

# High-Temperature Furnaces up to 1800 °C

High-temperature furnaces as table or stand models for maximum temperatures between 1400 °C and 1800 °C, for example for sintering ceramics or for melting small glass samples.



Dual shell housing made of textured stainless steel sheets with additional fan cooling for low surface temperature



Stainless steel exhaust hood as interface to customer's exhaust system for all standing models



Exclusive use of insulation materials without categorization according to EC Regulation No. 1272/2008 (CLP)



NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive



Defined application within the constraints of the operating instructions



As additional equipment: Process control and documentation via VCD software package for monitoring, documentation and control



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# High-Temperature Furnaces with SiC Rod Heating up to 1600 °C

These powerful laboratory muffle furnaces are available for temperatures up to 1400 °C, 1500 °C, 1550 °C or 1600 °C. The durability of the SiC rods in periodic use, in combination with their high heating speed, make these high-temperature furnaces to all-rounders in the laboratory. Heating times of 20 - 25 minutes to 1400 °C can be achieved, depending on the furnace model and the conditions of use.



High-temperature furnace LHTCT 01/16

## Standard Equipment

- Tmax 1400 °C, 1500 °C, 1550 °C or 1600 °C
- Working temperature 1500 °C (for high-temperature furnaces LHTC ../16), increased wear and tear must be expected in case of working at higher temperatures
- Optional flap door (LHTC) which can be used as work platform or lift door (LHTCT) with hot surface facing away from the operator (High-temperature furnace LHTCT 01/16 only with lift door)
- Switching system with solid-state-relays, power tuned to the SiC rods
- Easy replacement of heating rods
- Adjustable air inlet opening, exhaust air opening in the roof
- Controller C450 (10 programs with each 20 segments), alternative controllers see page 75

## Additional Equipment

- Over-temperature limiter with adjustable cutout temperature as temperature limiter to protect the oven and load
- Protective gas connection to purge with non-flammable protective or reaction gases, not gas tight
- Manual or automatic gas supply system

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load in kW	Electrical connection*	Weight in kg	Heating time in min <sup>3</sup>
		w	d	h		W	D	H <sup>2</sup>				
LHTC(T) 03/14	1400	120	210	120	3.0	415	545	490	10.0	3-phase <sup>4</sup>	30	20
LHTC(T) 08/14	1400	170	290	170	8.0	490	625	540	15.5	3-phase	40	20
LHTC(T) 03/15	1500	120	210	120	3.0	415	545	490	10.0	3-phase <sup>4</sup>	30	25
LHTC(T) 08/15	1500	170	290	170	8.0	490	625	540	15.5	3-phase	40	20
LHTCT 01/16	1550	110	120	120	1.5	340	300	460	3.5	1-phase	18	30
LHTC(T) 03/16	1600	120	210	120	3.0	415	545	490	10.0	3-phase <sup>4</sup>	30	30
LHTC(T) 08/16	1600	170	290	170	8.0	490	625	540	15.5	3-phase	40	25

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

<sup>2</sup>Plus maximum 240 mm for models LHTCT when open

<sup>3</sup>Heating time of the empty and closed furnace up to Tmax - 100 K (connected to 230 V 1/N/PE resp. 400 V 3/N/PE)

\*Please see page 75 for more information about supply voltage

<sup>4</sup>Heating only between two phases



High-temperature furnace LHTC 08/16



Gas supply system for non-flammable protective or reactive gas



Furnace chamber with high-quality fiber materials and SiC heating rods on both sides of the furnace

# High-Temperature Furnaces with MoSi<sub>2</sub> Heating Elements up to 1800 °C

Designed as tabletop models, these compact high-temperature furnaces have a variety of advantages. The first-class workmanship using high-quality materials, combined with ease of operation, make these furnaces all-rounders in research and the laboratory. These high-temperature furnaces are also perfectly suited for the sintering of technical ceramics, such as zirconium oxide dental bridges.



