

# Laboratory



**Muffle Furnaces**  
**Ashing Furnaces**  
**Tube Furnaces**  
**Ovens**  
**Air Circulation Furnaces**  
**Chamber Furnaces**  
**Melting Furnaces**  
**High-Temperature Furnaces**  
**Vacuum Furnaces**



### **Made in Germany**

Nabertherm, and our staff of more than 300 employees worldwide, have developed and produced furnaces and ovens for laboratory and industrial applications for more than 50 years. 150,000 satisfied customers in 100 countries document our success. Subsidiaries and partners, established for years, in all the significant countries of the world guarantee one-on-one customer service and advice on site. Complete fabrication of our furnaces takes place exclusively at our German head office. Nabertherm will continue to rely on its German production facility in the future.

### **Benchmarks in quality and reliability**

Our product line ranges from standard muffle furnaces to technically demanding high-temperature and vacuum furnaces. A variety of accessories is available to adapt standard furnaces to your particular needs. The innovative Nabertherm regulation and automation technology enables precise control, as well as monitoring and documentation of processes.

The depth of our product range guarantees the application flexibility of our furnaces. Applications like ashing and burn-off, heat treatment, drying, or the manufacture of bioceramics are just a few examples of the many uses for our furnaces.

Technical details like the double-wall stainless steel housings on most of our furnaces mean both energy-efficiency and a long service life, ensuring your decisive competitive advantage.

### **Time is money**

We know you need your laboratory furnaces fast in order to be able to perform your experiments or production. And we won't let you down in this important point. That's why many models are warehoused ready to deliver. Even for complex laboratory furnaces, we promise you quick delivery.

### **Customer service and replacement parts**

The experts on our customer service team are ready to answer any of your questions. Whether on site, by telephone, or by email, our service technicians will solve your problem. We are particularly proud of our replacement parts service. We send you most replacement parts anywhere in the world in the shortest possible time – and at fair prices, no matter how old your furnace is.

### **Experience in many applications**

Besides furnaces for the laboratory, Nabertherm also provides a range of standard furnances for a variety of other application areas. Many laboratory furnaces are also available in larger versions for your production facilities. Our experienced engineering team views customer-specific solutions as a challenge. We are also happy to provide consulting on custom system solutions.

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## Professional furnaces: L 3/11 - LT 40/12 with folding door or lift door



L 9/11



L 5/12

Our L 3/11 - LT 40/12 series is the right choice for daily laboratory use. These models stand out for their excellent workmanship, advanced and attractive design, and high level of reliability. The furnaces come equipped with either a folding door or lift door at no extra charge.

- Tmax 1100 °C or 1200 °C
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Highly durable cured vacuum fibre module lining
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and high stability
- Optional fold-down door (L) which can be used as work surface or lift door (LT) with hot surface facing away from the operator
- Adjustable air inlet integrated in door (see illustration)
- Exhaust air outlet in rear wall of furnace
- Silent solid-state power control relay
- Please see page 40 for a description of various controllers



Over-temperature limit controller

### Optional equipment

- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connection on the rear wall of furnace
- Manual or automatic gas supply system
- Please see page 13 for more optional equipment



LT 15/12



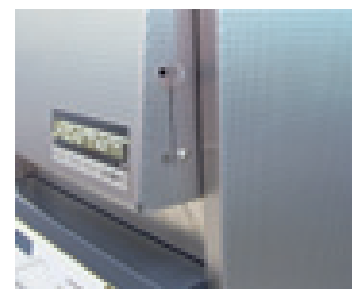
LT 24/11

Model fold. door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
L 3/11	1100	160	140	100	3	380	370	420	1.2	single-phase	20	60
L 5/11	1100	200	170	130	5	440	470	520	2.4	single-phase	35	60
L 9/11	1100	230	240	170	9	480	550	570	3.0	single-phase	45	75
L 15/11	1100	230	340	170	15	480	650	570	3.6	single-phase	55	90
L 24/11	1100	280	340	250	24	560	660	650	4.5	3-phase	75	95
L 40/11	1100	320	490	250	40	600	790	650	6.0	3-phase	95	95
L 3/12	1200	160	140	100	3	380	370	420	1.2	single-phase	20	75
L 5/12	1200	200	170	130	5	440	470	520	2.4	single-phase	35	75
L 9/12	1200	230	240	170	9	480	550	570	3.0	single-phase	45	90
L 15/12	1200	230	340	170	15	480	650	570	3.6	single-phase	55	105
L 24/12	1200	280	340	250	24	560	660	650	4.5	3-phase	75	110
L 40/12	1200	320	490	250	40	600	790	650	6.0	3-phase	95	110

Model Lift door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H¹				
LT 3/11	1100	160	140	100	3	380	370	420+165	1.2	single-phase	20	60
LT 5/11	1100	200	170	130	5	440	470	520+220	2.4	single-phase	35	60
LT 9/11	1100	230	240	170	9	480	550	570+290	3.0	single-phase	45	75
LT 15/11	1100	230	340	170	15	480	650	570+290	3.6	single-phase	55	90
LT 24/11	1100	280	340	250	24	560	660	650+335	4.5	3-phase	75	95
LT 40/11	1100	320	490	250	40	600	790	650+335	6.0	3-phase	95	95
LT 3/12	1200	160	140	100	3	380	370	420+165	1.2	single-phase	20	75
LT 5/12	1200	200	170	130	5	440	470	520+220	2.4	single-phase	35	75
LT 9/12	1200	230	240	170	9	480	550	570+290	3.0	single-phase	45	90
LT 15/12	1200	230	340	170	15	480	650	570+290	3.6	single-phase	55	105
LT 24/12	1200	280	340	250	24	560	660	650+335	4.5	3-phase	75	110
LT 40/12	1200	320	490	250	40	600	790	650+335	6.0	3-phase	95	110

¹including opened lift door

\*Please see page 40 for more information about mains voltage

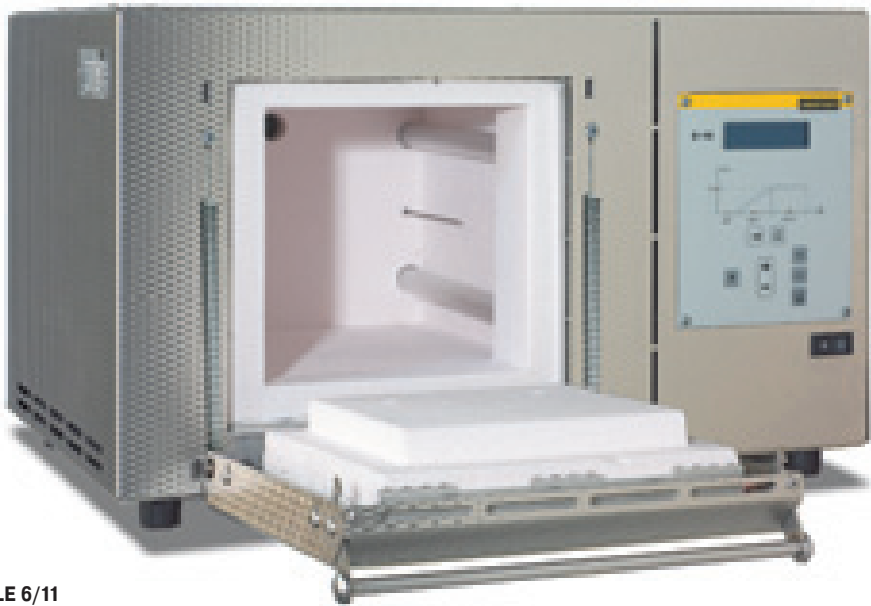


Infinitely variable working air inlet sliding valve

# Compact muffle furnaces LE 2/11 - LE 14/11



LE 4/11



LE 6/11

With their unbeatable price/performance ratio, these compact muffle furnaces are perfect for many applications in the laboratory. Quality features like the double-walled furnace casing of rust-free stainless steel, their compact, lightweight constructions, or the heating elements encased in quartz glass tubes make these models reliable partners for your application.

- Tmax 1100 °C, working temperature 1050 °C
- Heating from two sides from heating elements in quartz glass tubes
- Maintenance-friendly replacement of heating elements and insulation
- Multilayered insulation with fibre plates in the furnace chamber
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and high stability
- Folding door which can also be used as a work surface
- Exhaust air outlet in rear wall
- Low-noise high-power relay
- Compact dimensions and light weight
- Controller mounted in side space (under the door on the LE 2/11 and LE 4/11 to save space)
- Please see page 40 for a description of various controllers

### Optional equipment

- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connection on the rear wall of furnace
- Manual gas supply system
- Please see page 13 for more optional equipment



Over-temperature limit controller

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
LE 2/11	1100	110	180	110	2	275	380	350	1.8	single-phase	10	25
LE 4/11	1100	170	200	170	4	335	400	410	1.8	single-phase	15	35
LE 6/11	1100	170	200	170	6	510	400	320	1.8	single-phase	18	35
LE 14/11	1100	220	300	220	14	555	500	370	2.9	single-phase	25	40

\*Please see page 40 for more information about mains voltage

## Muffle furnaces L 3/13 - LT 15/13 with brick insulation and flap door or lift door



LT 15/13



LT 9/13

Heating elements embedded in grooves radiating freely into the furnace chamber give these models particularly short heating times. Thanks to their robust lightweight refractory brick insulation, they can reach a maximum working temperature of 1300 °C. These models thus represent an interesting alternative to the familiar L(T) 3/11 models, when you need particularly short heating times or a higher application temperature.

- Tmax 1300 °C
- Heating elements freely radiating, embedded in grooves for high heating speeds
- Multilayer insulation with robust lightweight refractory bricks in the furnace chamber
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and stability
- Optional fold-down door (L) which can be used as work surface or lift door (LT) with hot surface facing away from the operator
- Adjustable air inlet in the furnace door
- Exhaust air outlet in rear wall of furnace
- Silent solid-state power control relay
- Please see page 40 for a description of various controllers



Furnace interior with high-quality lightweight refractory brick insulation

### Optional equipment

- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connection on the rear wall of furnace
- Manual or automatic gas supply system
- Please see page 13 for more optional equipment



Over-temperature limit controller

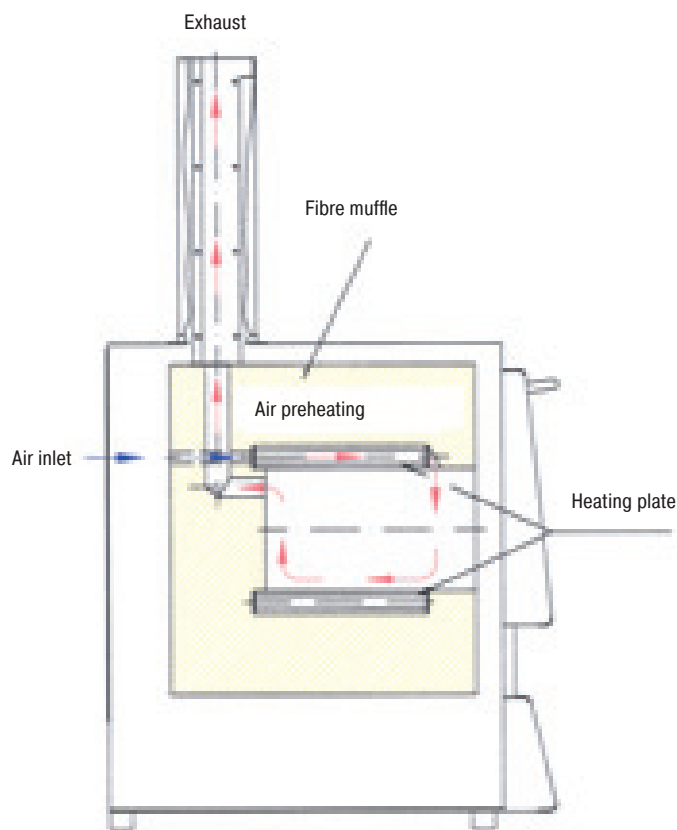
Model fold. door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
L 3/13	1300	160	140	100	3	380	370	420	1.6	single-phase	25	45
L 5/13	1300	200	170	130	5	440	470	520	2.4	single-phase	42	45
L 9/13	1300	230	240	170	9	480	550	570	3.0	single-phase	60	50
L 15/13	1300	230	340	170	15	480	650	570	3.6	single-phase	70	60

Model Lift door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H <sup>1</sup>				
LT 3/13	1300	160	140	100	3	380	370	420+165	1.6	single-phase	25	45
LT 5/13	1300	200	170	130	5	440	470	520+220	2.4	single-phase	42	45
LT 9/13	1300	230	240	170	9	480	550	570+290	3.0	single-phase	60	50
LT 15/13	1300	230	340	170	15	480	650	570+290	3.6	single-phase	70	60

<sup>1</sup>including opened lift door

\*Please see page 40 for more information about mains voltage

## Ashing furnaces LV 3/11 - LVT 15/11 with flap door or lift door



**Air intake and exhaust  
flow principle**



**LV 3/11**

The models LV 3/11 - LVT 15/11 are especially designed for ashing in the laboratory. A special air intake and exhaust system allows air exchange of more than 6 times per minute. Incoming air is preheated to ensure a good temperature uniformity.

