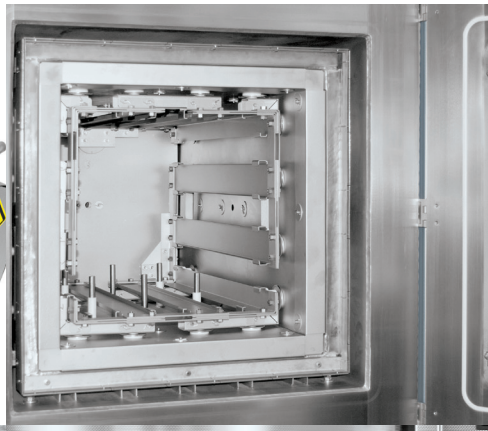
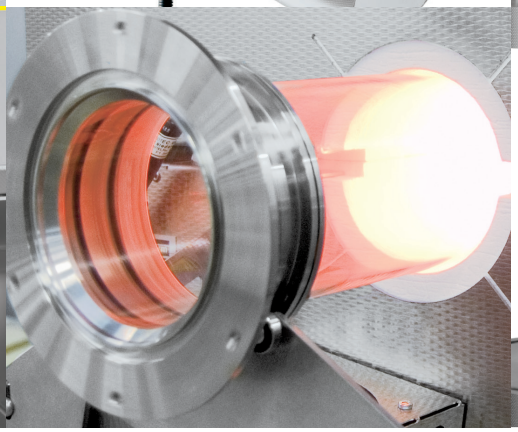
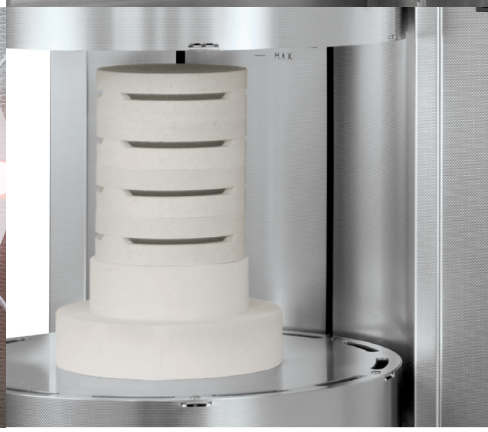
Nabertherm
MORE THAN HEAT 30-3000 °C

Laboratory

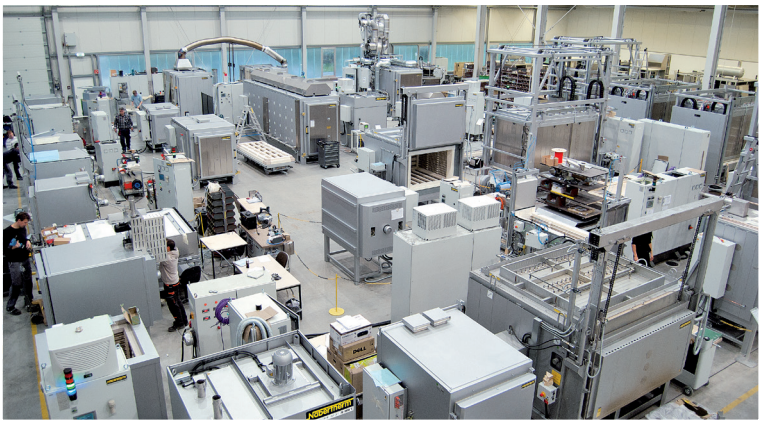




Muffle Furnaces
Preheating Furnaces
Ashing Furnaces
Tube Furnaces
Ovens
Forced Convection Furnaces
Chamber Furnaces
Melting Furnaces
High-Temperature Furnaces
Retort Furnaces
Vacuum Furnaces
Annealing Furnaces
Clean Room Furnaces

Made in Germany

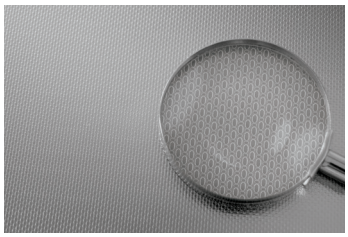


Made in Germany

Nabertherm with 500 employees worldwide have been developing and producing industrial furnaces for many different applications for 70 years. As a manufacturer, Nabertherm offers the widest and deepest range of furnaces worldwide. 150,000 satisfied customers in more than 100 countries offer proof of our commitment to excellent design, quality and cost efficiency. Short delivery times are ensured due to our complete inhouse production and our wide variety of standard furnaces.

Setting Standards in Quality and Reliability

Nabertherm does not only offer the widest range of standard furnaces. Professional engineering in combination with in house manufacturing provide for individual project planning and construction of tailor-made thermal process plants with material handling and charging systems. Complete thermal processes are realized by customized system solutions.



Front made of textured stainless steel for mostly all furnace models

Innovative Nabertherm control technology provides for precise control as well as full documentation and remote monitoring of your processes. Our engineers apply state-of-the-art technology to improve the temperature uniformity, energy efficiency, reliability and durability of our systems with the goal of enhancing your competitive edge.

Global Sales and Service Network – Close to you

Nabertherm´s strength is one of the biggest R&D departments in the furnace industry. In combination with central manufacturing in Germany and decentralized sales and service close to the customer we can provide for a competitive edge to live up to your needs. Long term sales partners in all important world markets ensure individual on-site customer service and consultation. There are certainly reference customers who are using similar furnaces or systems close to you.

Large Customer Test Center

What furnace is the right choice for this specific process? This question cannot always be answered easily. Therefore, we have set up our modern test center which is unique in respect to size and variety. A representative number of furnaces is available for tests for our customers.

Customer Service and Spare Parts

Our professional service engineers are available for you worldwide. Due to our complete inhouse production, we can despatch most spare parts from stock over night or produce with short delivery time.

Experience in Many Fields of Thermal Processing

In addition to furnaces for laboratory, Nabertherm offers a wide range of standard furnaces and plants for many other thermal processing applications. The modular design of our products provides for customized solutions to you individual needs without expensive modifications.

