CARBOLITE
a VERDER company

LABORATORIUM OVEN, GRAFIET ISOLATIE (LHT GR)

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.

TOEPASSINGSVOORBEELDEN

carbonisatie, drogen, metaal injectie vormgieten (MIM), ontbinden, ontgassen, pyrolyse, rapid prototyping, siliconisering, sinteren, solderen, synthese, temperen

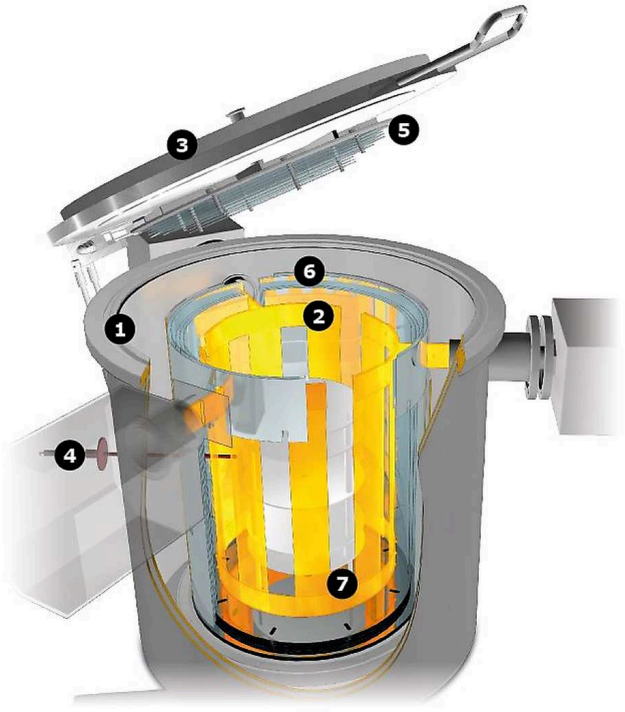
STANDAARD FUNCTIES

- Compact design suited for laboratories
- Best possible vacuum
- Vacuum level < 5 x 10-6 mbar
- Partial pressure 10 - 1000 mbar
- Overpressure operation up to 100 bar possible
- High temperature top loader up to 3000 °C with Graphite
- Hydrogen partial pressure operation on demand
- Precisely controlled vacuum pumping speeds appropriate for use with powders
- Data registratie voor kwaliteitsbeheer

TECHNISCHE DETAILS

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



View inside LHT

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.

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.

TECHNISCHE DETAILS (MODELLEN)

	LHTG 100-200/22-1G	LHTG 100-200/30-1G
Insulation material	Graphite	Graphite
Afmetingen: Buiten H x B x D (mm)	1800 x 1900 x 1000	1800 x 1900 x 1000
Transport weight (kg)	780	1000
Usable space		
Volume (l)	1.5	1.5
Ø x H, usable space without retort (mm)	100 x 200	100 x 200
Ø x H, usable space with retort (mm)	90 x 200	90 x 200
Thermal values		
Tmax vacuum (°C)	2200	2200
Tmax atmospheric pressure (°C)	2200	3000
-Delta-T, between 500°C and 2200°C (K) according to DIN 17052	± 10	± 10
Max. heat-up rate (K/min)	10	20
Cooling time (h)	4	5
Connecting values		
Vermogen (kW)	22	40
Voltage (V)	400 (3P)	400 (3P)
Current (A)	3 x 55	3 x 100
Series fuse (A)	3 x 63	3 x 125
Vacuum (option)		
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10-3	< 5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum	rough or fine vacuum
Cooling water required		
Flow (l/min)	20	30
Max. inlet temperature (°C)	23	23
Gas supply		

	LHTG 100-200/22-1G	LHTG 100-200/30-1G
Nitrogen or Argon flow, others on request (l/h)	50-500	50-500
Controller		
Manual operation	TP1200 touch panel	TP1200 touch panel
Automatic operation	TP1900 touch panel, Siemens S7-1500 PLC	TP1900 touch panel, Siemens S7-1500 PLC

	LHTG 200-300/22-1G	LHTG 200-300/30-1G
Insulation material	Graphite	Graphite
Afmetingen: Buiten H x B x D (mm)	1800 x 1900 x 1000	1800 x 1900 x 1000
Transport weight (kg)	900	1500
Usable space		
Volume (l)	10	10
Ø x H, usable space without retort (mm)	200 x 300	200 x 300
Ø x H, usable space with retort (mm)	180 x 300	180 x 300
Thermal values		
Tmax vacuum (°C)	2200	2200
Tmax atmospheric pressure (°C)	2200	3000
-Delta-T, between 500°C and 2200°C (K) according to DIN 17052	± 10	± 10
Max. heat-up rate (K/min)	10	20
Cooling time (h)	5	7
Connecting values		
Vermogen (kW)	45	85
Voltage (V)	400 (3P)	400 (3P)
Current (A)	3 x 65	3 x 120
Series fuse (A)	3 x 80	3 x 160
Vacuum (option)		
Leakage rate - clean, cold and empty (mbar l/s)	< 5x10-3	< 5x10-3
Vacuum range depending on the pumping unit	rough or fine vacuum	rough or fine vacuum
Cooling water required		
Flow (l/min)	50	75
Max. inlet temperature (°C)	23	23
Gas supply		
Nitrogen or Argon flow, others on request (l/h)	50-500	50-500
Controller		

	LHTG 200-300/22-1G	LHTG 200-300/30-1G
Manual operation	TP1200 touch panel	TP1200 touch panel
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