- Tmax 1100 °C
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Highly durable, high-performance cured vacuum fibre module lining
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and stability
- Optional fold-down door (L) which can be used as work surface or lift door (LT) with hot surface facing away from the operator
- Silent solid-state power control relay
- Air exchanged more than 6 times per minute
- Good temperature uniformity due to preheating of incoming air
- Please see page 40 for a description of the different controllers





LVT 9/11



LVT 15/11

#### Optional equipment

- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Please see page 13 for more optional equipment



Over-temperature limit controller

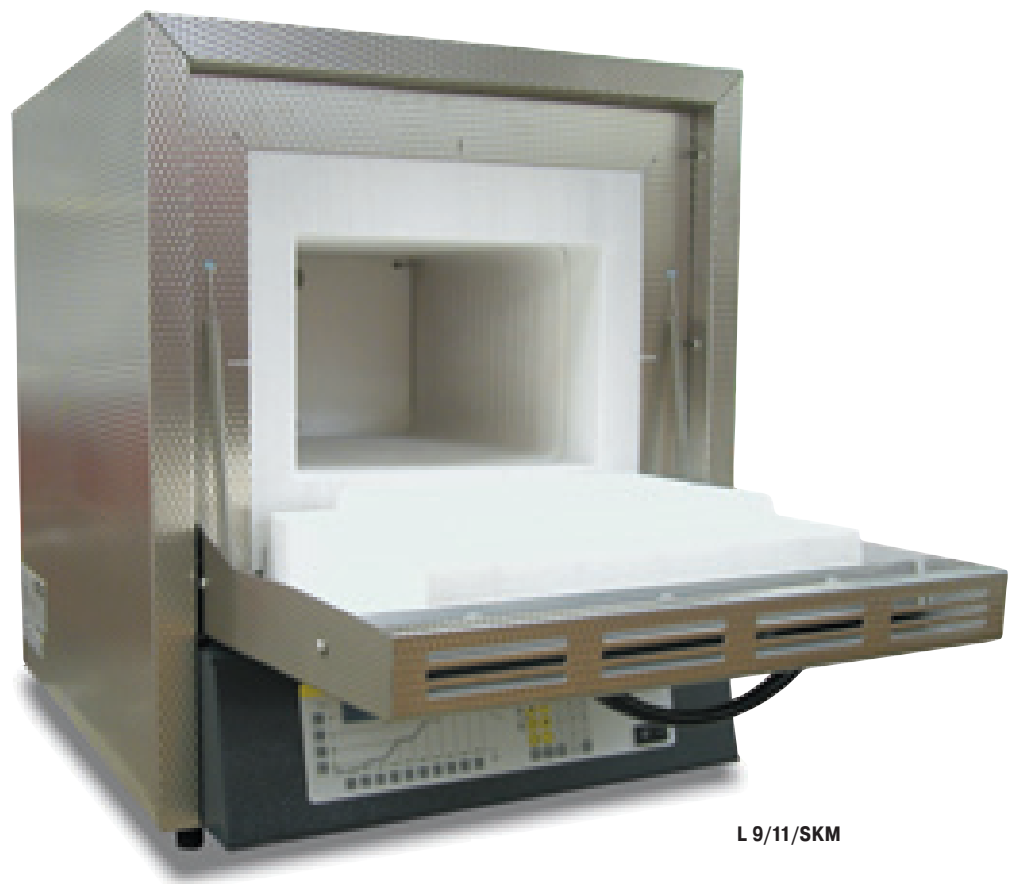
Model fold. door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Supply kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H <sup>1</sup>				
LV 3/11	1100	160	140	100	3	380	370	750	1.2	single-phase	20	120
LV 5/11	1100	200	170	130	5	440	470	850	2.4	single-phase	35	120
LV 9/11	1100	230	240	170	9	480	550	900	3.0	single-phase	45	120
LV 15/11	1100	230	340	170	15	480	650	900	3.6	single-phase	55	120

Model Lift door	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H <sup>1</sup>				
LVT 3/11	1100	160	140	100	3	380	370	750	1.2	single-phase	20	120
LVT 5/11	1100	200	170	130	5	440	470	850	2.4	single-phase	35	120
LVT 9/11	1100	230	240	170	9	480	550	900	3.0	single-phase	45	120
LVT15/11	1100	230	340	170	15	480	650	900	3.6	single-phase	55	120

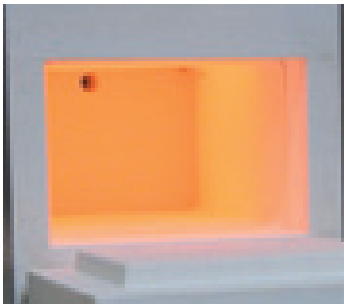
<sup>1</sup>including exhaust tube (Ø 80mm)

\*Please see page 40 for more information on mains voltage

Muffle furnaces L 9/11/SKM with embedded heating elements in the ceramic muffle



L 9/11/SKM



Muffle heated from four sides



Gas panel



Over-temperature limit controller

We particularly recommend the L 9/11/SKM model if your application involves aggressive substances. The furnace has a ceramic muffle with embedded heating from four sides. The furnace thus combines a very good temperature uniformity with excellent protection of the heating elements from aggressive atmospheres. Another aspect is the smooth, nearly dust-free muffle (furnace door made of fibre insulation), an important quality feature for some ashing processes.

- Tmax 1100 °C
- Muffle heated from four sides
- Furnace chamber with embedded ceramic muffle, high resistance to aggressive gasses and vapours
- Casing made of sheets of textured stainless steel (non-rusting design)
- Adjustable working air inlet in the door
- Exhaust air outlet in rear wall of furnace
- Silent solid-state power control relay
- Please see page 40 for a description of the different controllers

Optional equipment

- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connection on the rear wall of furnace
- Manual or automation gas supply system
- Please see page 13 for more optional equipment

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
L 9/11/SKM	1100	230	240	170	9	480	550	570	3.0	single-phase	50	90

\*Please see page 40 for more information about mains voltage

## Furnace systems L 9/11/SW with scale and software for determination of combustion loss

This complete system, with an L 9/11 furnace, integrated precision scale, and software, was designed especially for combustion loss determination in the laboratory. The determination of combustion loss is necessary, for instance, when analyzing sludges and household garbage, and is also used in a variety of technical processes for the evaluation of results. The difference between the initial total mass and the combustion residue is the combustion loss. During the process, the software included records both the temperature and the weight loss.



L 9/11/SW

- Tmax 1100 °C or 1200 °C
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Highly durable cured vacuum fibre module lining
- Casing made of sheets of structured stainless steel (non-rusting design)
- Adjustable working air inlet in the door
- Exhaust air outlet in rear wall of furnace
- Silent solid-state power control relay
- Delivery includes base, ceramic plunger with base plate in the furnace interior, precision scale and software package
- 3 scales available for different maximum weights and scaling ranges
- Software for documentation of the temperature curve and combustion loss using a PC
- Please see page 40 for a description of the different controllers



3 scales available for different maximum weights and scaling areas

### Optional equipment

- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Please see page 13 for more optional equipment



Over-temperature limit controller

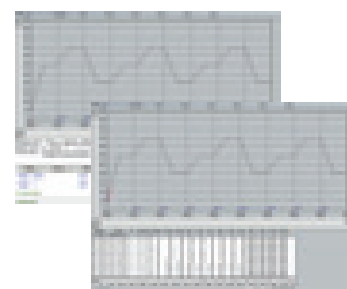
Model	Tmax	Inner dimensions in mm			Volume	Outer dimensions in mm			Power	Supply	Weight	Minutes
fold. door	°C	w	d	h	in L	W	D	H	kW	voltage*	in kg	to Tmax
L 9/11/SW	1100	230	240	170	9	480	550	800	3.0	single-phase	55	75
L 9/12/SW	1200	230	240	170	9	480	550	800	3.0	single-phase	55	90

Model	Tmax	Inner dimensions in mm			Volume	Outer dimensions in mm			Power	Supply	Weight	Minutes
Lift door	°C	w	d	h	in L	W	D	H'	kW	voltage*	in kg	to Tmax
LT 9/11/SW	1100	230	240	170	9	480	550	800+290	3.0	single-phase	55	75
LT 9/12/SW	1200	230	240	170	9	480	550	800+290	3.0	single-phase	55	90

\*including opened lift door

\*Please see page 40 for more information about mains voltage

Scale type	Readability in g	Weight range in g	Weight of plunger in g	Calibration value in g	Minimum load in g
EW-1500	0,01	1500 incl. plunger	850	0,1	0,5
EW-3000	0,01	3000 incl. plunger	850	0,1	0,5
EW-6000	0,10	6000 incl. plunger	850	1,0	5,0

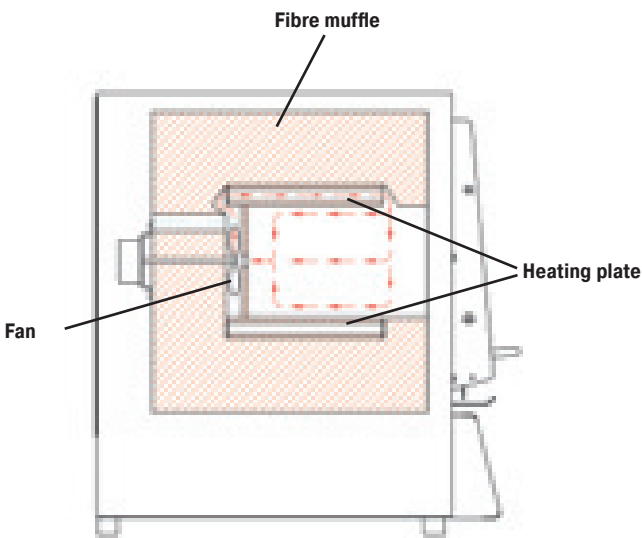


Software for documentation of the temperature curve and combustion loss using a PC

Muffle furnaces LT 5/11 HA - LT 15/11 HA with integrated air circulation



LT 5/11HA with air circulation



The LT 5/11HA - LT 15/11HA muffle ovens with integrated air circulation provide an optimum temperature uniformity in the furnace chamber and heat transmission to your batch. This advantageous effect not only increases the precision of the results of your work, it is also a true quality factor, particularly when you need good uniformity in the lower temperature range.



Ventilator in rear wall of furnace

- Tmax 1100 °C
- Ceramic heating plates with integral heating element which is safeguarded against splashing, and easy to replace
- Highly durable cured vacuum fibre module lining
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and stability
- With lift door (LT), whereby the hot side is away from the operator
- Exhaust air outlet in rear wall of furnace
- Silent solid-state power control relay
- Circulation fans for better heat transmission and distribution, particularly during heating and cooling
- Please see page 40 for a description of the different controllers



Over-temperature limit controller

Optional equipment

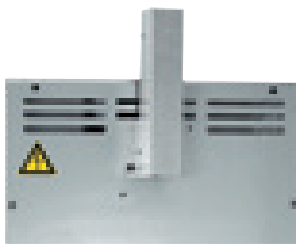
- Vent, vent with fan or catalytic converter
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connection on the rear wall of furnace
- Please see page 13 for more optional equipment

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H¹				
LT 5/11HA	1100	200	160	130	5	440	470	520+220	2.4	single-phase	36	60
LT 9/11HA	1100	230	230	170	9	480	550	570+290	3.0	single-phase	46	60
LT15/11HA	1100	230	330	170	15	480	650	570+290	3.6	single-phase	56	75

¹including opened lift door

\*Please see page 40 for more information about mains voltage

## Muffle furnace accessories



**Vent** for connection to an exhaust pipe.

Part number: 631000140



**Vent with fan**, to remove exhaust gas from the furnace better. The P 320 controller can be used to control the vent automatically.

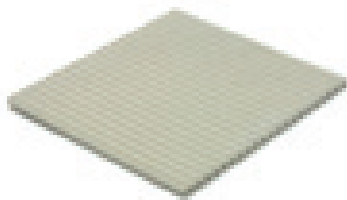
Part number: 631000141



**Catalytic converter with fan** for removal of organic components from the exhaust air. Organic components are catalytically oxidized at about 600 °C, broken into carbon dioxide and water vapour. Irritating odors are thus largely eliminated. The P 320 controller can be used to switch the catalytic converter automatically.

Part number: 631000166

Select between different **base plates** and **collecting pans** for protection of the furnace and easy loading (for models L, LT, LE, LV and LVT on pages 4-12).