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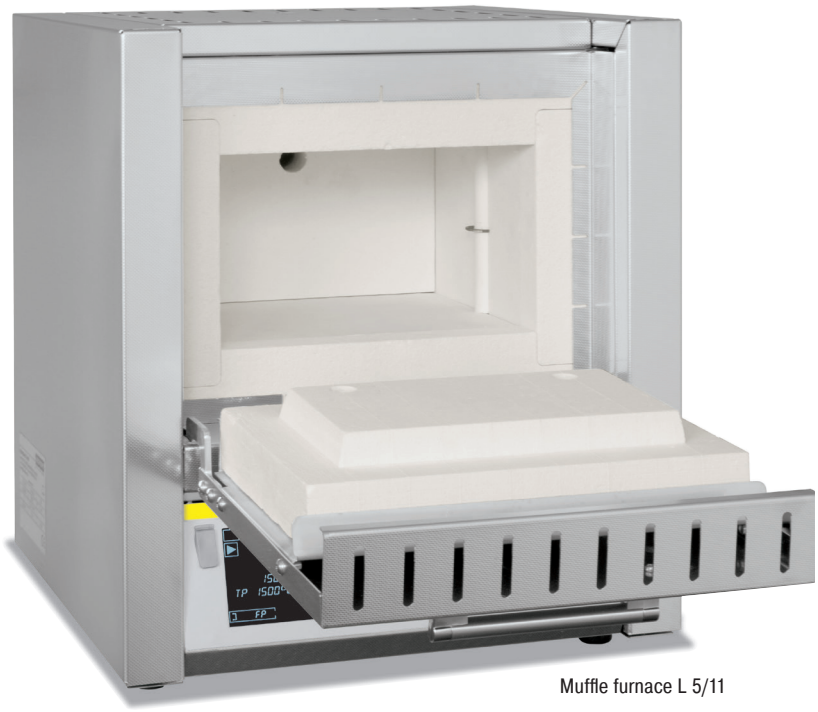
Muffle Furnaces with Flap Door or Lift Door

Muffle furnace L 3/12



Muffle furnace L 5/11

The muffle furnaces L 1/12 - LT 40/12 are 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 muffle furnaces come equipped with either a flap door or lift door at no extra charge.

Observation hole in the door as additional equipment

- Tmax 1100 °C or 1200 °C
- Heating from two sides by ceramic heating plates (heating from three sides for muffle furnaces L 24/11 - LT 40/12)
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Housing made of sheets of textured stainless steel
- Dual shell housing for low external temperatures and high stability
- Optional flap door (L) which can be used as work platform 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
- Solid state relays provide for low-noise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Over-temperature limiter

Additional equipment

- Chimney, chimney with fan or catalytic converter (not for L 1)
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Protective gas connection to purge with non-flammable protective or reaction gases (not available in combination with chimney, chimney with fan or catalytic converter)
- Observation hole in the door
- Manual or automatic gas supply system
- Please see page 14 for more accessories
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Muffle furnace LT 5/12

Muffle furnace L 3/11

Model Flap door	Tmax °C	Inner dimensions in mm w	 d	 h	Volume in l	Outer dimensions[3] in mm W	 D	 H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
L 3/11	1100	160	140	100	3	385	330	405	1.2	1-phase	20	60
L 5/11	1100	200	170	130	5	385	390	460	2.4	1-phase	30	60
L 9/11	1100	230	240	170	9	415	455	515	3.0	1-phase	35	75
L 15/11	1100	230	340	170	15	415	555	515	3.5	1-phase	40	95
L 24/11	1100	280	340	250	24	490	555	580	4.5	3-phase	55	95
L 40/11	1100	320	490	250	40	530	705	580	6.0	3-phase	65	95
L 1/12	1200	90	115	110	1	290	280	430	1.5	1-phase	10	25
L 3/12	1200	160	140	100	3	385	330	405	1.2	1-phase	20	75
L 5/12	1200	200	170	130	5	385	390	460	2.4	1-phase	30	75
L 9/12	1200	230	240	170	9	415	455	515	3.0	1-phase	35	90
L 15/12	1200	230	340	170	15	415	555	515	3.5	1-phase	40	110
L 24/12	1200	280	340	250	24	490	555	580	4.5	3-phase	55	110
L 40/12	1200	320	490	250	40	530	705	580	6.0	3-phase	65	110

Gas supply system for non-flammable protective or reactive gas with shutoff valve and flow meter with regulator valve, optionally with magnetic valve

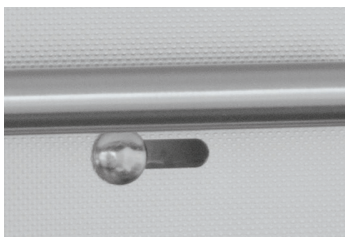
Model Lift door	Tmax °C	Inner dimensions in mm w	 d	 h	Volume in l	Outer dimensions[3] in mm W	 D	 H[1]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LT 3/11	1100	160	140	100	3	385	330	405+155	1.2	1-phase	20	60
LT 5/11	1100	200	170	130	5	385	390	460+205	2.4	1-phase	30	60
LT 9/11	1100	230	240	170	9	415	455	515+240	3.0	1-phase	35	75
LT 15/11	1100	230	340	170	15	415	555	515+240	3.5	1-phase	40	95
LT 24/11	1100	280	340	250	24	490	555	580+320	4.5	3-phase	55	95
LT 40/11	1100	320	490	250	40	530	705	580+320	6.0	3-phase	65	95
LT 3/12	1200	160	140	100	3	385	330	405+155	1.2	1-phase	20	75
LT 5/12	1200	200	170	130	5	385	390	460+205	2.4	1-phase	30	75
LT 9/12	1200	230	240	170	9	415	455	515+240	3.0	1-phase	35	90
LT 15/12	1200	230	340	170	15	415	555	515+240	3.5	1-phase	40	110
LT 24/12	1200	280	340	250	24	490	555	580+320	4.5	3-phase	55	110
LT 40/12	1200	320	490	250	40	530	705	580+320	6.0	3-phase	65	110

