



LABORATORY FURNACE, GRAPHITE INSULATION

LHT GR

www.carbolite.com/products/vacuum-furnace/laboratory-furnaces/lhtg/

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LABORATORY FURNACE, GRAPHITE INSULATION

The unique feature of the LHT high temperature laboratory furnace series is a compact design, making it the perfect tool for laboratories in research and development environments.

The cylindrical usable space of the laboratory furnace is surrounded by the heating elements and insulation material. The heated chamber is integrated into the water cooled vessel. As a result of the small volume, the LHT is ideal for small samples and requires minimal operating space.

The system is supported by a single frame platform which supports the furnace and electronic cabinet containing the software controls. Casters are attached to the supporting platform, which allows the whole system to move easily. For universities and industrial research laboratories, the LHT series is a perfect fit for such operating areas.



The small overall dimensions and simple operation result in a cost effective system without any performance loss in temperature uniformity or atmospheric quality. Additionally, the cylindrical design is best suited for overpressure heat treatment processes. Upon request, the system can be equipped with a suitable locking device and all necessary equipment for safe overpressure operations up to 100 bar.

The LHTG has heating elements and insulation material made from graphite. Graphite based LHT models are temperature controlled by pyrometers. An over-temperature thermocouple can be added as an option, which is highly recommended for unattended operation. Under Argon environment, the maximum temperature is 3000 °C, which requires the use of a pyrometer to measure the chamber temperature. The pyrometer is combined with the use of a sliding thermocouple to measure temperatures at the beginning of the process as the initial temperatures are not high enough to be detected by the pyrometer.

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APPLICATION EXAMPLES

brazing, carbonization, debinding, degassing, drying, metal injection moulding (MIM), pyrolysis, rapid prototyping, siliconization, sintering, synthesis, tempering

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STANDARD FEATURES

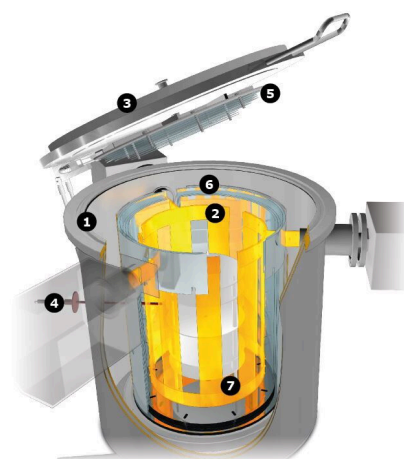
- | Compact design suited for laboratories
- | Vacuum level $< 5 \times 10^{-6}$ mbar
- | Overpressure operation up to 100 bar possible
- | Hydrogen partial pressure operation on demand
- | Data recording for quality management
- | Best possible vacuum
- | Partial pressure 10 - 1000 mbar
- | High temperature top loader up to 3000 °C with Graphite
- | Precisely controlled vacuum pumping speeds appropriate for use with powders

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VIEW INSIDE OF THE LHT LABORATORY FURNACE

- 1 | Water cooled vessel
- 2 | Heating elements
- 3 | Top cover, manually operated
- 4 | Thermocouple
- 5 | Radiation shields at the top
- 6 | Radiation shields at the mantle
- 7 | Short circuit ring

LHT models are heated by a single mantle heater because of their small volume. The temperature profile inside is better than ± 10 K. This uniformity is achieved through careful engineering and positioning of the heating element.



View inside LHTG

The LHTG is based on graphite heating elements and insulation material. If the highest temperature of 3000 °C is required, the insulation thickness and the graphite insulation layers must be specifically designed to withstand the extreme temperatures. The installed power must also be adapted to reach 3000 °C with a high heating rate. The heating cassette is surrounded by a water cooled vessel. The furnace is equipped with all necessary flanges, thermocouples, electrical connections and the pyrometer. The vessel is double walled and water cooled for safety. Electrical connections and electrical cables are water cooled as well.

Software operation is available with manual or automated controls. For the manual version, all valves and pumps are operated by simple push buttons at the user panel with a rotameter used to adjust gas flow. The automated software is operated via a touch panel interface. Mass flow controllers are used to regulate the gas flow. Data logging is possible for both manual and automated operation.

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TECHNICAL DATA

Model	LHTG 100-200/ 22-1G	LHTG 100-200/ 30-1G	LHTG 200-300/ 22-1G	LHTG 200-300/ 30-1G
INSULATION AND DIMENSIONS				
Insulation material	Graphite	Graphite	Graphite	Graphite
External H × W × D (mm)	1800 × 1900 × 1000	1800 × 1900 × 1000	1800 × 1900 × 1000	1800 × 1900 × 1000
Transport weight (kg)	780	1000	900	1500
Volume (l)	1.5	1.5	10	10
Ø × H, usable space without retort (mm)	100 × 200	100 × 200	200 × 300	200 × 300
Ø × H, usable space with retort (mm)	90 × 200	90 × 200	180 × 300	180 × 300
THERMAL VALUES				
Tmax vacuum (°C)	2200	2200	2200	2200
Tmax atmospheric pressure (°C)	2200	3000	2200	3000
ΔT, 500 °C to 2200 °C (K), DIN 17052	± 10	± 10	± 10	± 10
Max. heat-up rate (K/min)	10	20	10	20
Cooling time (h)	4	5	5	7
CONNECTING VALUES				
Power (kW)	22	40	45	85
Voltage (V)	400 (3P)	400 (3P)	400 (3P)	400 (3P)
Current (A)	3 × 55	3 × 100	3 × 65	3 × 120
Series fuse (A)	3 × 63	3 × 125	3 × 80	3 × 160
VACUUM (OPTION)				
Leakage rate — clean, cold and empty (mbar l/s)	< 5×10 ⁻³	< 5×10 ⁻³	< 5×10 ⁻³	< 5×10 ⁻³
Vacuum range depending on the pumping unit	rough or fine vacuum	rough or fine vacuum	rough or fine vacuum	rough or fine vacuum
COOLING WATER REQUIRED				
Flow (l/min)	20	30	50	75
Max. inlet temperature (°C)	23	23	23	23
GAS SUPPLY				
Nitrogen or Argon flow, others on request (l/h)	50-500	50-500	50-500	50-500
CONTROLLER				
Manual operation	TP1200 touch panel	TP1200 touch panel	TP1200 touch panel	TP1200 touch panel
Automatic operation	TP1900 touch panel, Siemens S7-1500 PLC	TP1900 touch panel, Siemens S7-1500 PLC	TP1900 touch panel, Siemens S7-1500 PLC	TP1900 touch panel, Siemens S7-1500 PLC

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PRODUCT DATA SHEET →

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