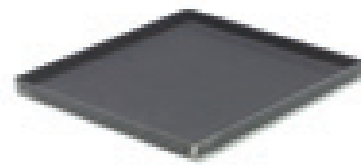
**Ceramic ribbed plate**

for models	Part number
LE 2	691601097
L 3, LT 3, LV, LVT 3	691600507
LE 4, LE 6, L 5, LT 5, LV 5, LVT 5	691600508
L 9, LT 9, LV 9, LVT 9	691600509
LE 14	691601098
L 15, LT 15, LV 15, LVT 15	691600506
L 24, LT 24	691600874
L 40, LT 24	691600875



**Ceramic collecting pan**

for models	Part number
LE 2	691601099
L 3, LT 3, LV 3, LVT 3	691600510
LE 4, LE 6, L 5, LT 5, LV 5, LVT 5	691600511
L 9, LT 9, LV 9, LVT 9	691600512



**Steel collecting pan**

for models	Part number
LE 2	691402096
L 3, LT 3, LV 3, LVT 3	691400145
LE 4, LE 6, L 5, LT 5, LV 5, LVT 5	691400146
L 9, LT 9, LV 9, LVT 9	691400147
LE 14	691402097
L 15, LT 15, LV 15, LVT 15	691400149
L 24, LT 24	691400626
L 40, LT 40	691400627

Heat-resistant **gloves** for protection of the operator when loading or removing hot materials, resistant to 600 °C or 900 °C.



**Gloves, Tmax 600 °C**

Part number: 493000004



**Gloves, Tmax 900 °C**

Part number: 491041101



Various **tongs** for easy loading and unloading of the furnace

Part number: 493000002 (300 mm)  
493000003 (500 mm)

## Annealing and hardening furnaces N 7/H - N 61/H



N 7/H as tabletop model



N 41/H

To withstand harsh use in the laboratory, e.g. when heat-treating metals, robust insulation with light refractory bricks is necessary. The N 7/H - N 61/H models are a perfect fit to solve this problem. The furnaces can be extended with a variety of accessories, like annealing boxes for operation under protective gas, roller guides, or a cooling station with a quenching bath. Even high-performance applications like the annealing of titanium in medical applications can be implemented without the use of expensive and complicated annealing systems.



Working with gas boxes for protective atmospheres using a loading carriage

- Tmax 1280 °C
- Three-sided heating from both sides and the floor
- Heating elements embedded in protective grooves
- Floor heating protected by heat-resistant SiC plate
- Multilayer insulation with high-quality lightweight refractory bricks in the furnace chamber
- Exhaust opening in the side of the furnace, or on back wall of furnace in the N 31/H models and higher
- Models N 7/H - N 17/HR are designed as tabletop models
- Stand included with model N 31/H and up
- Parallel swinging door which opens downward, or upward upon request
- Manual or automatic gassing system
- Please see page 40 for a description of various controllers

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
N 7/H	1280	250	250	120	7	720	640	510	3.0	single-phase	60	180
N 11/H	1280	250	350	140	11	720	740	510	3.6	single-phase	70	180
N 11/HR	1280	250	350	140	11	720	740	510	5.5	3-phase <sup>1</sup>	70	120
N 17/HR	1280	250	500	140	17	720	890	510	6.4	3-phase <sup>1</sup>	90	120
N 31/H	1280	350	350	250	31	840	1010	1320	15.0	3-phase	210	105
N 41/H	1280	350	500	250	41	840	1160	1320	15.0	3-phase	260	120
N 61/H	1280	350	750	250	61	840	1410	1320	20.0	3-phase	400	120

<sup>1</sup>only heating between two phases

\*Please see page 40 for information on mains voltage

## Hardening Accessories

Our wide selection of annealing and hardening furnaces can be extended with a variety of hardening accessories to suit your application. The accessories shown below represent only a small fraction of the products available. For further details, please see our separate catalogues for heat-treatment furnaces and hardening accessories.

### Hardening and Annealing Boxes

- Hardening and annealing boxes with or without protective gas connectors, up to 1100 °C, also in a tailor-made variant for cold evacuation, for instance for the annealing of small parts and bulk goods

### Annealing tray with Holder

- Annealing tram with alloy bag and holder with protective gas connection for models N 7/H to N 61/H for annealing and hardening under protective gas and quenching in air

### Hearth Plates

- Hearth plates for up to 1100 °C for protection of the furnace floor for models N 7/H to N 61/H, edged on three sides

### Hardening Tongs

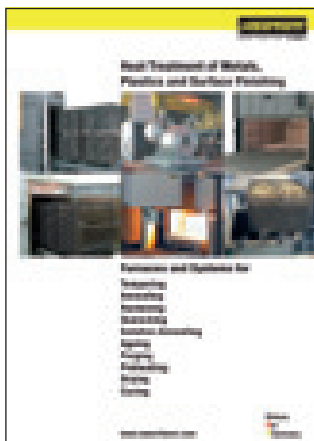
- Hardening tongs in various sizes and forms for use in annealing and hardening

### Heat Treating Foil

- Heat treating foil for wrapping of samples for oxidation-free annealing and hardening of steels up to 1200 °C

### Gloves

- Heat-resistant gloves to 600 °C or 900 °C for protection of operator during loading (see page 13)



Please ask for our separate catalogues for hardening furnaces and hardening accessories!

## Hinged tube furnaces RS for horizontal or vertical operation, adaptable for operation with flammable and nonflammable gasses or under vacuum



**RS 50/300/11** for horizontal operation



**RS 50/300/11** with stand as additional equipment for vertical operation

The RS tube furnaces can be used for either horizontal or vertical operation. Using a variety of accessories, these professional tube furnaces can be optimally laid out for your process. By using different available gassing packages, operations can be performed under a protective gas atmosphere, vacuum, or even with flammable gasses.



Gas panel

- Tmax 1100 °C or 1300 °C
- Casing made of sheets of textured stainless steel (non-rusting design)
- Tmax 1100 °C: Type K thermocouple
- Tmax 1300 °C: Wear-free type S thermocouple
- Available in horizontal or vertical designs
- Hinged design for simple insertion of the working tube
- Working tube made of ceramic C 530 for operation in air included in scope of delivery
- Switching and control unit separate from furnace
- Please see page 40 for a description of various controllers

Model	Tmax °C	Exterior dimensions <sup>3</sup> in mm			for tube Ø interior/mm	Heated length mm	Length constant temperature +/- 5 °C	Tube length in mm	Power kW	Supply voltage*	Weight in kg
RS 50/300/11	1100	555	430	380	50	300	100	650	1.6	single-phase	80
RS 50/500/11	1100	750	430	380	50	500	170	850	3.2	single-phase	90
RS 50/750/11	1100	1005	430	380	50	750	250	1100	4.0	3-phase <sup>1</sup>	100
RS 70/500/11	1100	755	440	390	70	500	170	850	3.4	single-phase	90
RS 70/750/11	1100	1005	440	390	70	750	250	1100	4.6	3-phase <sup>2</sup>	100
RS 100/500/11	1100	760	500	450	100	500	170	850	4.8	3-phase <sup>2</sup>	90
RS 100/750/11	1100	1005	500	450	100	750	250	1100	7.0	3-phase <sup>2</sup>	100
RS 100/1000/11	1100	1265	500	450	100	1000	330	1350	10.8	3-phase <sup>2</sup>	110
RS 50/300/13	1300	555	450	400	50	300	100	650	3.3	single-phase	80
RS 50/500/13	1300	755	450	400	50	500	170	850	5.2	3-phase <sup>2</sup>	90
RS 50/750/13	1300	1005	450	400	50	750	250	1100	8.0	3-phase <sup>2</sup>	100
RS 70/500/13	1300	755	460	410	70	500	170	850	6.7	3-phase <sup>2</sup>	90
RS 70/750/13	1300	1005	460	410	70	750	250	1100	10.0	3-phase <sup>2</sup>	100
RS 100/500/13	1300	760	520	470	100	500	170	850	7.1	3-phase <sup>2</sup>	90
RS 100/750/13	1300	1010	520	470	100	750	250	1100	11.6	3-phase <sup>2</sup>	100

<sup>1</sup>only heating on one phase (asymmetrical load)

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

<sup>3</sup>Exterior dimensions for vertical operation upon request

<sup>4</sup>without tube

\*Please see page 40 for more information about mains voltage





**RS .. /13** hinged tube furnace with special tube of quartz glass and flanges for protective gas operation

The RS tube furnace line can be custom-fit to your needs with a variety of extras. Starting with various working tubes of different materials to protective gas or vacuum operation. For optimum temperature distribution, all RS furnaces are also available as three-zone tube furnaces with modern PLC controls. The heat loss at the ends of the tube is compensated using this three-zoned control, and a longer uniform zone is the result. An overview of the complete line of accessories can be found starting on page 20.

#### Optional equipment

- Cascade controller with temperature measurement in the tube and in the oven chamber behind the tube
- Working tubes designed for process requirements
- Different gassing packages (starting on page 20) for protective gas and vacuum operation
- 3-zoned implementation for optimization of temperature distribution
- Burst protector for heating elements and/or as support surface for the load
- Stand for vertical operation
- Please see page 20 for more optional equipment



Switching and control unit separate from furnace mounted on an optional trolley



Quartz glass and flanges for protective gas operation as optional equipment



Various working tubes as optional equipment



Burst protector for heating elements and/or as support surface for the load

## High-temperature tube furnaces, RHTH for horizontal and RHTV for vertical operation, adaptable for operation with flammable and nonflammable gasses or under vacuum



**RHTH horizontal tube furnace 70/300/16**  
with vacuum flanges as optional equipment

The high-temperature tube furnaces are available in either horizontal (type RHTH) or vertical (type RHTV) designs. High-quality insulation materials made of vacuum-formed fibre plates enable energy-saving operation and a fast heating time due to low heat storage and heat conductivity. By using different gas supply systems, operations can be performed under a protective gas atmosphere, vacuum, or even with flammable gasses.



Gas panel

- Tmax 1600 °C, 1700 °C, or 1800 °C
- MoSi<sub>2</sub> heating elements, mounted vertically for easy replacement
- Insulation with vacuum-formed ceramic fibre plates
- Rectangular outer casing with slots for convection cooling
- Casing made of sheets of textured stainless steel (non-rusting design)
- Ceramic tube including fibre plugs for operation in air, included in delivery
- Type B thermocouple
- Power unit with low-voltage transformer and thyristor controller
- Switching and control unit separate from furnace in own wall or standing cabinet
- Please see page 40 for a description of various controllers

### Optional equipment

- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Cascade controller with temperature measurement in the tube and in the oven chamber behind the tube
- Working tubes designed for process requirements
- Gas-tight flanges for protective gas and vacuum operation
- Manual or automatic gas supply system
- 3-zoned implementation for optimization of temperature distribution
- Stand for vertical operation
- Please see page 20 for more optional equipment



Over-temperature limit controller



Choice of various working tubes



Vacuum pump stand for operation up to 10<sup>-5</sup> mbar (see pages 20 and following)

**RHTV 100-250/17 vertical tube furnace with stand as optional equipment**

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Heated length mm	Length constant temperature +/- 5 °C	Power kW	Supply voltage*	Weight in kg
Horizontal design		W	D	H						
RHTH 40/100/..	1600 or 1700 or 1800	420	390	510	40	100	30	2.2	single-phase	45
RHTH 40/250/..		420	540	510	40	250	80	3.6	3-phase <sup>1</sup>	60
RHTH 40/500/..		420	790	510	40	500	170	8.0	3-phase <sup>1</sup>	90
RHTH 70/150/..		520	450	620	70	150	50	4.5	3-phase <sup>1</sup>	65
RHTH 70/300/..		520	590	620	70	300	100	6.4	3-phase <sup>1</sup>	90
RHTH 70/600/..		520	890	620	70	600	200	8.0	3-phase <sup>1</sup>	120
RHTH 100/150/..		520	450	620	100	150	50	4.8	3-phase <sup>1</sup>	65
RHTH 100/300/..		520	590	620	100	300	100	7.5	3-phase <sup>1</sup>	90
RHTH 100/600/..		520	890	620	100	600	200	10.9	3-phase <sup>1</sup>	120
RHTH 150/300/..		570	590	670	150	300	100	8.0	3-phase <sup>1</sup>	140
RHTH 150/600/..		570	890	670	150	600	200	12.0	3-phase <sup>1</sup>	180
RHTH 200/300/..		620	590	720	200	300	100	10.0	3-phase <sup>1</sup>	140
RHTH 200/600/..		620	890	720	200	600	200	12.0	3-phase <sup>1</sup>	180

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Heated length mm	Length constant temperature +/- 5 °C	Power kW	Supply voltage*	Weight in kg
Vertical design		W	D	H						
RHTV 40/100/..	1600 or 1700 or 1800	425	425	365	40	100	30	2.0	single-phase	30
RHTV 40/250/..		425	425	515	40	250	80	3.0	single-phase	40
RHTV 40/500/..		425	425	765	40	500	170	6.0	3-phase <sup>1</sup>	65
RHTV 70/100/..		425	425	365	70	100	30	3.0	single-phase	30
RHTV 70/250/..		425	425	515	70	250	80	4.8	3-phase <sup>1</sup>	40
RHTV 70/500/..		425	425	765	70	500	170	8.0	3-phase <sup>1</sup>	65
RHTV 100/250/..		455	455	515	100	250	80	6.4	3-phase <sup>1</sup>	45
RHTV 100/500/..		455	455	765	100	500	170	10.4	3-phase <sup>1</sup>	70
RHTV 150/250/..		510	510	515	150	250	80	8.0	3-phase <sup>1</sup>	55
RHTV 150/500/..		510	510	765	150	500	170	12.0	3-phase <sup>1</sup>	80
RHTV 200/250/..		560	560	515	200	250	80	10.0	3-phase <sup>1</sup>	70
RHTV 200/500/..		560	560	765	200	500	170	18.5	3-phase <sup>1</sup>	95

<sup>1</sup>only heating between two phases

\*Please see page 40 for information on mains voltage

## Gas supply systems for tube furnaces RS, RHTH and RHTV

When equipped with various equipment packages, the tube furnace series RS, RHTH, and RHTV can be adapted for operation with nonflammable or flammable gasses or for vacuum operation. The different equipment packages can be delivered together with the furnace, or later as needed.