[1]Including opened lift door

*Please see page 43 for more information about supply voltage

[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE

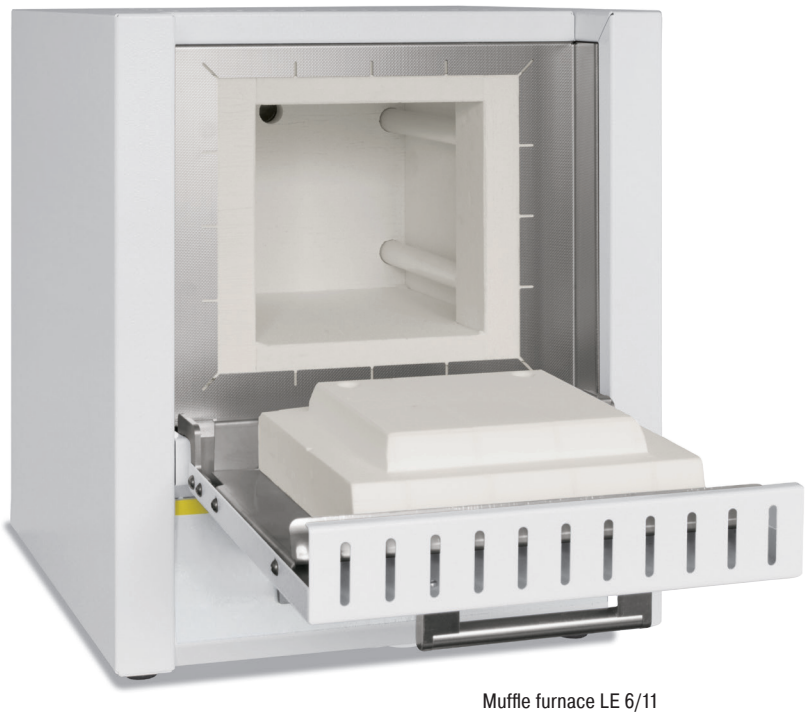
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.



Adjustable air inlet integrated in the door

Muffle Furnaces Basic Models

Muffle furnace LE 1/11



Muffle furnace 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 dual shell furnace housing 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
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Housing made of sheets of textured stainless steel
- Dual shell housing for low external temperatures and high stability
- Flap door which can also be used as a work platform
- Exhaust air outlet in rear wall
- Solid state relays provide for low-noise operation
- Compact dimensions and light weight
- Controller mounted under the door to save space
- Defined application within the constraints of the operating instructions
- Controls description see page 42

Over-temperature limiter

Additional equipment

- Chimney, chimney with fan or catalytic converter (not for L 1)
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual gas supply system
- Observation hole in the door
- Please see page 14 for more accessories

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[2] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[1]
LE 1/11	1100	90	115	110	1	290	280	430	1.5	1-phase	10	10
LE 2/11	1100	110	180	110	2	330	385	430	1.8	1-phase	10	25
LE 6/11	1100	170	200	170	6	390	435	490	1.8	1-phase	18	35
LE 14/11	1100	220	300	220	14	440	535	540	2.9	1-phase	25	40

[1]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE

*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Muffle Furnaces with Brick Insulation and Flap Door or Lift Door

Muffle furnace L 9/13

Muffle furnace LT 5/13

Heating elements on support tubes radiating freely into the furnace chamber provide for particularly short heating times for these muffle furnaces. Thanks to their robust lightweight refractory brick insulation, they can reach a maximum working temperature of 1300 °C. These muffle furnaces 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.

Furnace lining with high-quality lightweight refractory brick insulation

- Tmax 1300 °C
- Heating from two sides
- Heating elements on support tubes ensure free heat radiation and a long service life
- Multi-layer insulation with robust lightweight refractory bricks in the furnace chamber
- Housing made of sheets of textured stainless steel
- Dual shell housing for low external temperatures and stability
- Optional flap door (L) which can be used as work platform 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
- Solid state relays provide for low-noise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

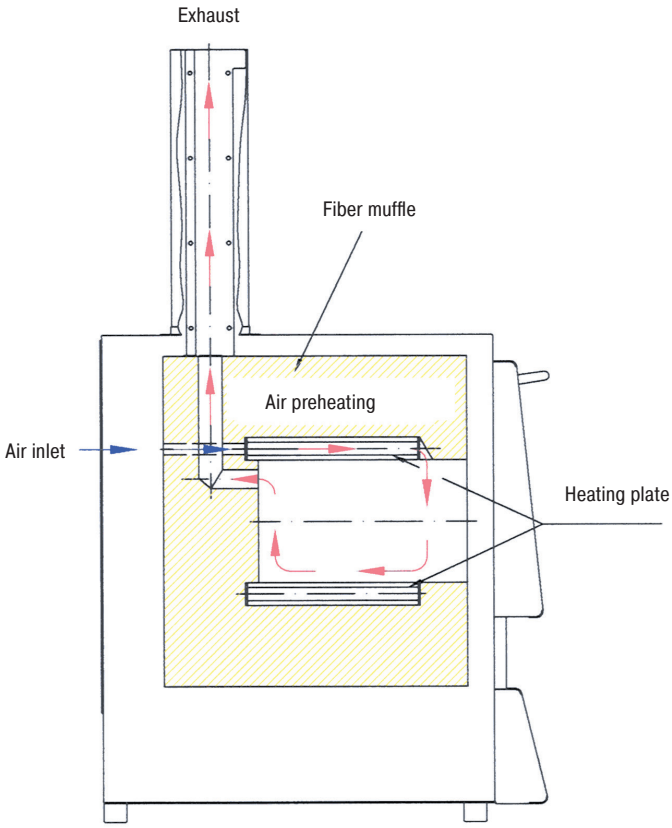
- Chimney, chimney with fan or catalytic converter
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automatic gas supply system
- Observation hole in the door
- Please see page 14 for more accessories
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Over-temperature limiter

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H[1]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
L, LT 5/13	1300	200	170	130	5	490	450	580+320	2.4	1-phase	42	45
L, LT 9/13	1300	230	240	170	9	530	525	630+350	3.0	1-phase	60	50
L, LT 15/13	1300	260	340	170	15	530	625	630+350	3.5	1-phase	70	60

[1]Including opened lift door (LT models)
*Please see page 43 for more information about supply voltage
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Ashing Furnaces with Flap Door or Lift Door



Air inlet and exhaust flow principle in ashing furnaces

Ashing furnace LV 3/11

Observation hole in the door as additional equipment

The ashing furnaces 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
- Heating from two sides
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Air exchange of more than 6 times per minute
- Good temperature uniformity due to preheating of incoming air
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Housing made of sheets of textured stainless steel
- Dual shell housing for low external temperatures and stability
- Optional flap door (LV) which can be used as work platform or lift door (LVT) with hot surface facing away from the operator
- Solid state relays provide for lownoise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Ashing furnace LVT 9/11

Ashing furnace LVT 5/11

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Observation hole in the door
- Please see page 14 for more accessories
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Over-temperature limiter