High-temperature furnace LHT 03/17 D

### Standard Equipment

- Tmax 1600 °C, 1750 °C, or 1800 °C
- Recommended working temperature 1750 °C (for models LHT ../18), increased wear and tear must be expected in case of working at higher temperatures
- High-quality molybdenum disilicide heating elements
- Adjustable air inlet opening, exhaust air opening in the roof
- Type B thermocouple
- Controller P470 (50 programs with each 40 segments), controls description see page 75

### Additional Equipment

- Over-temperature limiter with adjustable cutout temperature as temperature limiter to protect the oven and load
- Protective gas connection to purge with non-flammable protective or reaction gases, not gas tight
- Manual or automatic gas supply system

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load in kW	Electrical connection*	Weight in kg	Heating time in min <sup>3</sup>
		w	d	h		W	D	H <sup>2</sup>				
LHT 02/16	1600	90	150	150	2	470	630	760+260	3.0	1-phase	75	30
LHT 04/16	1600	150	150	150	4	470	630	760+260	5.2	3-phase <sup>4</sup>	85	25
LHT 08/16	1600	150	300	150	8	470	810	760+260	8.0	3-phase <sup>4</sup>	100	25
LHT 01/17 D	1650	110	120	120	1	385	425	525+195	2.9	1-phase	28	35
LHT 03/17 D	1650	135	155	200	4	470	630	760+260	3.0	1-phase	75	30
LHT 02/17	1750	90	150	150	2	470	630	760+260	3.0	1-phase	75	35
LHT 04/17	1750	150	150	150	4	470	630	760+260	5.2	3-phase <sup>4</sup>	85	30
LHT 08/17	1750	150	300	150	8	470	810	760+260	8.0	3-phase <sup>4</sup>	100	30
LHT 02/18	1800	90	150	150	2	470	630	760+260	3.6	1-phase	75	60
LHT 04/18	1800	150	150	150	4	470	630	760+260	5.2	3-phase <sup>4</sup>	85	40
LHT 08/18	1800	150	300	150	8	470	810	760+260	9.0	3-phase <sup>4</sup>	100	40

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

<sup>2</sup>Including opened lift door

<sup>3</sup>Heating time of the empty and closed furnace up to Tmax - 100 K (connected to 230 V 1/N/PE resp. 400 V 3/N/PE)

\*Please see page 75 for more information about supply voltage

<sup>4</sup>Heating only between two phases



High-temperature furnace LHT 01/17 D



Saggars with top lid



Example of an over-temperature limiter

# High-Temperature Bottom Loading Furnaces up to 1700 °C

The motor-driven lifting table significantly simplifies the charging of the high-temperature furnaces LHT ../. LB (Speed). The heating all around the cylindrical furnace chamber provides for an optimal temperature uniformity. For the tabletop models LHT 01/17 LB Speed and LHT 02/17 LB Speed the charge can be placed in charge saggars made of technical ceramics. Up to three charge saggars can be stacked on top of each other resulting in a high productivity.



High-temperature furnace LHT 02/17 LB Speed with a set of saggars

## Standard Equipment

- Tmax 1650 °C, 1700 °C (LHT 16/17 LB)
- High-quality heating elements made of molybdenum disilicide offer very good protection against chemical interaction between charge and heating elements
- Excellent temperature uniformity thanks to three (LHT 02/17 LB Speed) or four-sided (LHT 01/17 LB Speed) heating of the furnace chamber
- Furnace chamber with a volume of 1, 2 or 16 liters, table with large floor space
- Precise, motorized toothed belt drive of the table with button operation
- Exhaust air vent in the roof
- Type S thermocouple
- Controller P480 (50 programs with each 40 segments), controls description see page 75

## Additional Equipment

- Over-temperature limiter with adjustable cutout temperature as temperature limiter to protect the oven and load
- Stackable saggars for loading in up to two or three levels, depending on model, see page 25
- Adjustable air inlet through the floor

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load in kW	Electrical connection*	Weight in kg
		w	d	h		W	D	H			
LHT 01/17 LB Speed	1650	145	180	100	1	350	590	680	2.9	1-phase	40
LHT 02/17 LB Speed	1650	185	180	185	2	390	590	765	3.4	1-phase	50
LHT 16/17 LB	1700	Ø 260		260	16	650	1250	1980	12.0	3-phase	410

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

\*Please see page 75 for more information about supply voltage



Electrically driven lift-bottom



Saggars



Furnace chamber heated on four sides for model LHT 01/17 LB Speed

# High-Temperature Furnaces with Scale for Determination of Combustion Loss and Thermogravimetric Analysis (TGA) up to 1750 °C

These high-temperature furnaces were specially developed to determine combustion loss during annealing and for thermogravimetric analysis (TGA) in the lab. The complete system consists of the high-temperature furnace for 1600 °C or 1750 °C, a table frame, precision scale with feedthroughs into the furnace and powerful software for recording both the temperature curve and the weight loss over time.



