

## Chamber furnace, graphite insulation - HTK GR

### General Information

The Graphite Furnace HTK GR operates with rough/fine vacuum, protective gases such as Nitrogen/Argon, and reactive gases like Hydrogen and Carbon Monoxide. The Graphite Furnace HTK GR cannot operate in an Oxygen atmosphere due to the Graphite insulation.

The rectangular design with a front door allows for easy loading and unloading. The HTK GR range is available in up to six different sizes. The smallest designs with a capacity of 8 litres and 25 litres are typically employed by laboratories for research and development. The 80 litre, 220 litre, 400 litre or 600 litre furnaces are predominantly used as pilot manufacturing systems or large scale production.

The HTK GR is based on Graphite insulation material, as well as graphite heating elements. With maximum temperatures up to 2200 °C, the HTK GR is suited for extreme heat treatment needs. Upon request, the system can be equipped with a Graphite retort that is capable of a defined gas guiding flow within the unit and improves temperature uniformity to  $< \pm 10$  °C. For processes with strong outgassing, the retort protects the heating elements and increases the lifetime of the furnace.



### Standard features

- Graphite furnace, offering the highest possible temperatures
- Hydrogen partial pressure operation if requested
- Precisely controlled vacuum pumping speeds appropriate for powders
- Data recording for quality management

### Technical Specifications

#### HTK 8 GR/22-1G

Insulation material	Graphite
Volume (l)	8
Tmax vacuum (°C)	2200
Dimensions:	2100 x 1300 x 1100
External H x W x D (mm)	
Transport weight (kg)	1200
Usable space	
H x W x D, usable space without retort (mm)	200 x 200 x 200
H x W x D, usable space with retort (mm)	180 x 180 x 200
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500 °C (K) according to DIN 17052	$\pm 10$
Max. heat-up rate (K/min)	10

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Cooling time (h)	6
Connecting values	
Power (kW)	26.5
Voltage (V)	400 (3P)
Current (A)	3 x 66
Series fuse (A)	3 x 80
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	40
Max. inlet temperature (°C)	23
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	200-2000
Controller	on request

### HTK 25 GR/22-1

Insulation material	Graphite
Volume (l)	25
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2200 x 1900 x 1800
Transport weight (kg)	1700
Usable space	
H x W x D, usable space without retort (mm)	250 x 250 x 400
H x W x D, usable space with retort (mm)	230 x 230 x 400
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500 °C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	6
Connecting values	
Power (kW)	60
Voltage (V)	400 (3P)
Current (A)	3 x 90
Series fuse (A)	3 x 125
Vacuum (option)	

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Leakage rate - clean, cold and empty (mbar l/s)	5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	70
Max. inlet temperature (°C)	23
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	200-2000
Controller	on request

### HTK 80 GR/22-1G

Insulation material	Graphite
Volume (l)	80
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2300 x 2100 x 2200
Transport weight (kg)	2000
Usable space	
H x W x D, usable space without retort (mm)	400 x 400 x 500
H x W x D, usable space with retort (mm)	380 x 380 x 400
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	8
Connecting values	
Power (kW)	100
Voltage (V)	400 (3P)
Current (A)	3 x 150
Series fuse (A)	3 x 200
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	100
Max. inlet temperature (°C)	23
Gas supply	

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Nitrogen or Argon flow, others on request (l/h)	200-2000
Controller	on request

### HTK 220 GR/22-1G

Insulation material	Graphite
Volume (l)	220
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2500 x 2300 x 2600
Transport weight (kg)	3000
Usable space	
H x W x D, usable space without retort (mm)	600 x 600 x 600
H x W x D, usable space with retort (mm)	560 x 560 x 560
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	8
Connecting values	
Power (kW)	160
Voltage (V)	400 (3P)
Current (A)	3 x 240
Series fuse (A)	3 x 315
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	5x10 <sup>-3</sup>
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	150
Max. inlet temperature (°C)	23
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	1000-10000
Controller	on request

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### HTK 400 GR/22-1G

Insulation material	Graphite
Volume (l)	400
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2500 x 2300 x 2600
Transport weight (kg)	3800
Usable space	
H x W x D, usable space without retort (mm)	650 x 700 x 900
H x W x D, usable space with retort (mm)	630 x 680 x 900
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	12
Connecting values	
Power (kW)	250
Voltage (V)	400 (3P)
Current (A)	3 x 370
Series fuse (A)	3 x 500
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	200
Max. inlet temperature (°C)	23
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	1000-10000
Controller	on request

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### HTK 600 GR/22-1G

Insulation material	Graphite
Volume (l)	600
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2500 x 2500 x 2900
Transport weight (kg)	4500
Usable space	
H x W x D, usable space without retort (mm)	650 x 750 x 1200
H x W x D, usable space with retort (mm)	630 x 730 x 1200
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, between 500 and 1500°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	12-16
Connecting values	
Power (kW)	300
Voltage (V)	400 (3P)
Current (A)	3 x 450
Series fuse (A)	3 x 500
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	5x10 <sup>-3</sup>
Vacuum range depending on the pumping unit	rough or fine vacuum
Cooling water required	
Flow (l/min)	2200
Max. inlet temperature (°C)	23
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	1000-10000
Controller	on request