Model Flap door	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H[1]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LV 3/11	1100	160	140	100	3	385	360	735	1.2	1-phase	20	120
LV 5/11	1100	200	170	130	5	385	420	790	2.4	1-phase	35	120
LV 9/11	1100	230	240	170	9	415	485	845	3.0	1-phase	45	120
LV 15/11	1100	230	340	170	15	415	585	845	3.5	1-phase	55	120

Model Lift door	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H[1]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LVT 3/11	1100	160	140	100	3	385	360	735	1.2	1-phase	20	120
LVT 5/11	1100	200	170	130	5	385	420	790	2.4	1-phase	35	120
LVT 9/11	1100	230	240	170	9	415	485	845	3.0	1-phase	45	120
LVT15/11	1100	230	340	170	15	415	585	845	3.5	1-phase	55	120

[1]Including exhaust tube (Ø 80 mm)

*Please see page 43 for more information about supply voltage

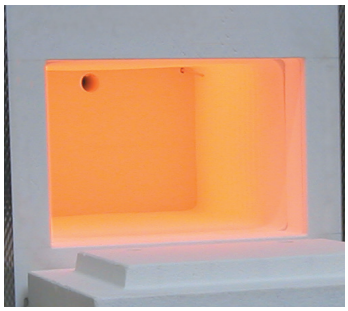
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE

[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Muffle Furnaces with Embedded Heating Elements in the Ceramic Muffle

L 9/11/SKM

Gas supply system for non-flammable protective or reactive gas with shutoff valve and flow meter with regulator valve, optionally with magnetic valve



Muffle heated from four sides

Over-temperature limiter

We particularly recommend the muffle furnace L 9/11/SKM if your application involves aggressive substances. The furnace has a ceramic muffle with embedded heating from four sides. The muffle furnace thus combines a very good temperature uniformity with excellent protection of the heating elements from aggressive atmospheres. Another aspect is the smooth, nearly particle free muffle (furnace door made of fiber 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
- Dual shell housing made of sheets of textured stainless steel
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Optional flap door (L) which can be used as work platform or lift door (LT) with hot surface facing away from the operator
- Adjustable working air inlet in the door
- Exhaust air outlet in rear wall of furnace
- Solid state relays provide for lownoise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Chimney, chimney with fan or catalytic converter
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automation gas supply system
- Observation hole in the door
- Please see page 14 for more accessories
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
L 9/11/SKM	1100	230	240	170	9	490	505	580	3.4	1-phase	50	90
LT 9/11/SKM	1100	230	240	170	9	490	505	580+320[1]	3.4	1-phase	50	90

[1]Including opened lift door

*Please see page 43 for more information about supply voltage

[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE

[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Weighing Furnace incl. Scale and Software for Determination of Combustion Loss

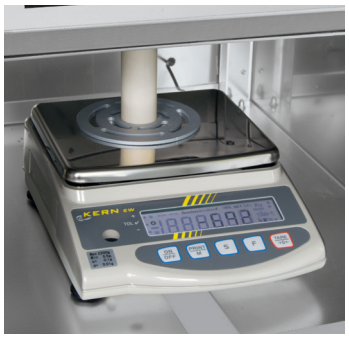
This weighing furnace with integrated precision scale and software, was designed especially for combustion loss determination in the laboratory. The determination of combustion loss is necessary, for instance, when analyzing sludges and household garbage, and is also used in a variety of technical processes 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.

Weighing furnace L 9/11/SW

- Tmax 1100 °C or 1200 °C
- Heating from two sides
- Ceramic heating plates with integral heating element which is safeguarded against fumes and splashing, and easy to replace
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Dual shell housing made of sheets of textured stainless steel
- Optional flap door (L) which can be used as work platform or lift door (LT) with hot surface facing away from the operator
- Adjustable working air inlet in the door
- Exhaust air outlet in rear wall of furnace
- Solid state relays provide for lownoise operation
- Delivery includes base, ceramic plunger with base plate in the furnace lining, precision scale and software package
- 4 scales available for different maximum weights and scaling ranges
- Process control and documentation for temperature and combustion loss via VCD software package for monitoring, documentation and control see page 45
- Defined application within the constraints of the operating instructions
- Controls description see page 42

Additional equipment

- Chimney, chimney with fan or catalytic converter
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Observation hole in the door
- Please see page 14 for more accessories



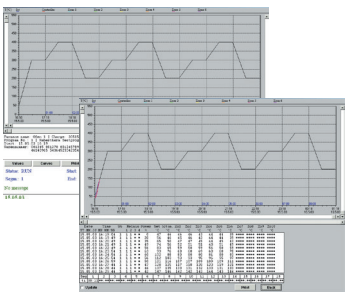
4 scales available for different maximum weights and scaling areas

Model flap door	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
L 9/11/SW	1100	230	240	170	9	415	455	740	3.0	1-phase	50	75
L 9/12/SW	1200	230	240	170	9	415	455	740	3.0	1-phase	50	90

Model Lift door	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H[1]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LT 9/11/SW	1100	230	240	170	9	415	455	740+240	3.0	1-phase	50	75
LT 9/12/SW	1200	230	240	170	9	415	455	740+240	3.0	1-phase	50	90

[1]Including opened lift door
*Please see page 43 for more information about supply voltage
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

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



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

Exhaust Systems/Accessories

Article No.:
631000140

Chimney for connection to an exhaust pipe.

Article No.:
631000812

Chimney with fan, to remove exhaust gas from the furnace better. The B400 - P480 controllers can be used to activate the fan automatically (not for models L(T) 15.., L 1/12, LE 1/11, LE 2/11).*

Article No.:
631000166

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 B400 - P480 controllers can be used to switch the catalytic converter automatically (not for models L(T) 15.., L 1/12, LE 1/11, LE 2/11).*

* Note: If other controller types are used an adapter cable for connection to mains supply has to be ordered separately. The device will be activated by plugging in the socket.

Exhaust torch to burn exhaust gases which are generated during the process. The torch is gas-fired and will be operated with propane gas. If a catalytic post combustion cannot be used for the process this torch is recommended.

Article No.:
699000279 (saggar)
699000985 (lid)

Square saggar for furnaces LHTC and LHT, Tmax 1600 °C

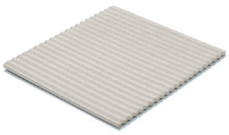
The load is placed in ceramic saggars for optimal utilization of the furnace space. Up to three saggars can be stacked on top of each other in the furnace. Each saggar has cut-outs for better ventilation. The top saggar should be closed with a lid made of ceramics also.