**Gas supply system 1:**  
Fibre plugs with protective gas connection, suitable for many laboratory applications

### Gas supply system 1 for simple protective gas applications

This package represents a basic version sufficient for many applications, for operation with nonflammable protective gasses. The standard working tube made of ceramic C 530 delivered with the furnace can still be used.

- Tube of ceramic C 530 can be used
- 2 plugs of ceramic fibre with protective gas connections
- Gas supply system for nonflammable protective gas (Ar, N<sub>2</sub>, inert gas) with shutoff valve and flow meter with control valve (volume 50-500 l/hr), piped and ready to connect (gas intake pressure at 300 mbar to be provided by customer)

#### Optional equipment

- Extension of gas supply system with a second or third nonflammable type of gas
- Bottle pressure regulator for use with bottled gas
- Automatically controlled gas supply with solenoid valves on the gas supply panel, which can be switched on and off through a controller with programmable extra functions (e.g. P 320)



Gas supply panel for nonflammable protective gas with shutoff valve and flow meter with regulator valve, piped and ready to connect

### Gas supply system 2 for gas-tight operation with nonflammable gasses

For increased atmospheric purity requirements in the tube, we recommend this gas supply system. The standard working tube is replaced by a dense tube of ceramic C 610 or C 799 in a gas-tight design. Besides the longer working tube, the scope of delivery also includes gas-tight flanges and a corresponding bracket system in the furnace. The system can also be equipped for vacuum operation.

- Longer, gas-tight working tube of ceramic C 610 for furnaces to 1300 °C or of C 799 for temperatures above 1300 °C
- 2 vacuum-tight, water-cooled stainless steel flanges with fittings on the outlet side (cooling water supply with NW9 hose connector to be provided by the customer)
- Mounting system on furnace for the flanges
- Gas supply system for nonflammable protective gas (Ar, N<sub>2</sub>, inert gas) with shutoff valve and flow meter with control valve (volume 50-500 l/hr), piped and ready to connect (gas intake pressure at 300 mbar to be provided by customer)

#### Optional equipment

- Extension of gas supply system with a second or third nonflammable type of gas
- Bottle pressure regulator for use with bottled gas
- Automatically controlled gas supply with solenoid valves on the gas supply panel, which can be switched on and off through a controller with programmable extra functions (e.g. P 320)
- Water-cooled end flange with quick connectors
- Vacuum package for evacuation of the working tube, consisting of a tee for the gas outlet, 2 ball valves, manometer, 1-stage manually operated rotary vane vacuum pump with corrugated stainless steel hose connected to the gas outlet, max. attainable end pressure in tube about 10<sup>-3</sup> mbar
- Vacuum package with adapted pumps for a max. end pressure down to 10<sup>-5</sup> mbar upon request
- Cooling unit for closed loop water circuit

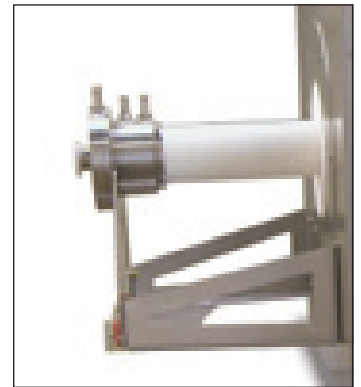
### Gas supply system 3 for gas-tight operation with hydrogen, introduced above 800 °C

Adding gas supply system 3 to the tube furnace allows operation under a hydrogen atmosphere. The built-in safety system allows the introduction of hydrogen into the working tube, when heated to at least 800 °C. The furnace and control system are designed to provide the highest possible degree of safety for the furnace, operator, and surroundings.

- Longer, gas-tight working tube of ceramic C 630 for furnaces to 1300 °C, or of C 799 for temperatures above 1300 °C
- 2 vacuum-tight, water-cooled stainless steel flanges with fittings on the outlet side with cooling water supply (to be provided by the customer) and NW9 hose connector
- Mounting system on furnace for the flanges
- Safety system for gassing with flammable protective gases starting at 800 °C
- Exhaust gas torch, propane-powered for customer-installed propane gas supply at 30 mbar
- Gas supply system for H<sub>2</sub> and N<sub>2</sub>. The customer provides an H<sub>2</sub> supply at 300 mbar and a N<sub>2</sub> supply at 10 bar
- N<sub>2</sub> emergency purge container
- PLC-controlled regulation with operation via HiProSystem touchscreen, locking procedures, and safety matrix programmed into the software

#### Optional equipment

- Extension of gas supply system with a second or third nonflammable type of gas
- Bottle pressure regulator for use with bottled gas
- Vacuum package for pre-evacuation of the working tube, consisting of a tee for the gas outlet, 2 ball valves, manometer, 1-stage manually operated rotary vane vacuum pump with corrugated stainless steel hose connected to the gas outlet, max. attainable end pressure in tube about 10<sup>-3</sup> mbar
- Vacuum package with adapted pumps for a max. end pressure down to 10<sup>-5</sup> mbar upon request
- Cooling unit for closed loop water circuit



Gas-tight design with water-cooled flanges

### Gas supply system 4 for gas-tight operation with hydrogen, introduced at room temperature

Adding gas supply system 4 to the tube furnace allows operation under a hydrogen atmosphere. The built-in safety system allows the introduction of hydrogen into the working tube at room temperature. The furnace and control system are designed to provide the highest possible degree of safety for the furnace, operator, and surroundings.

- Equipment as for gassing package 3, but with extended safety system for operation with hydrogen at room temperature.

#### Optional equipment

- Extension of gas supply system with a second or third nonflammable type of gas
- Bottle pressure regulator for use with bottled gas
- Vacuum package for pre-evacuation of the working tube, consisting of a tee for the gas outlet, 2 ball valves, manometer, 1-stage manually operated rotary vane vacuum pump with corrugated stainless steel hose connected to the gas outlet, max. attainable end pressure in tube about 10<sup>-3</sup> mbar
- Vacuum package with adapted pumps for a max. end pressure down to 10<sup>-5</sup> mbar upon request
- Cooling unit for closed loop water circuit

## Accessories for all tube furnaces

#### Various working tubes

By using different working tubes, tube furnaces can be adapted optimally to each process. Working tubes are available in ceramic composition per DIN VED 0335 (DIN EN 60612) C 530 (Porus Sillamantite), C 610 (dense mullite) and C 799 (dense > 99 % Al<sub>2</sub>O<sub>3</sub>), as are CrFeAl or quartz glass.



Various working tubes as option

## Compact tube furnaces R

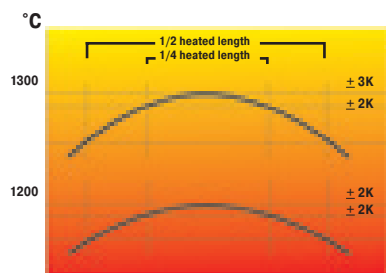


**R 30/250/12** single-zoned



**R 60/750/13** three-zoned

These compact tabletop tube furnaces with integrated control systems can be used universally for many processes. Equipped with a standard working tube of C 530 ceramic and two fibre plugs, these furnaces have an unbeatable price/performance ratio.



Temperature distribution, single-zoned tube furnaces

- Tmax 1200 °C or 1300 °C
- Casing made of textured stainless steel sheets (non-rusting design)
- Interior tube diameter of 30 to 100 mm, heated length from 250 to 1000 mm
- Working tube of C 530 ceramic including two fibre plugs as standard equipment
- Long lasting type S thermocouple
- Silent solid-state power control relays
- Please see page 40 for a description of various controllers



Over-temperature limit controller

### Optional equipment

- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Cascade controller for temperature measurement in the tube and behind the tube
- Working tubes designed for process requirements
- Three-zoned design with HiProSystem control (heated length from 750 mm, for 1300 °C models)
- Please see page 20 for optional equipment

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Heated length mm	Length constant temperature +/- 5 °C	Power kW	Supply voltage*	Weight in kg
R 30/250/12	1200	400	240	490	30	250	80	1.2	single-phase	20
R 40/250/12	1200	400	240	490	40	250	80	1.2	single-phase	20
R 30/500/12	1200	650	240	490	30	500	170	1.8	single-phase	25
R 40/500/12	1200	650	240	490	40	500	170	1.8	single-phase	25
R 60/750/12	1200	1000	360	640	60	750	250	3.6	single-phase	80
R 80/750/12	1200	1000	360	640	80	750	250	3.6	single-phase	80
R 100/1000/12	1200	1300	420	730	100	1000	330	6.0	3-phase	170
R 30/250/13	1300	400	240	490	30	250	80	1.3	single-phase	35
R 40/250/13	1300	400	240	490	40	250	80	1.3	single-phase	35
R 30/500/13	1300	650	240	490	30	500	170	1.8	single-phase	48
R 40/500/13	1300	650	240	490	40	500	170	1.8	single-phase	48
R 60/750/13 <sup>†</sup>	1300	1000	360	690	60	750	250	4.4	3-phase	120
R 80/750/13 <sup>†</sup>	1300	1000	360	690	80	750	250	4.4	3-phase	120
R 100/1000/13 <sup>†</sup>	1300	1300	420	780	100	1000	330	6.5	3-phase	230

<sup>†</sup>these models also available with 3 zones

\*Please see page 40 for information about mains voltage

## Universal tube furnaces RT with stand for horizontal or vertical operation



RT 50-250/11



RT 50-250/13

These compact tube furnaces are used when laboratory experiments must be performed horizontally, vertically, or at specific angles. The ability to configure the angle of tilt and the working height, and their compact design, also make these furnaces suitable for integration into existing process systems.

- Tmax 1100 °C, 1300 °C, or 1500 °C
- Compact design
- Vertical or horizontal operation freely adjustable
- Working height freely adjustable
- Working tube made of C 530 ceramic
- Long lasting type S thermocouple
- Operation also possible separate from stand if safety guidelines are observed
- Control system built into furnace base
- Please see page 20 for optional equipment
- Please see page 40 for a description of various controllers

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Heated length mm	Length constant temperature +/- 5 °C	Tube length in mm	Power kW	Supply voltage*	Weight in kg
RT 50-250/11	1100	350	380	740	50	250	80	360	1.8	single-phase	25
RT 50-250/13	1300	350	380	740	50	250	80	360	1.8	single-phase	25
RT 30-200/15	1500	445	475	740	30	200	70	360	1.8	single-phase	45

\*Please see page 40 for more information about mains voltage

## Universal high-temperature tube furnaces RHTC with SiC rod heating



RHTC 70-180

These powerful laboratory tube furnaces can be used at temperatures up to 1500 °C. The use of SiC rods ensures fast heating and cooling times, as well as good temperature uniformity. The compact design of these furnaces results in a great price/performance ratio.

- Tmax 1500 °C
- Fast heating and cooling times
- Ceramic tube including fibre plugs for operation in air included in delivery
- Long lasting type S thermocouple
- Please see page 20 for optional equipment
- Please see page 40 for a description of various controllers

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Heated length/mm	Length constant temperature +/- 5 °C	Tube length in mm	Power kW	Supply voltage*	Weight in kg
RHTC 75-180	1500	620	600	520	75	180	60	600	4.0	single-phase	50
RHTC 75-450	1500	620	900	520	75	450	150	900	6.0	3-phase¹	70
RHTC 75-610	1500	620	1200	520	75	610	200	1200	7.0	3-phase¹	90

¹only heating between two phases

\*Please see page 40 for information on mains voltage

## Rotary tube furnaces RSR



RSR 70-500/11 with built-in reactor

When the retention of the granular characteristics of the material is important, e.g. when drying or calcining, this rotary tube furnace is the optimum solution. The continuous rotary operation of the furnace tube and the option of operating it under protective gas lead to excellent results.