High-temperature furnace LHT 04/16 SW with scale for measuring weight reduction during annealing

## Standard Equipment

- Tmax 1600 °C or 1750 °C
- High-quality molybdenum disilicide heating elements
- Dual shell housing made of textured stainless steel sheets with additional fan cooling for low surface temperature
- Adjustable air inlet
- Exhaust air opening in the roof
- Type B thermocouple
- Delivery includes base, ceramic plunger with base plate in the furnace lining, precision scale and software package
- 4 scales available for different maximum weights and scaling ranges
- Process control and documentation for temperature and combustion loss via VCD software package for monitoring, documentation and control see page 74

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load in kW	Electrical connection*	Weight in kg	Heating time in min <sup>2</sup>
		w	d	h		W	D	H				
LHT 04/16 SW	1600	150	150	150	4	655	370	890	5.0	3-phase <sup>3</sup>	85	25
LHT 04/17 SW	1750	150	150	150	4	655	370	890	5.0	3-phase <sup>3</sup>	85	30

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.  
<sup>2</sup>Heating time of the empty and closed furnace up to Tmax –100 K (connected to 230 V 1/N/PE resp. 400 V 3/N/PE)  
<sup>3</sup>Heating only between two phases  
 \*Please see page 75 for more information about supply voltage

Scale type	Readability in g	Maximum weighing range in g	Weight of plunger in g	Calibration value in g	Minimum load in g
EW-2200	0.01	2200 incl. plunger	850	0.1	0.5
EW-4200	0.01	4200 incl. plunger	850	0.1	0.5
EW-6200	0.01	6200 incl. plunger	850	-	1.0
EW-12000	0.10	12000 incl. plunger	850	1.0	5.0

4 scales available for different maximum weights and scaling ranges

Software for documentation of the temperature curve and combustion loss using a PC

High-quality molybdenum disilicide heating elements

# High-Temperature Furnaces with Molybdenum Disilicide Heating Elements with Fiber Insulation up to 1800 °C

Due to their solid construction and compact stand-alone design, these high-temperature furnaces are perfect for processes in the laboratory where the highest precision is needed. Outstanding temperature uniformity and practical details set very high quality benchmarks. For configuration for your processes, these furnaces can be extended with extras from our extensive option list.



High-temperature furnace HT 16/17

## Standard Equipment

- Tmax 1600 °C, 1750 °C, or 1800 °C
- Recommended working temperature 1750 °C (for models HT ../18), increased wear and tear must be expected in case of working at higher temperatures
- Dual shell housing with fan cooling for low shell temperatures
- Heating from both sides via molybdenum disilicide heating elements
- High-quality fiber insulation backed by special insulation
- Side insulation constructed with tongue and groove blocks provides for low heat loss to the outside
- Long-life roof insulation with special suspension
- Chain-guided parallel swivel door for defined opening and closing of the door
- Two-door design (front/back) for high-temperature furnaces from HT 276/..
- Labyrinth sealing ensures the least possible temperature loss in the door area
- Reinforced floor as protection for bottom insulation as standard from models HT 16/16 upwards (distributed load 5 kg/dm<sup>2</sup>)
- Vapor vent in the furnace roof with motorized exhaust air flaps, controlled via the extra function of the controller
- Heating elements switched via thyristors

## Additional Equipment

- Cooling system to cool the furnace with a defined temperature gradient or with a preset fresh air volume. Both operating modes can be switched on and off for different segments by means of the extra function of the controller.
- Safety package for debinding in air. Debinding technical ceramics is a critical process because of the hydrocarbons that are released. Hydrocarbons are flammable and there is a risk that a flammable mixture could form inside the furnace. Nabertherm offers tailored safety packages with respect to the process and the volume of binder that allow the furnace to be operated safely.
- Special heating elements for zirconia sintering
- Protective gas connection to purge with non-flammable protective or reaction gases
- Automatic gas supply system with solenoid valve and rotameter, controlled by the extra function of the controller
- Inner process box to improve the gas tightness and to protect the furnace chamber against contamination
- Refractory brick floor insulation for a higher floor load (Tmax 1700 °C)
- Lift door
- Automatic door lock incl. door contact switch
- Ethernet interface