Article No.:
699001054
(sintering dish)
699001055
(spacer ring)

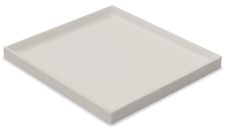
Round saggar (Ø 115 mm) for furnaces LHT/LB, Tmax 1650 °C

These saggars are perfectly suited for furnaces LHT/LB. The load is placed in the saggars. Up to three saggars can be stacked on top of each other in order to use the overall furnace chamber.

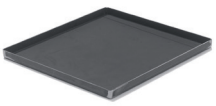
Select between different **bottom plates** and **collecting pans** for protection of the furnace and easy loading (for models L, LT, LE, LV and LVT on pages 4 - 13).



Ceramic ribbed plate, Tmax 1200 °C



Ceramic collecting pan, Tmax 1300 °C



Steel collecting pan, Tmax 1100 °C

For models	Ceramic ribbed plate		Ceramic collecting pan		Steel collecting pan (Material 1.4828)	
	Articel No.	Dimensions in mm	Articel No.	Dimensions in mm	Articel No.	Dimensions in mm
L 1, LE 1	691601835	110 x 90 x 12.7	-	-	691404623	85 x 100 x 20
LE 2	691601097	170 x 110 x 12.7	691601099	100 x 160 x 10	691402096	110 x 170 x 20
L 3, LT 3, LV 3, LVT 3	691600507	150 x 140 x 12.7	691600510	150 x 140 x 20	691400145	150 x 140 x 20
LE 6, L 5, LT 5, LV 5, LVT 5	691600508	190 x 170 x 12.7	691600511	190 x 170 x 20	691400146	190 x 170 x 20
L 9, LT 9, LV 9, LVT 9, N 7	691600509	240 x 220 x 12.7	691600512	240 x 220 x 20	691400147	240 x 220 x 20
LE 14	691601098	210 x 290 x 12.7	-	-	691402097	210 x 290 x 20
L 15, LT 15, LV 15, LVT 15, N 11	691600506	340 x 220 x 12.7	-	-	691400149	230 x 330 x 20
L 24, LT 24	691600874	340 x 270 x 12.7	-	-	691400626	270 x 340 x 20
L 40, LT 40	691600875	490 x 310 x 12.7	-	-	691400627	310 x 490 x 20

Heat-resistant **gloves** for protection of the operator when loading or removing hot materials, resistant to 650 °C or 700 °C.

Article No.:
493000004

Gloves, Tmax 650 °C

Article No.:
491041101

Gloves, Tmax 700 °C

Article No.:
493000002 (300 mm)
493000003 (500 mm)

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

Assay Furnaces

Assay furnace N 8/13 CUP with optional base frame on castors

Assay furnace N 25/13 CUP

These furnaces are especially used for the assay of precious metals and ashing processes 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. The assay furnace is equipped with an integrated exhaust hood above the furnace door for connection to and exhaust sytem.

Laboratory assay furnace N 4/13 CUP

- Muffle heated from four sides (three sides for assay furnace N 25/13 CUP)
- Heating elements and insulation protected by muffle
- Simple replacement of muffle
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Warm furnace can be opened
- Tool holder on furnace
- Stainless steel exhaust chimney above the door opening for connection of an exhaust system
- Dual shell housing with fan cooling to reduce exterior temperatures
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Base frame on castors (not for assay furnace N 4/13 CUP)
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Pit-type furnace S 73/HS with rolling lid

Pit-type furnace with rolling lid

- For bigger charges we offer pit-type furnaces as assay furnaces

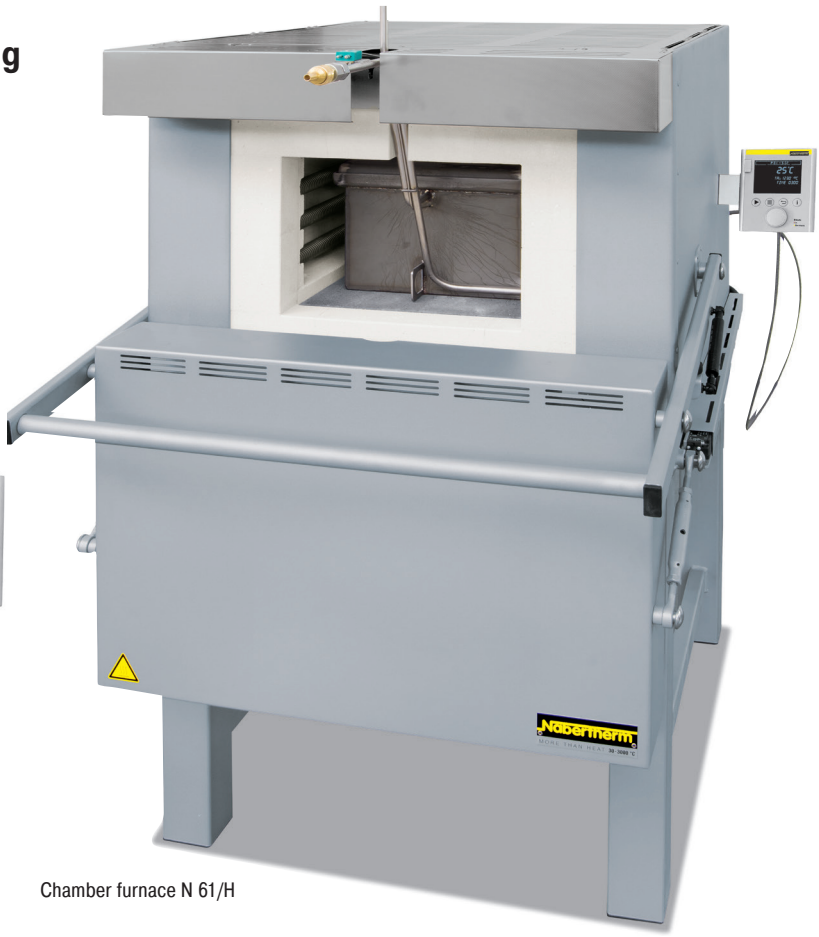
Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
N 4/13 CUP	1280	185	250	80	3.7	750	675	520[1]	3	1-phase	65
N 8/13 CUP	1300	260	340	95	8.0	900	1335	2100	22	3-phase	510
N 25/13 CUP	1300	250	500	250	25.0	1050	1200	1520[2]	15	3-phase	280