Tube drive

- Design similar to RS models, see page 16
- Tmax 1100 °C
- Type K thermocouple
- Compact unit, designed as tabletop device
- Delivery includes quartz glass process reactor
- Hinged design for easy tube exchange
- Rotational speed freely adjustable from 1-20 RPM
- Continuous drive with NW 10KF gas inlet
- Good saturation of load with process gas due to inlet on one side and outlet on other side of tube
- Please see page 20 for optional equipment
- Please see page 40 for a description of various controllers

Model	Tmax °C	Outer dimensions in mm			Tube Ø interior/mm	Tube length in mm	Reactor Ø interior/mm	Reactor length/mm	Heated length/mm	Length constant temperature +/- 5 °C	Power kW	Supply voltage*	Weight in kg
RSR 70-500/11	1100	755+500	460	410	28	1160	70	480	500	170	3.4	single-phase	95
RSR 70-750/11	1100	1005+500	460	410	28	1410	70	730	750	250	4.6	3-phase	105
RSR 100-500/11	1100	760+500	520	470	28	1160	100	480	500	170	4.8	3-phase	105
RSR 100-750/11	1100	1010+500	520	470	28	1410	100	730	750	250	7.0	3-phase	105

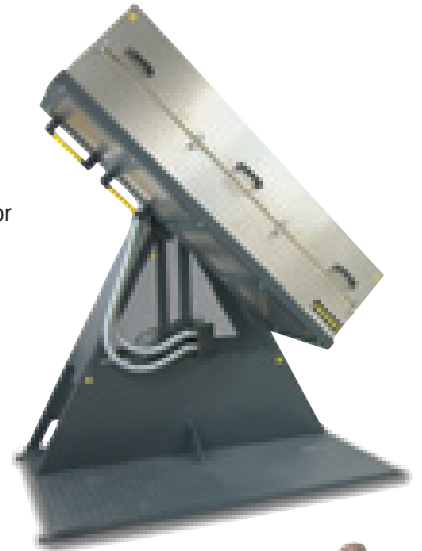
\*Please see page 40 for more information about mains voltage



## Customized tube furnaces

Besides our extensive selection of standard tube furnaces, we can also provide you with a tube furnace custom-designed for your application. Some examples of tube furnace systems we have supplied to other customers are listed below. From modified standard furnaces to fully-customized tube furnace systems – we will find a solution for your needs!

- RS 100/1500/13S tube furnace for integration in the customer's production plant
- Operates horizontally, vertically, or at a defined angle
- Tmax 1300 °C
- Heated length: 1500 mm
- Tube interior diameter: 100 mm
- 3-zoned control system for optimization of temperature distribution



- R 100/1000/11S tube furnace for vacuum operation for annealing of metals under vacuum or protective gas atmospheres
- Tube closed on one side made of highly heat-resistant 1.4841 (314) alloy
- Load carrier made of 1.4841 (314) alloy
- 1-stage rotary vane pump for vacuum down to  $10^{-1}$  mbar
- Tmax 1100 °C
- Heated length: 1000 mm
- Tube interior diameter: 100 mm



- Dual tube ceramic furnace system with 2 RS 50/300/13 furnaces for working with different temperatures in one working tube
- Furnaces hinged for simple insertion of the working tube
- Each furnace has its own controller
- Gas-tight flanges, water-cooled for working under protective gas
- Tmax 1300 °C
- Overall tube length: 800 mm
- Heated length: 2 x 300 mm
- Tube interior diameter: 50 mm



- RS 200/2500/13S production tube furnace with hinged lid
- Simple insertion of working tube from above by opening the furnace lid
- Lid to be opened using a crane
- Tmax 1300 °C
- Heated length: 2500 mm
- Tube interior diameter: 200 mm



- RS 100/1000/11 hinged tube furnace for debinding under protective gas atmospheres
- Gas-tight flanges, water-cooled for working under protective gas
- Binder cold trap with condensate separator on the right side of the tube
- Tmax 1100 °C
- Heated length: 1000 mm
- Tube interior diameter: 100 mm



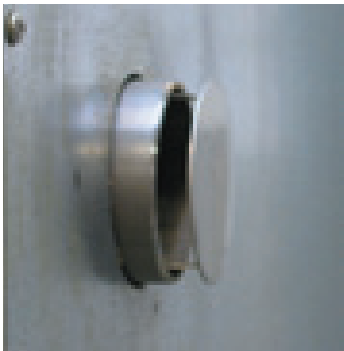
Ovens TR 60 - TR 1050 up to 300 °C



TR 60



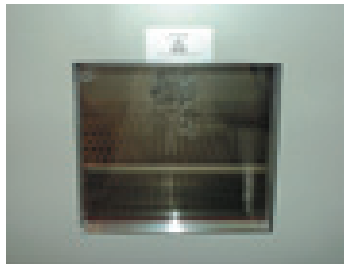
TR 1050  
with double door



Exhaust air opening in the rear wall to vent the exhaust gasses generated during drying

Usable to a maximum of 300 °C, these ovens offer optimum temperature uniformity over their entire useable volume. Horizontal air circulation ensures high drying power and a fast heating time. Maximum temperature uniformity is achieved even for closely packed charges. Multiple tray supports enable loading on multiple layers.

- Tmax 300 °C
- Compact design as tabletop model (TR 420 and TR 1050 as free standing model)
- Horizontal air circulation for temperature uniformity better than  $\pm 4^{\circ}\text{C}$  in the usable space
- Stacking in multiple layers possible using removeable trays
- Furnace chamber of stainless steel, material 1.4301 (304)
- Double door for model TR 1050
- View window upon request
- Please see page 40 for a description of various controllers



Optional view window

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Trays in- cluded	Trays max.	max. total load <sup>1</sup>
		w	d	h		W	D	H						
TR 60	300	490	360	340	60	650	550	640	2.1	single-phase	45	1	4	120
TR 120	300	600	360	480	105	750	550	780	2.1	single-phase	70	2	7	150
TR 240	300	700	550	640	240	860	730	940	3.1	single-phase	100	2	9	150
TR 420	300	710	550	1080	420	860	830	1370	4.0	3-phase	120	3	17	150
TR 1050	300	1240	570	1510	1050	1430	860	1920	9.0	3-phase	380	4	22	170

<sup>1</sup>Max load per layer 30 kg

\*Please see page 40 for information on mains voltage

## High-temperature ovens, air circulation furnaces up to 850 °C



If very good temperature uniformity is necessary for your heat treatment, our air circulation furnaces with horizontal air circulation are the right solution for you. Due to their solid industrial design, they can be used for many processes, like ageing, preheating, drying, hardening, tempering and annealing.

- Tmax 450 °C, 650 °C, or 850 °C
- Furnace plenum made of stainless steel (N 15/65HA without plenum)
- Model with 15 liters designed as tabletop model, other models freestanding with stand
- Solid industrial design
- Optimum temperature distribution per DIN 17052-1 to  $\pm 3K$  in useable space
- Loading of multiple layers possible using removeable trays. For models N 30/.. - N 560/.. one tray is included in scope of delivery
- Please see page 40 for a description of various controllers



Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
N 30/45HA	450	290	420	260	30	607+255	1175	1315	3.0	single-phase	195
N 60/45HA	450	350	500	350	60	667+255	1250	1400	6.0	single-phase	240
N 120/45HA	450	450	600	450	120	767+255	1350	1500	9.0	3-phase	310
N 250/45HA	450	600	750	600	250	1002+255	1636	1860	19.0	3-phase	610
N 560/45HA	450	750	1000	750	560	1190+255	1800	1190	19.0	3-phase	730
N 15/65HA <sup>1</sup>	650	295	340	170	15	470	875	460	2.4	single-phase	55
N 30/65HA	650	290	420	260	30	607+255	1175	1315	5.5	single-phase	195
N 60/65HA	650	350	500	350	60	667+255	1250	1400	9.0	single-phase	240
N 120/65HA	650	450	600	450	120	767+255	1350	1500	13.0	3-phase	310
N 250/65HA	650	600	750	600	250	1002+255	1636	1860	21.0	3-phase	610
N 500/65HA	650	750	1000	750	500	1152+255	1886	2010	31.0	3-phase	1030
N 30/85HA	850	290	420	260	30	607+255	1175	1315	6.1	3-phase	195
N 60/85HA	850	350	500	350	60	667+255	1250	1400	9.6	3-phase	240
N 120/85HA	850	450	600	450	120	767+255	1350	1500	13.6	3-phase	310
N 250/85HA	850	600	750	600	250	1002+255	1636	1860	21.0	3-phase	610
N 500/85HA	850	750	1000	750	500	1152+255	1886	2010	31.0	3-phase	1030

<sup>1</sup>Tabletop model

\*Please see page 40 for more information on mains voltage

## Pit furnaces Top 16/R - Top 220



Top 60



Top 140



Top 190

Many applications in the laboratory require a universal furnace in which the material is loaded cold and removed cold. These include burning, combustion, or, for instance, cleaning processes. Our pit furnaces Top 16/R - Top 220 can be used optimally for these processes and offer an excellent price/performance ratio. The Top 16/R can be used as a tabletop model due to its extremely compact design.



Top 16/R

- Heating elements, embedded in protective grooves, heating from all sides
- Heating elements of the best quality, optimum wire strength and length for a long service life
- Quiet operation of heating with solid state relays
- Multilayered insulation for low power consumption and low exterior temperatures
- Firebrick material in interior chamber of furnace ensures clean combustion results
- Wear-free sealing of lid (brick on brick)
- Long lasting type S thermocouple
- Freely adjustable air intake opening in floor of furnace for good airflow and short cooling times
- Exhaust air opening in side of furnace with connectors for hoses, 80 mm diameter
- Lid contact switch for safety shutoff
- Attractive design with casing of stainless steel, easy to care for
- Lid with adjustable quick latch, can be locked with padlock
- Spring-supported lid opening
- Precise temperature control due to fast clocking of switching processes
- Rollers for easy transport of furnace without lifting, can be locked
- Please see page 40 for a description of the different controllers

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
Top 16/R	1300	Ø 280		230	16	440	700	470	2.6	single-phase	22
Top 45eco	1300	Ø 410		340	45	580	750	670	2.9	single-phase	60
Top 45	1300	Ø 410		340	45	580	750	670	3.6	single-phase	60
Top 60/Leco	1200	Ø 410		460	60	580	750	800	2.9	single-phase	72
Top 60	1200	Ø 410		460	60	580	750	800	3.6	single-phase	72
Top 60eco	1300	Ø 410		460	60	580	750	800	3.6	single-phase	72
Top 60/R	1300	Ø 410		460	60	580	750	800	5.5	3-phase <sup>1</sup>	72
Top 100	1300	Ø 480		575	100	660	830	910	7.0	3-phase	100
Top 140	1300	Ø 550		575	140	750	920	910	9.0	3-phase	120
Top 190	1300	Ø 590		690	190	790	960	1020	12.0	3-phase	150
Top 220	1300	930	590	460	220	1170	1000	960	15.0	3-phase	200

<sup>1</sup>only heating between two phases

\*Please see page 40 for information on mains voltage

## Compact chamber furnaces N 40 E - N 100 E



**N 40 E**  
as tabletop model



**N 60 E**  
with stand (optional)

We offer compact chamber furnaces as an alternative to the pit furnaces described, which can also handle a large number of simple processes.

- Heating from both sides with high-quality heating elements, embedded in protective grooves
- Multilayered insulation with light refractory bricks in the furnace interior and special backup insulation for low power consumption
- Double-walled door with low exterior temperature
- Casing made of sheets of textured stainless steel (non-rusting design)
- Quiet operation of heating with solid state relays
- High-quality types PtRh-Pt thermocouple
- Freely adjustable air intake for good ventilation and short cooling times
- Exhaust air outlet in roof
- Precise temperature characteristic due to fast clocking of switching processes
- Standard tabletop design
- Stand available optionally
- Door contact switch for safety shutoff
- Please see page 40 for a description of the different controllers

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
N 40 E	1300	360	400	320	40	560	690	570	2.9	single-phase	70
N 60 LE	1200	360	400	440	60	560	690	690	2.9	single-phase	90
N 60 E	1300	360	400	440	60	560	690	690	3.6	single-phase	90
N 100 E	1300	360	610	440	400	560	1035	690	5.5	3-phase	115

