

Top hat furnace - HBO

General Information

The metallic hood furnaces (HBO) generate the lowest achievable operation pressures. The highest purity gas atmosphere is attained due to the vacuum capability.

The materials used in the construction are selected for the lowest vapour pressures at the highest temperatures. Heat treatment up to the highest temperatures can be achieved without harming the heating elements or insulation material. Radiation shields are used to provide thermal insulation, which are made from the same material as the heating elements, and no fibrous thermal insulation is used.

Two varieties of HBO furnaces are produced: those made using molybdenum heating elements and radiation shields are suitable for use up to 1600 °C; those made using tungsten heating elements and radiation shields are suitable for use up to 2200 °C.

Nitrogen, Argon, and Hydrogen gases are available for use in mixed or pure forms. Additional gases can be installed upon request. A slight overpressure or controlled partial pressure between 10 and 1000 mbar can be achieved. Partial pressure provides a defined gas flow through the furnace.

Due to the complete metallic design, the final vacuum level in the HBO can reach the high vacuum range and better than 5×10^{-6} mbar. Depending on the vacuum requirements, the vacuum is provided by different pumping stations. Ultrahigh vacuum options are available upon request. Gases are controlled by various dosing and controlling devices. The temperature in each of the three heating zones is individually controlled to maintain the best uniformity.



Standard features

- Precisely defined atmosphere with highest possible purity (6 N or better)
- Best possible vacuum
- Fast heat up and cool down upon request
- Hydrogen partial pressure operation upon request
- Precisely controlled vacuum pumping speeds appropriate for powders
- Certified safety management for flammable and toxic gases
- Fully automatic operation
- Data recording for quality management

Options (specify these at time of order)

- Vacuum system for pre-vacuum, fine vacuum or high vacuum operation
- Software for automated operation, data tracking and data export
- Reaction gas equipment for more than one inert gas, retorts, afterburners
- Water cooling system

Technical Specifications

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HBO 10 MO/16-1G

Insulation material	Molybdenum
Volume (l)	10
Tmax vacuum (°C)	1600
Dimensions: External H x W x D (mm)	2500 x 2300 x 2000
Transport weight (kg)	1800
Usable space	
Ø x H, usable space without retort (mm)	200 x 300
Ø x H, usable space with retort (mm)	180 x 280
Thermal values	
Tmax atmospheric pressure (°C)	1600
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	3
Connecting values	
Power (kW)	50
Voltage (V)	400 (3P)
Current (A)	3 x 125
Series fuse (A)	3 x 160
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10 ⁻³
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	40
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens

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HBO 25 MO/16-1G

Insulation material	Molybdenum
Volume (l)	25
Tmax vacuum (°C)	1600
Dimensions: External H x W x D (mm)	2500 x 2300 x 2000
Transport weight (kg)	2000
Usable space	
Ø x H, usable space without retort (mm)	300 x 400
Ø x H, usable space with retort (mm)	280 x 380
Thermal values	
Tmax atmospheric pressure (°C)	1600
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	4
Connecting values	
Power (kW)	65
Voltage (V)	400 (3P)
Current (A)	3 x 100
Series fuse (A)	3 x 125
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10 ⁻³
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	50
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens

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HBO 60 MO/16-1G

Insulation material	Molybdenum
Volume (l)	60
Tmax vacuum (°C)	1600
Dimensions: External H x W x D (mm)	2800 x 2300 x 2500
Transport weight (kg)	3000
Usable space	
Ø x H, usable space without retort (mm)	400 x 500
Ø x H, usable space with retort (mm)	380 x 480
Thermal values	
Tmax atmospheric pressure (°C)	1600
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	5
Connecting values	
Power (kW)	80
Voltage (V)	400 (3P)
Current (A)	3 x 120
Series fuse (A)	3 x 160
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10 ⁻³
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	64
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens

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HBO 10 W/22-1G

Insulation material	Tungsten
Volume (l)	10
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2500 x 2300 x 2000
Transport weight (kg)	1800
Usable space	
Ø x H, usable space without retort (mm)	200 x 300
Ø x H, usable space with retort (mm)	180 x 280
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	4
Connecting values	
Power (kW)	125
Voltage (V)	400 (3P)
Current (A)	3 x 180
Series fuse (A)	3 x 250
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10 ⁻³
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	100
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens

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HBO 25 W/22-1G

Insulation material	Tungsten
Volume (l)	25
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2500 x 2300 x 2000
Transport weight (kg)	2000
Usable space	
Ø x H, usable space without retort (mm)	300 x 400
Ø x H, usable space with retort (mm)	280 x 380
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	5
Connecting values	
Power (kW)	150
Voltage (V)	400 (3P)
Current (A)	3 x 220
Series fuse (A)	3 x 315
Vacuum (option)	
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10 ⁻³
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	120
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens

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HBO 60 W/22-1G

Insulation material	Tungsten
Volume (l)	60
Tmax vacuum (°C)	2200
Dimensions: External H x W x D (mm)	2800 x 2300 x 2500
Transport weight (kg)	3000
Usable space	
Ø x H, usable space without retort (mm)	400 x 500
Ø x H, usable space with retort (mm)	380 x 480
Thermal values	
Tmax atmospheric pressure (°C)	2200
-Delta-T, above 800°C (K) according to DIN 17052	± 10
Max. heat-up rate (K/min)	10
Cooling time (h)	6
Connecting values	
Power (kW)	250
Voltage (V)	400 (3P)
Current (A)	3 x 380
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, fine, high or ultra high vacuum
Cooling water required	
Flow (l/min)	200
Gas supply	
Nitrogen or Argon flow, others on request (l/h)	500-2000
Controller	Siemens