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LABORATORY FURNACE, METAL INSULATION

LHTM/W

www.carbolite.com/products/vacuum-furnace/laboratory-furnaces/lhtm-lhtw/

LHTM/W

LABORATORY FURNACE, METAL 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 metallic LHT models are based on heating elements and radiation shields constructed of tungsten or molybdenum for a maximum temperature of 2200 °C and 1600 °C, respectively. The radiation shields serve to insulate the heat of the heating elements from the water cooled vessel. The metallic LHT systems provide the highest possible atmospheric purity and best final vacuum level. With a turbomolecular pump in combination with a pre-pump, the working vacuum can reach the high vacuum region. An ultra high vacuum configuration is possible upon request.

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STANDARD FEATURES

- Compact design suited for laboratories
- Vacuum level < 5 x 10-6 mbar
- Overpressure operation up to 100 bar possible
- Precisely controlled vacuum pumping speeds appropriate for use with powders
- Best possible vacuum
- Partial pressure 10 – 1000 mbar
- Hydrogen partial pressure operation on demand
- Data recording for quality management

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APPLICATION EXAMPLES

annealing, brazing, carbonisation, ceramic injection moulding (CIM), debinding, degassing, drying, hardening, metal injection moulding (MIM), pyrolysis, quenching, rapid prototyping, siliconization, sintering, soldering, sublimation, synthesis, tempering

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VIEW INSIDE OF THE LHT LABORATORY FURNACE

1 | Water cooled vessel

2 | Heating elements

3 | Top cover, manually operated

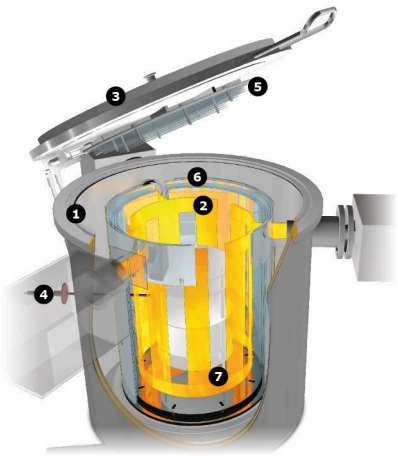
4 | Thermocouple

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 LHT

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FURNACE DESIGN AND OPERATION

The LHTM and LHTW are both constructed of metallic materials and 9 radiation shields. It has a single heating zone that covers the mantle of the cylindrical vessel. The mantle heater is designed for the highest stability. Two different heating elements are available. The standard heating elements consists of several molybdenum sheets, and upon request, a mesh heater is also available. The sample can be protected by a retort that further improves temperature uniformity. With the adaption of a high vacuum system, the best final vacuum is available.

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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EXAMPLES



LHTM/W 200-300 Smart



LHTW 200-300/22-1G automatic up to 2200°C with optional hydrogen package

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TECHNICAL DATA

Model	LHTM 100-200/16-1G	LHTM 200-300/16-1G	LHTW 100-200/22-1G	LHTW 200-300/22-1G
CONSTRUCTION AND USABLE SPACE				
Insulation material	Molybdenum	Molybdenum	Tungsten	Tungsten
Dimensions: External H x W x D (mm)	1800 x 1900 x 1000	1800 x 1900 x 1000	1800 x 1900 x 1000	1800 x 1900 x 1000
Transport weight (kg)	800	950	850	1000
Volume (l)	1.5	10	1.5	10
Ø x H, usable space without retort (mm)	100 x 200	200 x 300	100 x 200	200 x 300
Ø x H, usable space with retort (mm)	90 x 200	180 x 300	90 x 200	180 x 300
THERMAL VALUES				
Tmax vacuum (°C)	1600	1600	2200	2200
Tmax atmospheric pressure (°C)	1600	1600	2200	2200
-Delta-T, between 500°C and 2200°C (K) according to DIN 17052	± 10	± 10	± 10	± 10
Max. heat-up rate (K/min)	10	10	10	10
Cooling time (h)	2.5	4	3	5

LHTM/W

TECHNICAL DATA · CONTINUED

Model	LHTM 100-200/16-1G	LHTM 200-300/16-1G	LHTW 100-200/22-1G	LHTW 200-300/22-1G
CONNECTING VALUES				
Power (kW)	22	45	45	90
Voltage (V)	400 (3P)	400 (3P)	400 (3P)	400 (3P)
Current (A)	3 x 55	3 x 65	3 x 112.5	3 x 130
Series fuse (A)	3 x 63	3 x 80	3 x 160	3 x 160
VACUUM (OPTION)				
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10-3	< 5x10-3	< 5x10-3	< 5x10-3
Vacuum range depending on the pumping unit	rough, fine, high or ultra high vacuum	rough, fine, high or ultra high vacuum	rough, fine, high or ultra high vacuum	rough, fine, high or ultra high vacuum
COOLING WATER REQUIRED				
Flow (l/min)	30	50	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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DOWNLOADS

PRODUCT DATA SHEET LHT →

www.carbolite.com/files/450700/product-data-sheet-lht.pdf

HEAT TREATMENT OF METALS AND CERAMICS →

www.carbolite.com/files/57253/heat-treatment-of-metals-and-ceramics.pdf

VACUUM, INERT AND REACTIVE GAS FURNACES UP TO 3000 °C →

www.carbolite.com/files/15236/vacuum-inert-and-reactive-gas-furnaces-up-to-3000-c.pdf

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