High-temperature furnace HT 64/16S with lift door



High-temperature furnace HT 160/17 with gas supply system



High-temperature furnace HT 64/17 DB100-2 with safety package for debinding

Model	Tmax °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load kW	Electrical connection*	Weight in kg
		w	d	h		W	D	H			
HT 08/16	1600	150	300	150	8	740	640	1755	8.5	3-phase <sup>2</sup>	215
HT 16/16	1600	200	300	260	16	820	690	1860	12.5	3-phase <sup>2</sup>	300
HT 29/16	1600	275	300	350	29	985	740	1990	9.8	3-phase <sup>2</sup>	340
HT 40/16	1600	300	350	350	40	1010	800	1990	12.5	3-phase	420
HT 64/16	1600	400	400	400	64	1140	890	2040	18.5	3-phase	555
HT 128/16	1600	400	800	400	128	1140	1280	2040	26.5	3-phase	820
HT 160/16	1600	500	550	550	160	1250	1040	2240	21.5	3-phase	880
HT 276/16	1600	500	1000	550	276	1310	1600	2290	36.5	3-phase	1300
HT 450/16	1600	500	1150	780	450	1360	1800	2570	65.0	3-phase	1450
HT 08/17	1750	150	300	150	8	740	640	1755	8.5	3-phase <sup>2</sup>	215
HT 16/17	1750	200	300	260	16	820	690	1860	12.5	3-phase <sup>2</sup>	300
HT 29/17	1750	275	300	350	29	985	740	1990	9.8	3-phase <sup>2</sup>	340
HT 40/17	1750	300	350	350	40	1010	800	1990	12.5	3-phase	420
HT 64/17	1750	400	400	400	64	1140	890	2040	18.5	3-phase	555
HT 128/17	1750	400	800	400	128	1140	1280	2040	26.5	3-phase	820
HT 160/17	1750	500	550	550	160	1250	1040	2240	21.5	3-phase	880
HT 276/17	1750	500	1000	550	276	1310	1600	2290	36.5	3-phase	1300
HT 450/17	1750	500	1150	780	450	1360	1800	2570	65.0	3-phase	1450
HT 08/18	1800	150	300	150	8	740	640	1755	8.5	3-phase <sup>2</sup>	215
HT 16/18	1800	200	300	260	16	820	690	1860	12.5	3-phase <sup>2</sup>	300
HT 29/18	1800	275	300	350	29	985	740	1990	9.8	3-phase <sup>2</sup>	340
HT 40/18	1800	300	350	350	40	1010	800	1990	12.5	3-phase	420
HT 64/18	1800	400	400	400	64	1140	890	2040	18.5	3-phase	555
HT 128/18	1800	400	800	400	128	1140	1280	2040	26.5	3-phase	820
HT 160/18	1800	500	550	550	160	1250	1040	2240	21.5	3-phase	880
HT 276/18	1800	500	1000	550	276	1310	1600	2290	36.5	3-phase	1300
HT 450/18	1800	500	1150	780	450	1360	1800	2570	65.0	3-phase	1450

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.  
<sup>2</sup>Heating only between two phases

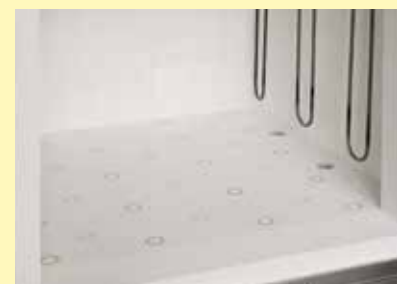
\*Please see page 75 for more information about supply voltage



Automatic gas supply system with solenoid valve and rotameter



Two-door design for high-temperature furnaces > HT 276/..



Reinforced floor as protection for bottom insulation for high-temperature furnace HT 16/16 and higher



# High-Temperature Furnaces with SiC Rod Heating up to 1550 °C

The high-temperature furnaces HTC 16/16 - HTC 450/16 are heated by vertically hung SiC rods, which makes them especially suitable for sintering processes up to a maximum operating temperature of 1550 °C. For some processes, e.g. for sintering zirconium oxide, the absence of interactivity between the charge and the SiC rods, these models are more suitable than the alternatives heated with molybdenum disilicide elements. The basic construction of these furnaces make them comparable with the already familiar models in the HT product line and they can be upgraded with the same additional equipment.