[1]Plus 150 mm for exhaust hood
[2]Plus 200 mm for exhaust hood
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

*Please see page 43 for more information about supply voltage

Chamber Furnaces for Annealing, Hardening and Brazing

Chamber furnace N 7/H as table-top model



Chamber furnace N 61/H

To withstand harsh use in the laboratory, e.g. when heat-treating metals, robust insulation with light refractory bricks is necessary. The chamber furnaces N 7/H - N 87/H 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 quench tank. 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 protective gas boxes for a protective gas atmosphere using a charging cart

- Tmax 1280 °C
- Deep furnace chamber with three-sides heating: from both side walls and bottom
- Heating elements on support tubes ensure free heat radiation and a long service life
- Bottom heating protected by heat-resistant SiC plate
- Low energy consumption due to multi-layer insulation
- Exhaust opening in the side of the furnace, or on back wall of chamber furnace N 31/H and higher
- Base frame included in the delivery, N 7/H - N 17/HR designed as table-top model
- Parallel guided downward swinging door (user protected from heat radiation)
- Gas spring dampers provide for easy door opening and closing
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
N 7/H	1280	250	250	140	9	800	650	600	3.0	1-phase	60	180
N 11/H	1280	250	350	140	11	800	750	600	3.5	1-phase	70	180
N 11/HR	1280	250	350	140	11	800	750	600	5.5	3-phase[1]	70	120
N 17/HR	1280	250	500	140	17	800	900	600	6.4	3-phase[1]	90	120
N 31/H	1280	350	350	250	31	1040	1100	1340	15.0	3-phase	210	105
N 41/H	1280	350	500	250	41	1040	1250	1340	15.0	3-phase	260	120
N 61/H	1280	350	750	250	61	1040	1500	1340	20.0	3-phase	400	120
N 87/H	1280	350	1000	250	87	1040	1750	1340	25.0	3-phase	480	120

[1]Heating only between two phases

*Please see page 43 for more information about supply voltage

[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE

[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Accessories for Annealing Hardening and Brazing

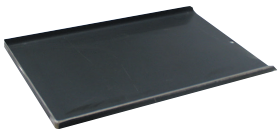
Our wide selection of chamber furnaces for annealing, hardening and brazing can be extended with a variety of accessories to suit your application. The accessories shown below represent only a small fraction of the products available. For further details, please see our separate catalogues for heat-treatment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

Annealing Boxes

- 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 87/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 87/H, edged on three sides

Hardening Tongs

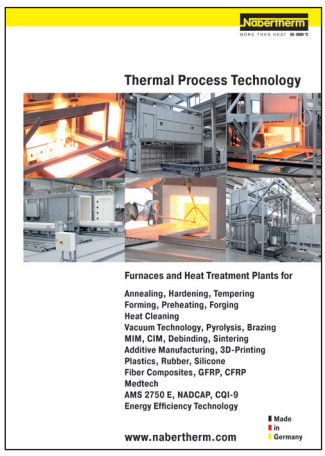
- Hardening tongs in various sizes and forms for use in annealing and hardening

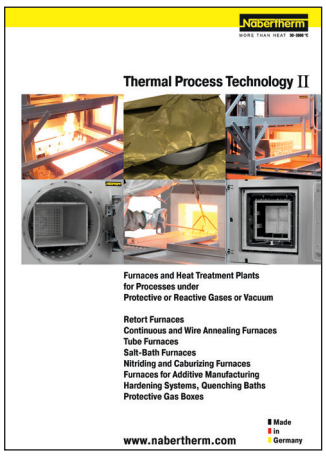
Heat Treating Foil

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

Gloves

- Heat-resistant gloves to 650 °C or 700 °C for protection of operator during loading see page 14



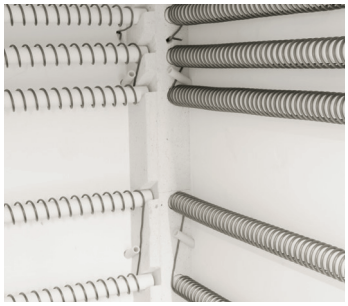


Please ask for our separate catalogues for hardening furnaces and hardening accessories!

Chamber Furnaces with Brick Insulation or Fiber Insulation

Chamber furnace LH 30/14

Chamber furnace LH 216/12SW with scale to measure weight reduction during annealing



LF furnace design provides for shorter heating and cooling times

The chamber furnaces LH 15/12 - LF 120/14 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 fiber material (LF models). With a wide variety of optional equipment, these chamber furnaces can be optimally adapted to your processes.

- Tmax 1200 °C, 1300 °C, or 1400 °C
- Dual shell housing with rear ventilation, provides for low shell temperatures
- High furnace chamber with five-sided heating for very good temperature uniformity
- Heating elements on support tubes ensure free heat radiation and a long service life
- Controller mounted on furnace door and removable for comfortable operation
- Protection of bottom heating and flat stacking surface provided by embedded SiC plate in the floor
- LH models: multi-layered insulation of light refractory bricks and special backup insulation
- LF models: high-quality fiber insulation with corner bricks for shorter heating and cooling times. Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2.
- Door with brick-on-brick seal, hand fitted
- Short heating times due to high installed power
- Self-supporting arch for high stability and greatest possible protection against dust
- Quick lock on door
- Motor driven exhaust air flap
- Freely adjustable air inlet integrated in furnace floor
- Base included
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Gas supply system for non-flammable protective or reactive gas with shutoff valve and flow meter with regulator valve, optionally with magnetic valve

Chamber furnace LF 60/14 with fresh air fan to accelerate the cooling times

Chamber furnace LH 30/12 with manual lift door

Additional equipment

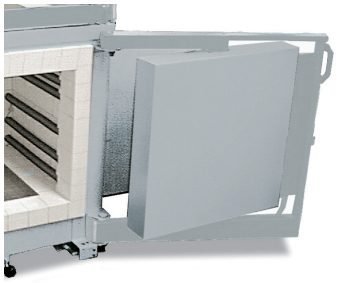
- Parallel swinging door, pivots away from operator, for opening when hot
- Lift door with electro-mechanic linear drive
- Separate wall-mounting or floor standing cabinet for switchgear
- Cooling fan for shorter cycle times
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automatic gas supply system
- Scale to measure weight reduction during annealing
- Process control and documentation via VCD software package or Nabertherm Control Center (NCC) for monitoring, documentation and control see page 45