\*Please see page 40 for more information about mains voltage

## Professional chamber furnaces with brick insulation LH or fibre insulation LF



**LH 15/12**  
with brick insulation



**LH 60/12**  
with brick insulation



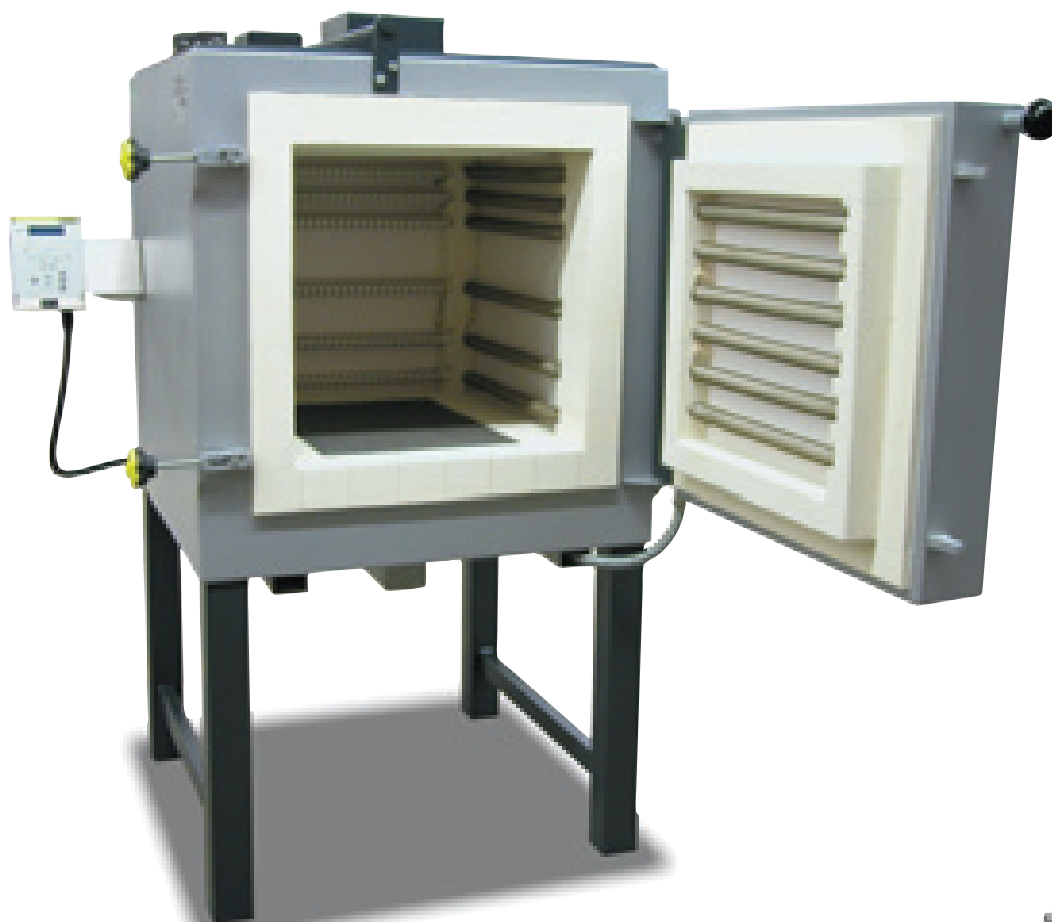
Interior of low heat storage fibre material  
for fast cooling times in LF models



Cooling fan connected to automatic vent  
flap for shorter cooling time

The LH 15/12 - LF 120/14 laboratory furnaces have been trusted for many years as professional chamber furnaces for the laboratory. These furnaces are available with either a robust insulation of light refractory bricks (LH models) or with a combination insulation of refractory bricks in the corners and low heat storage, quickly cooling fibre material (LF models). With a wide variety of optional equipment, these models can be optimally adapted to your processes.

- Tmax 1200 °C, 1300 °C, or 1400 °C
- 5-sided heating for very good temperature uniformity
- Heating elements on support tubes ensure free heat radiation and a long service life
- Protection of floor heating and flat stacking surface provided by embedded SiC plate in the floor
- LH models: multilayered, fibre-free insulation of light refractory bricks and special backup insulation
- LF models: high-quality fibre insulation with corner bricks for shorter heating and cooling times
- Door with brick-on-brick seal, hand fitted
- Short heating times due to high installed power
- Side vent with bypass connection for exhaust pipe
- Self-supporting arch for high stability and greatest possible protection against dust
- Quick lock on door
- Freely adjustable air slide intake in furnace floor
- Stand included
- Please see page 40 for a description of the different controllers



LF 120/12 with fibre insulation

#### Optional equipment

- Parallel swinging door, pivots away from operator, for opening when hot
- Separate wall-mounting or floor standing cabinet for switchgear
- Automatic vent flap
- Cooling fan for shorter cycle times
- Protective gas connector, sealed casing
- Manual or automatic gas supply system



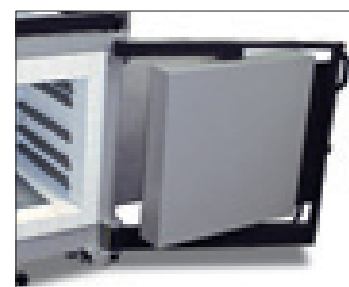
LH 120/12S with gas supply system and sight port in the door

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
LH 15/12	1200	250	250	250	15	570	790	1170	5.0	3-phase <sup>1</sup>	150
LH 30/12	1200	320	320	320	30	640	860	1240	7.0	3-phase <sup>1</sup>	170
LH 60/12	1200	400	400	400	60	720	1010	1320	8.0	3-phase	260
LH 120/12	1200	500	500	500	120	820	1110	1420	12.0	3-phase	340
LH 15/13	1300	250	250	250	15	570	790	1170	7.0	3-phase <sup>1</sup>	150
LH 30/13	1300	320	320	320	30	640	860	1240	8.0	3-phase <sup>1</sup>	170
LH 60/13	1300	400	400	400	60	720	1010	1320	11.0	3-phase	260
LH 120/13	1300	500	500	500	120	820	1110	1420	15.0	3-phase	340
LH 15/14	1400	250	250	250	15	570	790	1170	8.0	3-phase <sup>1</sup>	150
LH 30/14	1400	320	320	320	30	640	860	1240	10.0	3-phase <sup>1</sup>	170
LH 60/14	1400	400	400	400	60	720	1010	1320	12.0	3-phase	260
LH 120/14	1400	500	500	500	120	820	1110	1420	18.0	3-phase	340

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage	Weight in kg
		w	d	h		W	D	H			
LF 15/13	1300	250	250	250	15	570	790	1170	7.0	3-phase <sup>1</sup>	130
LF 30/13	1300	320	320	320	30	640	860	1240	8.0	3-phase <sup>1</sup>	150
LF 60/13	1300	400	400	400	60	720	1010	1320	11.0	3-phase	230
LF 120/13	1300	500	500	500	120	820	1110	1420	15.0	3-phase	300
LF 15/14	1400	250	250	250	15	570	790	1170	8.0	3-phase <sup>1</sup>	130
LF 30/14	1400	320	320	320	30	640	860	1240	10.0	3-phase <sup>1</sup>	150
LF 60/14	1400	400	400	400	60	720	1010	1320	12.0	3-phase	230
LF 120/14	1400	500	500	500	120	820	1110	1420	18.0	3-phase	300

<sup>1</sup>only heating between two phases

\*Please see page 40 for information on mains voltage



Parallel swinging door for opening when hot

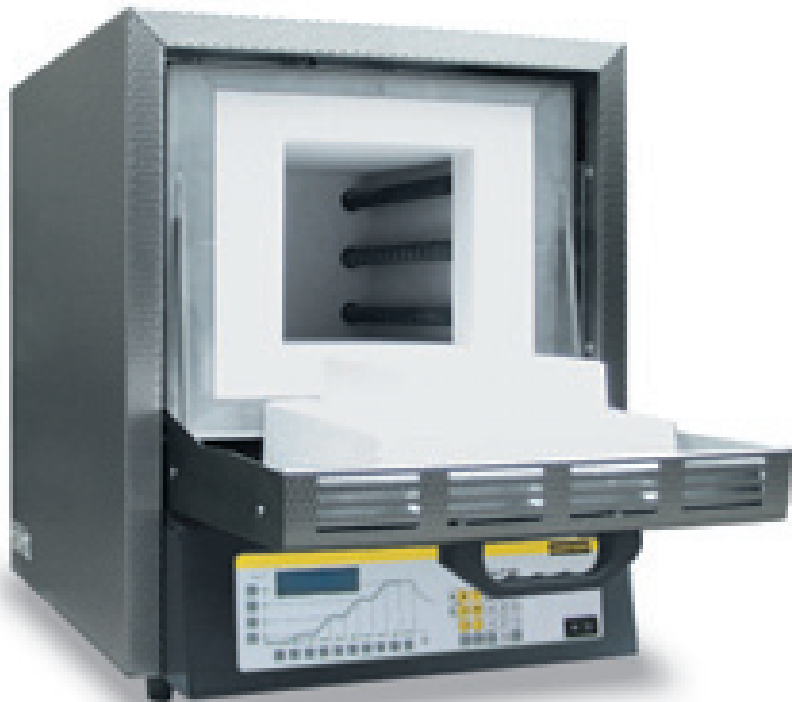


Gas panel

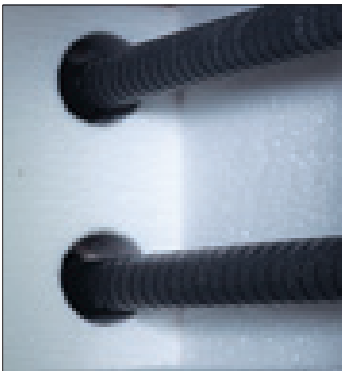
High-temperature furnaces HTC with SiC rod heating as tabletop model



HTC 03/14



HTC 08/15



Furnace chamber with high-quality fibre material and SiC heating rods in the sides of the furnace

These powerful laboratory muffle furnaces are available for temperatures up to 1400, 1500, or 1600 °C. The durability of the SiC rods in periodic use, in combination with their high heating speed, make these furnaces to all-rounders in the laboratory. Heating times of 40 minutes to 1400 °C can be achieved, depending on the furnace model and the conditions of use.

- Tmax 1400 °C, 1500 °C, or 1600 °C
- Easy replacement of heating rods
- High-quality fibre material, selected for the working temperature
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing for low external temperatures and high stability
- Adjustable air intake opening in the furnace door, exhaust air opening in the back wall
- Switching system with semiconductor relay, power tuned to the SiC rods
- Please see page 40 for a description of the different controllers

Optional equipment

- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load



Over-temperature limit controller

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
HTC 03/14	1400	120	210	120	3	400	510	500	7.0	3-phase	30	40
HTC 08/14	1400	170	290	170	8	450	610	550	10.5	3-phase	40	40
HTC 03/15	1500	120	210	120	3	400	510	500	7.0	3-phase	30	50
HTC 08/15	1500	170	290	170	8	450	610	550	10.5	3-phase	40	50
HTC 03/16	1600	120	210	120	3	400	510	500	7.0	3-phase	30	60
HTC 08/16	1600	170	290	170	8	450	610	550	10.5	3-phase	40	60

\*Please see page 40 for more information about mains voltage



## High-temperature furnaces LHT with MoSi<sub>2</sub> heating elements as tabletop model



**LHT 02/17**

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 furnaces are also perfectly suited for the sintering of technical ceramics, such as zirconium oxide dental bridges.

- Tmax 1600 °C, 1750 °C, or 1800 °C
- High-quality molybdenum disilicide heating elements
- Furnace chamber lined with first-class, durable fibre material
- Casing made of sheets of textured stainless steel (non-rusting design)
- Double-walled casing with additional cooling using fans, for low exterior temperature
- Furnace sizes of 2, 4, or 8 liters
- Parallel swinging doors, chain-guided, allowing safe opening and closing without destruction of the fibre insulation, whereby the hot side is turned away from the operator
- Adjustable air intake opening in the furnace door, exhaust air opening in the back wall
- Type B thermocouple
- Switching system with phase-angle firing thyristors (SCRs)
- Please see page 40 for a description of the different controllers



**LHT 04/17**

### Optional equipment

- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Protective gas connector in rear wall of furnace
- Manual or automatic gas supply system

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
LHT 02/16	1600	90	150	150	2	470	700	750+350	3.0	single-phase	75	30
LHT 04/16	1600	150	150	150	4	470	700	750+350	5.0	single-phase	85	25
LHT 08/16	1600	150	300	150	8	470	850	750+350	8.0	3-phase	100	25
LHT 02/17	1750	90	150	150	2	470	700	750+350	3.0	single-phase	75	60
LHT 04/17	1750	150	150	150	4	470	700	750+350	5.0	3-phase	85	40
LHT 08/17	1750	150	300	150	8	470	850	750+350	8.0	3-phase	100	40
LHT 02/18	1800	90	150	150	2	470	700	750+350	3.6	single-phase	75	75
LHT 04/18	1800	150	150	150	4	470	700	750+350	5.0	3-phase	85	60
LHT 08/18	1800	150	300	150	8	470	850	750+350	9.0	3-phase	100	60

\*Please see page 40 for more information about mains voltage



Over-temperature limit controller

## High-temperature furnaces HT with MoSi<sub>2</sub> heating elements as floor models



HT 04/16 with gas panel



HT 32/17 with automatic vapour vent flap and fresh air fan with dimmer



Gas panel



Automatic vent flap



Ask for our "Ceramics" catalog for more information on our high-temperature furnaces!

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 unbeatable quality benchmarks. For configuration for your processes, these furnaces can be extended with extras from our extensive option list.