High-temperature furnace HTC 160/16

## Standard Equipment

- Tmax 1550 °C
- Dual shell housing with fan cooling for low shell temperatures
- Heating from both sides via vertically mounted SiC rods
- High-quality fiber insulation backed by special insulation
- Side insulation constructed with tongue and groove blocks provides for low heat loss to the outside
- Long-life roof insulation with special suspension
- Chain-guided parallel swivel door for defined opening and closing of the door without destroying the insulation
- Two-door design (front/back) for high-temperature furnaces > HTC 276/..
- Labyrinth sealing ensures the least possible temperature loss in the door area
- Reinforced floor as protection for bottom insulation
- Vapor vent in the furnace roof with motorized exhaust air flaps, controlled via the extra function of the controller
- Heating elements switched via SCR's
- Over-temperature limiter with adjustable cutout temperature as temperature limiter to protect the oven and load

## Additional Equipment

Like HT models see page 39

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Heating Power in kW	Connected load in kW	Electrical connection*	Weight in kg
		w	d	h		W	D	H				
HTC 16/16	1550	200	300	260	16	810	700	1500	12.0	16.0	3-phase <sup>2</sup>	270
HTC 40/16	1550	300	350	350	40	1000	800	1620	12.0	16.1	3-phase	380
HTC 64/16	1550	400	400	400	64	1130	900	1670	18.0	41.1	3-phase	550
HTC 128/16	1550	400	800	400	128	1130	1290	1670	26.0	60.4	3-phase	750
HTC 160/16	1550	500	550	550	160	1250	1050	1900	21.0	39.2	3-phase	800
HTC 276/16	1550	500	1000	550	276	1300	1600	1900	36.0	72.5	3-phase	1100
HTC 450/16	1550	500	1150	780	450	1350	1740	2120	64.0	118.0	3-phase	1500

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.  
<sup>2</sup>Heating only between two phases

\*Please see page 75 for more information about supply voltage



Vertically mounted SiC rods and optional perforated air inlet tubes of the debinding system in a high-temperature furnace



Automatic gas supply system



Two-door design for high-temperature furnaces > HT 276/..

# High Temperature Furnaces with Molybdenum Disilicide Heating Elements with Refractory Brick Insulation up to 1700 °C

The high-temperature furnaces HFL 16/16 HFL 160/17 are characterized by their lining with robust light refractory bricks. This version is recommended for processes producing aggressive gases or acids, such as under glass melting.



High-temperature furnace HFL 16/17 DB50

## Standard Equipment

Like high-temperature furnaces HT (see page 39), except:

- Tmax 1600 °C or 1700 °C
- Robust refractory brick insulation and special backing insulation
- Furnace floor made of lightweight refractory bricks accommodates high charge weights
- Chain-guided parallel swivel door for defined opening and closing of the door without destroying the insulation
- Labyrinth sealing ensures the least possible temperature loss in the door area

## Additional Equipment

Like high-temperature furnaces HT see page 39

- Protective gas connection to purge with non-flammable protective or reaction gases
- Automatic gas supply system with solenoid valve and rotameter, controlled by the extra function of the controller
- Lift door

Model	Tmax in °C	Inner dimensions in mm			Volume in l	Outer dimensions <sup>1</sup> in mm			Connected load in kW	Electrical connection*	Weight in kg
		w	d	h		W	D	H			
HFL 16/16	1600	200	300	260	16	1000	890	1620	12	3-phase <sup>2</sup>	500
HFL 40/16	1600	300	350	350	40	1130	915	1890	12	3-phase	660
HFL 64/16	1600	400	400	400	64	1230	980	1940	18	3-phase	880
HFL 160/16	1600	500	550	550	160	1400	1250	2100	21	3-phase	1140
HFL 16/17	1700	200	300	260	16	1000	890	1620	12	3-phase <sup>2</sup>	530
HFL 40/17	1700	300	350	350	40	1130	915	1890	12	3-phase	690
HFL 64/17	1700	400	400	400	64	1230	980	1940	18	3-phase	920
HFL 160/17	1700	500	550	550	160	1400	1250	2100	21	3-phase	1190

<sup>1</sup>External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

<sup>2</sup>Heating only between two phases

\*Please see page 75 for more information about supply voltage



Automatic gas supply system



Thermocouple port in the ceiling with tripod



Light-weight refractory bricks and heating elements made from molybdenum disilicide