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[2] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
LH 15/12	1200	250	250	250	15	680	860	1230	5.0	3-phase[1]	170
LH 30/12	1200	320	320	320	30	710	930	1290	7.0	3-phase[1]	200
LH 60/12	1200	400	400	400	60	790	1080	1370	8.0	3-phase	300
LH 120/12	1200	500	500	500	120	890	1180	1470	12.0	3-phase	410
LH 216/12	1200	600	600	600	216	990	1280	1590	20.0	3-phase	450
LH 15/13	1300	250	250	250	15	680	860	1230	7.0	3-phase[1]	170
LH 30/13	1300	320	320	320	30	710	930	1290	8.0	3-phase[1]	200
LH 60/13	1300	400	400	400	60	790	1080	1370	11.0	3-phase	300
LH 120/13	1300	500	500	500	120	890	1180	1470	15.0	3-phase	410
LH 216/13	1300	600	600	600	216	990	1280	1590	22.0	3-phase	460
LH 15/14	1400	250	250	250	15	680	860	1230	8.0	3-phase[1]	170
LH 30/14	1400	320	320	320	30	710	930	1290	10.0	3-phase[1]	200
LH 60/14	1400	400	400	400	60	790	1080	1370	12.0	3-phase	300
LH 120/14	1400	500	500	500	120	890	1180	1470	18.0	3-phase	410
LH 216/14	1400	600	600	600	216	990	1280	1590	26.0	3-phase	470
LF 15/13	1300	250	250	250	15	680	860	1230	7.0	3-phase[1]	150
LF 30/13	1300	320	320	320	30	710	930	1290	8.0	3-phase[1]	180
LF 60/13	1300	400	400	400	60	790	1080	1370	11.0	3-phase	270
LF 120/13	1300	500	500	500	120	890	1180	1470	15.0	3-phase	370
LF 15/14	1400	250	250	250	15	680	860	1230	8.0	3-phase[1]	150
LF 30/14	1400	320	320	320	30	710	930	1290	10.0	3-phase[1]	180
LF 60/14	1400	400	400	400	60	790	1080	1370	12.0	3-phase	270
LF 120/14	1400	500	500	500	120	890	1180	1470	18.0	3-phase	370

[1]Heating only between two phases

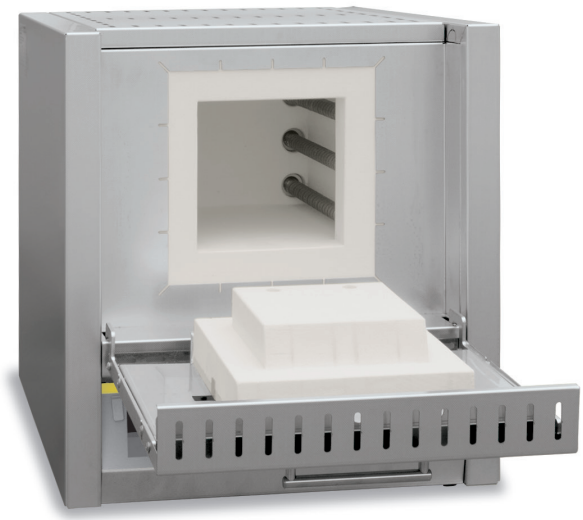
*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.



Parallel swinging door for opening when hot

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



High-temperature furnace LHTC 08/16

High-temperature furnace LHTCT 01/16

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

These powerful laboratory muffle furnaces are available for temperatures up to 1400 °C, 1500 °C, 1550 °C or 1600 °C. The durability of the SiC rods in periodic use, in combination with their high heating speed, make these high-temperature furnaces to all-rounders in the laboratory. Heating times of 40 minutes to 1400 °C can be achieved, depending on the furnace model and the conditions of use.

- Tmax 1400 °C, 1500 °C, 1550 °C or 1600 °C
- Working temperature 1500 °C (for high-temperature furnaces LHTC ../16), increased wear and tear must be expected in case of working at higher temperatures
- Dual shell housing made of textured stainless steel sheets with additional fan cooling for low surface temperature
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Optional flap door (LHTC) which can be used as work platform or lift door (LHTCT) with hot surface facing away from the operator (High-temperature furnace LHTCT 01/16 only with lift door)
- Switching system with solid-state-relays, power tuned to the SiC rods
- Easy replacement of heating rods
- Adjustable air inlet opening, exhaust air opening in the roof
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Saggars with top lid

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Square saggar for charging of up to three layers see page 14
- Lid for top saggar
- Manual or automatic gas supply system
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Over-temperature limiter

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[4] in mm W	D	H[2]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[3]
LHTC(T) 03/14	1400	120	210	120	3.0	415	545	490	9.0	3-phase[1]	30	40
LHTC(T) 08/14	1400	170	290	170	8.0	490	625	540	13.0	3-phase	40	40
LHTC(T) 03/15	1500	120	210	120	3.0	415	545	490	9.0	3-phase[1]	30	50
LHTC(T) 08/15	1500	170	290	170	8.0	490	625	540	13.0	3-phase	40	50
LHTCT 01/16	1550	110	120	120	1.5	340	300	460	3.5	1-phase	18	40
LHTC(T) 03/16	1600	120	210	120	3.0	415	545	490	9.0	3-phase[1]	30	60
LHTC(T) 08/16	1600	170	290	170	8.0	490	625	540	13.0	3-phase	40	60

[1]Heating only between two phases
*Please see page 43 for more information about supply voltage
[2]Plus maximum 240 mm for models LHTCT when open
[3]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

High-Temperature Furnaces with $MoSi_2$ Heating Elements up to 1800 °C

High-temperature furnace
LHT 01/17 D

High-temperature furnace LHT 03/17 D

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

- Tmax 1600 °C, 1750 °C, or 1800 °C
- High-quality molybdenum disilicide heating elements
- Dual shell housing made of textured stainless steel sheets with additional fan cooling for low surface temperature
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Compact design with lift door, opening upwards
- Adjustable air inlet
- Exhaust air opening in the roof
- Type B thermocouple
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Square saggar for charging of up to three layers see page 14
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automatic gas supply system
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Saggars with top lid

