating temperature is 100°C below maximum temperature
- Further to the depth of the control module 150 mm for the power plugs and other plugs needs to be added