- Tmax 1600 °C, 1750 °C, or 1800 °C
- High-quality molybdenum disilicide (MoSi<sub>2</sub>) heating elements
- Furnace chamber lined with first-class, durable fibre material
- Parallel swinging doors, chain-guided, allowing safe opening and closing without destruction of the fibre insulation. Positive closing of the door with a cam latch
- Type B thermocouple
- Furnace sizes from 4 to 450 liters, special sizes on request
- Over-temperature limit controller as standard equipment for protection of material
- Please see page 40 for a description of the different controllers

### Optional equipment

- Floor reinforcement for support of heavy loads
- Exhaust air flap controlled manually or automatically for better ventilation of furnace chamber
- Fan for better ventilation of combustion chamber and for fast cooling of the furnace
- Protective gas connector and seal of furnace casing to allow flushing of furnace with protective gasses
- Manual or automatic gas supply system

Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Minutes to Tmax
		w	d	h		W	D	H				
HT 04/16	1600	150	150	150	4	610	470	1400	5.0	3-phase	150	25
HT 08/16	1600	150	300	150	8	610	610	1400	8.0	3-phase	200	25
HT 16/16	1600	200	300	260	16	710	650	1500	12.0	3-phase	270	25
HT 04/17	1750	150	150	150	4	610	470	1400	5.0	3-phase	150	40
HT 08/17	1750	150	300	150	8	610	610	1400	8.0	3-phase	200	40
HT 16/17	1750	200	300	260	16	710	650	1500	12.0	3-phase	270	40
HT 04/18	1800	150	150	150	4	610	470	1400	5.0	3-phase	150	40
HT 08/18	1800	150	300	150	8	610	610	1400	8.0	3-phase	200	40
HT 16/18	1800	200	300	260	16	710	650	1500	12.0	3-phase	270	40

\*Please see page 40 for more information about mains voltage

## High-temperature furnaces HFL as floor models with brick insulation for melting experiments



**HFL 16/16**



**HFL 295/13** with lift door and transformer in stand, with customer-specific design

The HFL 16/16 - HFL 160/17 series is particularly characterized by their special cladding with light refractory bricks. This insulation is necessary when aggressive gasses (such as vapourized glass) or acids may be produced in the process.

- Tmax 1600 °C or 1700 °C
- High-quality molybdenum disilicide ( $\text{MoSi}_2$ ) heating elements
- Insulation with light refractory bricks and special backup insulation
- Type B thermocouple
- Furnace sizes of 16 to 160 liters
- For the release of vapours, a 30 mm large exhaust hole is integrated into the roof of the furnace
- Over-temperature limit controller for protection of material
- Please see page 40 for a description of the different controllers

### Optional equipment

- Exhaust air flap controlled manually or automatically for better ventilation of furnace chamber
- Fan for better ventilation of combustion chamber and for fast cooling of the furnace
- Protective gas connector and seal of furnace casing to allow flushing of furnace with protective gasses
- Manual or automatic gas supply system



Protective screen in front of heating elements for protection against mechanical damage

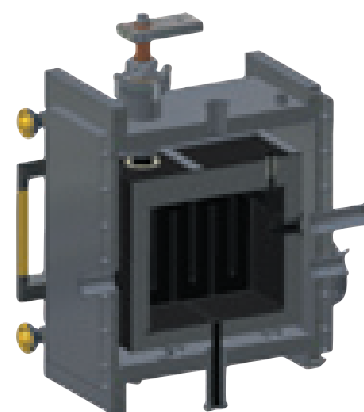
Model	Tmax °C	Inner dimensions in mm			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
HFL 16/16	1600	200	300	260	16	720	900	1520	12	3-phase	500
HFL 40/16	1600	300	350	350	40	820	950	1620	12	3-phase	660
HFL 64/16	1600	400	400	400	64	920	1000	1670	18	3-phase	880
HFL 160/16	1600	500	550	550	160	1020	1150	1820	21	3-phase	1140
HFL 16/17	1700	200	300	260	16	720	900	1520	12	3-phase	530
HFL 40/17	1700	300	350	350	40	820	950	1620	12	3-phase	690
HFL 64/17	1700	400	400	400	64	920	1000	1670	18	3-phase	920
HFL 160/17	1700	500	550	550	160	1020	1150	1820	21	3-phase	1190

\*Please see page 40 for more information about mains voltage

## High-temperature vacuum furnaces VHT with graphite or Molybdenum insulation

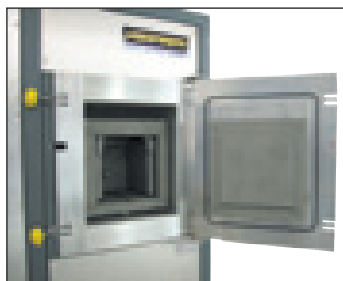


VHT 8/22-GR



The compact furnaces of the VHT line are available as vacuum chamber furnaces with graphite or Molybdenum hot zones. A wide variety of accessories allows these furnaces to be configured optimally for the process required. The vacuum-tight retort enables thermal processes in oxygen-free protective or reaction gas atmospheres and vacuum heating applications to  $10^{-5}$  mbar. According to the equipment variant, processes can be executed under nitrogen, argon, hydrogen, inert gas, partial pressure, or vacuum.

The VHT line is available with either graphite or Molybdenum hot zones in the base version with fully automatic control system, manual gas supply, and one-stage rotary vane pump for pre-evacuation of the furnace chamber. After extension with the "automation package", the process is controlled completely automatically by an integrated PLC and corresponding display. With the DB equipment package, this line is equipped to handle heat treatments with binder removal.



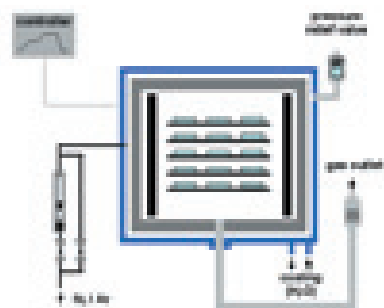
Graphite Hot Zone

### Basic design

- Tmax 1600 °C for Molybdenum model (VHT-MO), 2200 °C for graphite model (VHT-GR)
- Standard sizes of 8, 40, or 100 liters
- Double-walled stainless steel vacuum retort
- Compact design on rollers for simple moving of furnace
- Graphite heating and hardened graphite insulation for VHT-GR
- Molybdenum heating and molybdenum sheet insulation for VHT-MO
- Temperature measurement using optical pyrometer in VHT-GR
- Temperature measurement using type S thermocouple in VHT-MO
- Over-temperature limit controller with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and load
- Process gas introduction with flow meter and manual gas control
- Bypass to flush or flood furnace chamber
- Gas outlet with overflow protection
- Overpressure valve
- One-stage rotary vane pump with pressure manometer for pre-evacuation and for vacuum heat treatment in rough vacuum

### Optional equipment

- Automatic process gas introduction and shutoff via controller
- Adapted vacuum pumps for vacuum heat treatments down to  $10^{-5}$  mbar
- Operation under partial pressure for nonflammable gases
- Cooling unit for closed loop water circuit



Flow scheme for manual gas supply system with VHT

Model	Tmax °C	Interior dimensions			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg	Element material
		w	d	h		W	D	H				
VHT 8/22-GR	2200	170	240	200	8	1250 (800) <sup>1</sup>	1100	2000	25	3-phase	1200	Graphite
VHT 40/22-GR	2200	300	380	350	40	1400 (950) <sup>1</sup>	1300	2000	70	3-phase	2400	Graphite
VHT 8/16-MO	1600	170	240	200	8	1250 (800) <sup>1</sup>	1100	2000	25	3-phase	1200	Molybdenum
VHT 40/16-MO	1600	300	380	350	40	1400 (950) <sup>1</sup>	1300	2000	70	3-phase	2400	Molybdenum

<sup>1</sup>With switchgear removed

\*Please see page 40 for more information about mains voltage

## Extension package – "Automation"

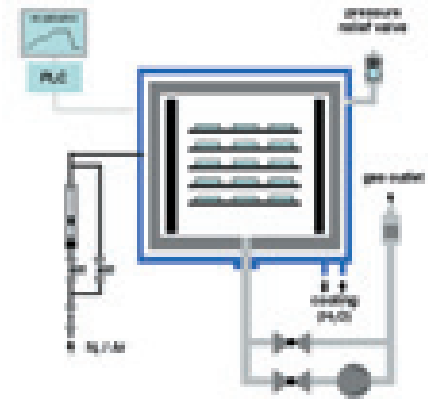
By extending the standard furnaces of the VHT line, the entire heat treatment process can be performed, monitored, displayed, and documented fully automatically. The entry of process data (e.g. temperatures, times, process gas introduction, vacuum, etc.) is conveniently managed using a large touch panel. System status, including process-relevant values (e.g. temperatures, times, pressures, valve positions, error messages) are displayed on a process management screen in an easy-to-understand manner. The system also has flushing, evacuation, and leak testing automation.

### Design in addition to basic design of the VHT furnaces

- PLC control with touch panel for data input and display
- Display of system status and process-relevant data
- Process gas introduction with manual flow setting and automatic valve
- Bypass for flushing and flooding of furnace chamber with automatic valve
- Relative and absolute pressure transmitter

### Optional equipment

- Extension option for hydrogen operation with corresponding safety system
- Exhaust gas torch
- Exhaust gas cooling
- Graphite and CFC retorts with direct process gas introduction
- Mass flow controller (MFC)
- Process control via partial pressure in the vacuum chamber
- PC control using Siemens Win CC with corresponding documentation options and the possible connection to customer's networks
- Cooling unit for closed loop water circuit



Flow scheme for automatic gas supply system with VHT



Graphite heater

## Extension package – "DB-debinding and sintering"

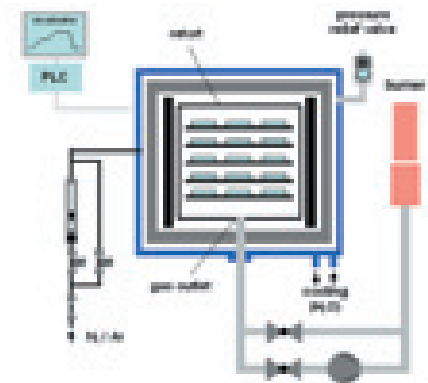
With the "DB - debinding and sintering" extension package, VHT furnaces with molybdenum heating can be used for processes which evolve volatile compounds during heat treatment. The VHT-DB is equipped with an additional retort with a direct gas outlet and an exhaust gas torch. The special gas plumbing prevents the pollution of the furnace insulation and the heater due to the thermal process. The furnace can also optionally be equipped with a heated gas exhaust, a partial pressure debinder, and a binding agent trap. The control system corresponds to that of the "Automation" extension package.

### Design in addition to the extension package "Automation"

- Available for VHT-MO
- The control system corresponds to that of the "Automation" extension package.
- Additional molybdenum retort in the furnace chamber with direct gas inlet and outlet to protect furnace insulation
- Exhaust gas torch to burn gasses produced by the process
- Exhaust gas cooler

### Optional equipment

- Heated gas outlet
- Binding agent trap with condensate separation for processes with a large proportion of binding agents
- Cooling unit for closed loop water circuit



Flow scheme for automatic gas supply system with VHT-DB

## Melting furnaces K 1/10 - K 4/13, KC models



K 1/10

These compact melting furnaces for the melting of non-ferrous metals and alloys are one of a kind and have a number of technical advantages. Designed as tabletop models, they can be used for many laboratory applications. The practical counter balanced hinge with shock absorbers and the pouring groove on the front of the furnace make exact dosing easy when pouring the melt. The furnaces are available for furnace chamber temperatures of 1000, 1300, or 1500 °C. This corresponds to melt temperatures of about 80-110 °C lower.

- Tmax in furnace chamber of 1000 °C, 1300 °C, or 1500 °C, with melt temperature about 80 - 110 °C lower
- Crucible sizes of 1, 2, or 4 liters
- Crucible with integrated pouring spout of iso-graphite included with delivery
- Pouring groove on furnace for exact dosing
- Compact table design, simple emptying of crucible by tipping mechanism with hydraulic support
- Crucible for heating of furnace insulated with a hinged lid, lid opened when pouring
- Please see page 40 for a description of the different controllers



KC 1/10

### Optional equipment

- Other crucible types available, e.g. steel or SiC
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60518-2 as temperature limiter to protect the oven and melt. The furnace shuts off upon overtemperature and switches back on when the temperature falls below the critical level.



Over-temperature limiter

Model	Tmax °C	Crucible	Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
K 1/10	1000	A 6	1,0	520	680	660	3.0	single-phase	85
K 2/10	1000	A10	2,0	520	680	660	3.0	single-phase	90
K 4/10	1000	A25	4,0	570	755	705	3.3	single-phase	110
K 1/13 <sup>2</sup>	1300	A 6	1,0	520	680	660	3.0	single-phase	120
K 2/13 <sup>2</sup>	1300	A10	2,0	520	680	660	3.0	single-phase	125
K 4/13 <sup>2</sup>	1300	A25	4,0	570	755	705	5.5	3-phase <sup>1</sup>	170
KC 1/15 <sup>2</sup>	1500	A6	1,0	580	630	580	5.5	3-phase	170
KC 2/15 <sup>2</sup>	1500	A10	2,0	580	630	580	5.5	3-phase	170

<sup>1</sup>only heating between two phases

<sup>2</sup>External dimensions of furnace, transformer in separate housing

\*Please see page 40 for information on mains voltage

## Assay furnace N 110/HS



**N 110/HS**



**N 110/HS** with manual lift door and integrated control cabinet

The N 110/HS furnace is especially used for the assay of precious metals where the insulation and heating must be protected from emerging gasses and vapours. The furnace chamber forms a ceramic muffle which can easily be replaced. In the standard design, the muffle is closed with a firebrick plug. A lift door can be installed instead upon request.

- Tmax 1300 °C
- Muffle heated from four sides
- Heating elements and insulation protected by ceramic muffle
- Simple replacement of muffle
- Operation also possible with open furnace if brick stopper is removed
- Tool holder on furnace
- Stainless steel exhaust chimney above the door opening for connection of an exhaust system
- Work surface with embedded ceramic plate in front of the muffle opening to place load
- Front side with large service door for easy access to the furnace chamber behind the muffle
- Switching and control unit separate from furnace
- Please see page 40 for a description of the different controllers

### Optional equipment

- Lift door, manually operated with counterweight or electrically operated, for easy opening and closing
- Electrical lift door drive with 2-hand button operation
- Second work surface with embedded ceramic plate below the standard surface
- Double-walled casing with fan cooling to reduce exterior temperatures



Customized pit furnace **S 73/HS** for the assay of large charges in crucibles



Work surface in front of muffle to place load

Model	Tmax °C	Interior dimensions			Volume in L	Outer dimensions in mm			Power kW	Supply voltage*	Weight in kg
		w	d	h		W	D	H			
N 110/HS	1300	260	340	95	8	760	790	1435	22	3-phase	510

\*Please see page 40 for more information about mains voltage



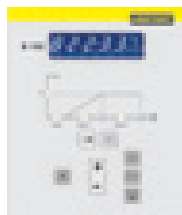
## Measurement and control systems



Controller B 170



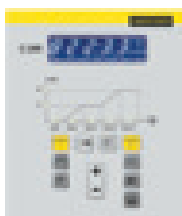
Controller P 320



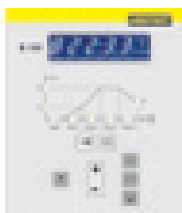
Controller B 150



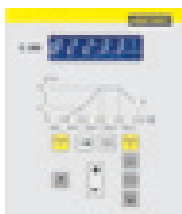
Controller C 250



Controller C 295



Controller B 130



Controller C 280

Nabertherm has many years of experience in the design and construction of both standard and custom control system. All controls are remarkable for their ease of use and even in the basic version have a wide variety of functions.

### Standard controller

Our extensive line of standard controllers satisfies most customer requirements. Based on the specific furnace model, the controller regulates the furnace temperature reliably. The standard controllers are developed and fabricated within the Nabertherm group. When developing controllers, our focus is on ease of use. From a technical standpoint, these devices are custom-fit for each furnace model or the associated application. From the simple controller with an adjustable temperature to the control unit with freely configurable control parameters, stored programs, and a computer interface, we have a solution to meet your requirements.

### Assignment of standard controllers to furnace families

	L 3 - LT 40	LE 2/11 + LE 4/11	LE 6/11 + LE 14/11	LV 3/11 - LVT 15/11	L 9/11/SKM	L(T) 9/..SW	N 7/H - N 61/H	RS 50/300/11 - RS 100/750/13	R 30/250/12 - R 100/1000/13	RT 50-250/11 - RT 50-250/13	RT 30-200/15	RHTH/RHTV	RHTC	RSR 70-500/11	TR 60 - TR 1050	N 15/..HA	N 30/..HA - N 560/..HA	N 40E - N 100 E	Top	LH 15/12 - LF 120/14	HTC 03/14 - HTC 08/16	LHT 02/16 - LHT 08/18	HT 04/16 - HT 16/18	HFL 16/16 - HFL 160/17	VHT	K 1/10 - K 4/13, KC	N 110/HS
Catalog page	4,7,12	6	6	8	10	11	14	16	22	23	23	18	24	24	26	27	27	29	28	30	32	33	34	35	36	38	39
Controller																											
B 170	✓			✓	✓	✓			✓				✓	✓	✓	✓					✓						
P 320	●			●	●	●			●				●	●	●	●					●						
R 6		✓																									
C 6										✓																✓	
2416											✓																
B 150			✓				✓	✓									✓			✓							
C 250			●				●	●									●			●							
C 295												✓						✓	✓			✓	✓			✓	
B 130																											
C 280																		✓	✓								
HiProSystems								●	●			●						●	●				●	●	✓		

### Functionality of the standard controllers

	B 170	P 320	R 6	B 150	C 250	C 295	B 130	C 280
Number of programs	1	9	1	1	9	9	2	9
Steps per program <sup>1</sup>	2	16	1	2	12	16	3	3
Extra functions (e.g. fan or autom. flaps)		2			2	2		2
Clear, blue-white LCD display	✓	✓		✓	✓	✓	✓	✓
Status messages in clear text	✓	✓		✓	✓	✓	✓	✓
Start time configurable (e.g. to use night power rates)	✓	✓		✓	✓	✓	✓	✓
Power usage measurement	✓	✓		✓	✓	✓	✓	✓
Operating hour counter	✓	✓		✓	✓	✓	✓	✓
Auto tune	✓	✓		✓	✓	✓	✓	✓
Program entry in steps of 1 ° or 1 min.	✓	✓		✓	✓	✓	✓	✓
Keypad lock				✓	✓		✓	✓
Interface for MV software	●	✓		●	●	●	●	●
Programmable power outlet		✓*						

<sup>1</sup>2 steps equal to one ramp-soak pair

\*not for model L(T)15..

✓ Standard  
● Option

### Mains voltages for Nabertherm furnaces

Single-phase: all furnaces are available for mains voltages from 110 V - 240 V at 50 or 60 Hz.

Three-phase: all furnaces are available for mains voltages from 200 V - 240 V or 380 V - 480 V, at 50 or 60 Hz.



## Alternatives for high-performance control and documentation

### HiProSystems Control and documentation

This professional control system for single and multi-zone furnaces is based on Siemens hardware and can be upgraded extensively. HiProSystems control is used in the following situations:

When more than two process-dependent functions, such as exhaust dampers, cooling fans, automatic movements, etc., have to be handled during a cycle; when furnaces with more than one zone have to be controlled; when special documentation of each batch is required and; when remote telediagnostic service is necessary. The system is also perfectly suited for controlling multiple furnaces or furnace groups. It is flexible and is easily tailored to your process or documentation needs.

#### Alternative user interfaces

##### Touch panel H 700

This basic panel accommodates most basic needs and is very easy to use.

##### Touch panel H 1700

Firing cycle data and the extra functions activated are clearly displayed in a table. Messages appear as text.

##### Touch panel H 3700

All functions and process data are stored and displayed in easy to read charts. The data can be exported through various interfaces (RS 232, RS 422/485, USB, Ethernet TCI/IP, MPI, Profibus) to a local PC or your company network for further processing. A CF card also gives the opportunity for data storage and transfer to a PC with a card reader.

### Nabertherm Control Center NCC (PC-based)

Upgrading the HiProSystems-Control into an NCC provides for additional interfaces, operating documentation, and service benefits in particular for controlling furnace groups including charge beyond the furnace itself (quenching tank, cooling station etc.):

- Charge data can be read in via barcodes
- Interface for connection to existing Enterprise Database systems (e.g. SAP, Oracle)
- Internet connection for remote operation and monitoring
- Connection to mobile phone network for alarm message transmission via SMS
- Control from various locations over the network
- Documentation according to ISO 9000, etc.
- Maximum operator convenience: full keyboard, large screen
- Ideal for controlling furnace groups and documentation

### Controltherm MV Software for monitoring, documentation and control with standard controllers

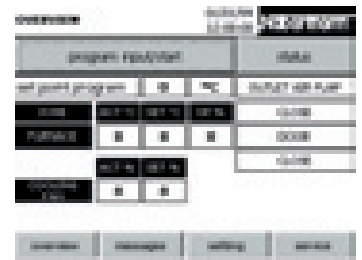
Documentation and reproducibility are more important with the quality standards certain industries demand. Here, the powerful Nabertherm software, Controltherm MV provides an optimum solution for the control and documentation of one or more furnaces (furnace data only).

#### Features

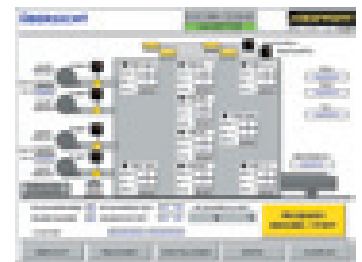
- Parallel control/monitoring and documentation of up to 16 furnaces
- Programming, archiving and printing of programs and graphics
- Documentation of furnace data according to ISO 9000 etc.
- Free input of descriptive charge data text
- Data exportable into Excel format for further evaluation
- Start/stop of the Controller from the local PC

#### Temperature recorder

Reliable documentation method with a dot printer or continuous pen and up to six measuring points, also available with various digital storage systems (e.g. disk, CF card).



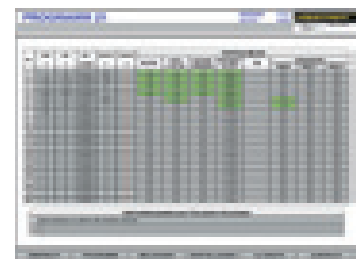
**H 1700** with monochrome presentation of data in table format



**H 3700** with colored graphic presentation of data



Control Center NCC user interface displayed on a PC



Program documentation with MV Software



Temperature recorder

## Furnaces for applications outside the laboratory

Besides the laboratory furnaces described in this catalog, the construction and fabrication of furnaces and furnace systems for industrial production is also part of the Nabertherm product spectrum. This makes Nabertherm your competent partner as your product moves from the laboratory into production.

Whatever your heat treatment requirements, we would be happy to produce a solution to meet your needs. We can satisfy the majority of customer requirements from our standard product line. Our engineers can also develop custom solutions for your application.



### Examples

Air circulation furnaces with loading systems, like loading carriages, are particularly well-suited for drying processes, curing and other heat treatments involving exact temperature distribution. From the standard furnace with 30 liters of volume to production furnaces with many thousands of liters, we can provide a solution.



Many heat treatment processes for glass, such as tempering, bending, arching, cooling, and melting require furnace systems with particularly good temperature control. We supply furnaces like the bending furnace shown which can satisfy these requirements.



Multifurnace systems with automatic conveyor technology for various applications. HiProSystems controls not only regulate the heat treatment process, but can also automatically control the movement of goods into furnaces or from furnaces to a cooling station. Complete process documentation including documentation of conveyor events can also be implemented.



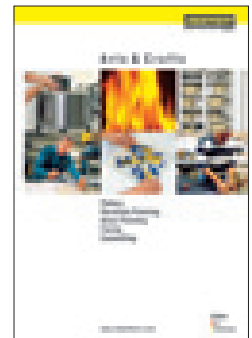
We provide our customers with bogie hearth furnaces or shuttle table furnaces for load weights of up to 100 tons. The furnaces are used at a variety of customer groups. Our customers include foundries, hardening shops, glass-processing operations, and even makers of porcelain and ceramics. Manufacturers of technical ceramics also use product furnaces from Nabertherm for their debinding and sintering processes.

## The Nabertherm Product Range

### Arts & Crafts

No matter if for pottery, glass fusing porcelain painting or enameling we have the right kiln for your needs.

[www.nabertherm.com/Products/Ceramics/Arts & Crafts](http://www.nabertherm.com/Products/Ceramics/Arts & Crafts)



### Glass

Different furnace concepts for bending, slumping, decorating, tempering and fusing characterize Nabertherm as your strong partner for heat treatment of glass.

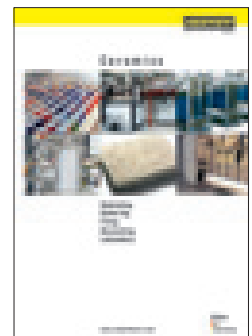
[www.nabertherm.com/Products/Glass](http://www.nabertherm.com/Products/Glass)



### Ceramics

Starting from a small laboratory furnace and up to fully automatic high-temperature furnace plants with afterburning systems of exhaust gases, our product range covers all needs.

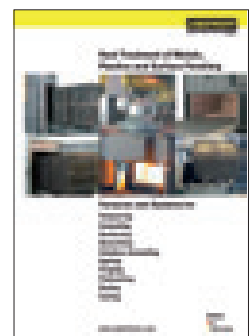
[www.nabertherm.com/Products/Ceramics/Ceramic Industry](http://www.nabertherm.com/Products/Ceramics/Ceramic Industry)



### Heat Treatment of Metals, Plastics and Surface Finishing

Tempering, annealing, hardening, quenching and tempering, solution annealing, forging, curing, preheating, drying, ageing – these are only some of the applications which are possible with our extensive program of furnaces and systems. From the compact hardening furnace to fully-automatic systems with conveying technology and process documentation – we certainly will find a solution tailored to your application.

[www.nabertherm.com/Products/Heat Treatment](http://www.nabertherm.com/Products/Heat Treatment)



### Foundry

Starting from electrically or gas heated melting furnaces up to fully automatic annealing plants we provide solutions for the foundry industry in the most professional manner.

[www.nabertherm.com/Products/Foundry](http://www.nabertherm.com/Products/Foundry)



## The whole world of Nabertherm: [www.nabertherm.com](http://www.nabertherm.com)

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**[www.nabertherm.com](http://www.nabertherm.com)** and find out all you want to know about us and our products.

In addition to our current calendar of trade fairs and training dates, there is also the opportunity to get in touch directly with your local sales office or nearest dealer worldwide.

### Professional solutions for:

- Arts & Crafts
- Glass
- Ceramics
- Laboratory/Dental
- Heat Treatment of Metals,  
Plastics and Surface Finishing
- Foundry



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