Over-temperature limiter

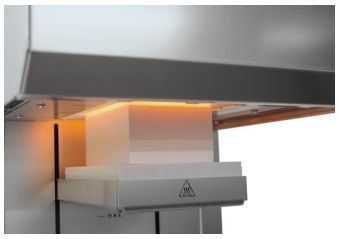
Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[4] in mm W	D	H[3]	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LHT 02/16	1600	90	150	150	2	470	630	760+260	3.0	1-phase	75	30
LHT 04/16	1600	150	150	150	4	470	630	760+260	5.2	3-phase[1]	85	25
LHT 08/16	1600	150	300	150	8	470	810	760+260	8.0	3-phase[1]	100	25
LHT 01/17 D	1650	110	120	120	1	385	425	525+195	2.2	1-phase	28	10
LHT 03/17 D	1650	135	155	200	4	470	630	760+260	3.0	1-phase	75	60
LHT 02/17	1750	90	150	150	2	470	630	760+260	3.0	1-phase	75	60
LHT 04/17	1750	150	150	150	4	470	630	760+260	5.2	3-phase[1]	85	40
LHT 08/17	1750	150	300	150	8	470	810	760+260	8.0	3-phase[1]	100	40
LHT 02/18	1800	90	150	150	2	470	630	760+260	3.6	1-phase	75	75
LHT 04/18	1800	150	150	150	4	470	630	760+260	5.2	3-phase[1]	85	60
LHT 08/18	1800	150	300	150	8	470	810	760+260	9.0	3-phase[1]	100	60

[1]Heating only between two phases
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[3]Including opened lift door
[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.
*Please see page 43 for more information about supply voltage

High-Temperature Bottom Loading Furnaces up to 1700 °C

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

LHT 16/17 LB



Electrically driven lift-bottom

The motor-driven lifting table significantly simplifies the charging of the high-temperature furnaces LHT/LB. The heating all around the cylindrical furnace chamber provides for an opitimal temperature uniformity. For the tabletop models LHT 01/17 LB and LHT 02/17 LB the charge can be placed in charge saggars made of technical ceramics. Up to three charge saggars can be stacked on top of each other resulting in a high productivity. Due to its volume the high-temperature furnace LHT 16/17 LB can also be used for applications in production.

- Tmax 1650 °C, 1700 °C (LHT 16/17 LB)
- High-quality heating elements made of molybdenum disilicide offer best possible protection against chemical interaction between charge and heating elements
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Outstanding temperature uniformity due to all-round furnace chamber heating
- Furnace chamber with a volume of 1, 2 or 16 liters, table with large floor space
- Precise, motorized toothed belt drive of the table with button operation
- Appealing, dual shell stainless steel housing
- Exhaust air vent in the roof
- Type S thermocouple
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Saggar

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Stackable saggars for loading in up to two or three levels, depending on model, see page 14
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automatic gas supply system
- Adjustable air inlet through the floor
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[1] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
LHT 01/17 LB	1650	145	180	100	1	350	590	680	2.2	1-phase	40
LHT 02/17 LB	1650	185	180	185	2	390	590	765	3.4	1-phase	50
LHT 16/17 LB	1700	Ø 260		260	16	650	1250	1980	12.0	3-phase	410

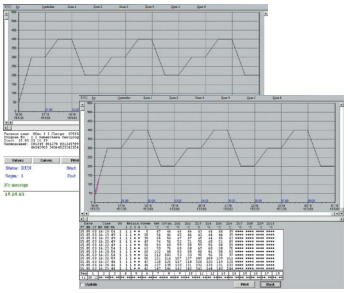
[1]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.
*Please see page 43 for more information about supply voltage

High-Temperature Furnaces with Scale for Determination of Combustion Loss and Thermogravimetric Analysis (TGA)

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

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

- Defined application within the constraints of the operating instructions
- Technical description of the furnaces: see models LHT 04/16 and LHT 04/17 see page 21
- Description of the weighing system: see models L 9/... SW see page 11
- Process control and documentation for temperature and combustion loss via VCD software package for monitoring, documentation and control see page 45



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

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg	Minutes to Tmax[2]
LHT 04/16 SW	1600	150	150	150	4	655	370	890	5.0	3-phase[1]	85	25
LHT 04/17 SW	1750	150	150	150	4	655	370	890	5.0	3-phase[1]	85	40

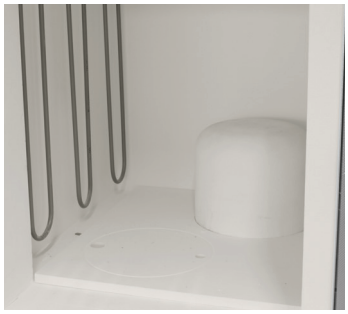
[1]Heating only between two phases
*Please see page 43 for more information about supply voltage
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

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

High-temperature furnace HT 16/18 with gas supply system

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

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



Inner process top hat with gas injection through the furnace bottom protects the furnace chamber against contamination and/or prevents chemical interaction between the charge and heating elements

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. Oustanding 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
- Recommended working temperature 1750 °C (for models HT ../18), increased wear and tear must be expected in case of working at higher temperatures
- Dual shell housing with fan cooling for low shell temperatures
- Heating from both sides via molybdenum disilicide heating elements
- High-quality fiber insulation backed by special insulation
- Side insulation constructed with tongue and groove blocks provides for low heat loss to the outside
- Long-life roof insulation with special suspension
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Chain-guided parallel swivel door for defined opening and closing of the door
- Two-door design (front/back) for high-temperature furnaces > HT 276/..
- Labyrinth sealing ensures the least possible temperature loss in the door area
- Reinforced floor as protection for bottom insulation as standard from models HT 16/16 upwards
- Vapor vent in the furnace roof
- Heating elements switched via thyristors
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Uncontrolled or controlled cooling system with frequency-controlled cooling fan and motor-driven exhaust air flap
- Furnace in DB design featuring fresh air preheating, exhaust gas ventilation and an extensive safety package for debinding and sintering in one process, i. e. without transfering the material from the debinding furnace to the sintering furnace
- Stainless steel exhaust gas top hats
- Special heating elements for zirconia sintering provide for longer service life with respect to chemical interaction between charge and heating elements
- Protective gas connection to purge with non-flammable protective or reaction gases
- Manual or automatic gas supply system
- Inner process box to improve the gas tightness and to protect the furnace chamber against contamination
- Lift door
- Motorized exhaust air flap, switchable via the program
- Thermal or catalytic exhaust cleaning systems see page 40
- Process control and documentation via VCD software package or Nabertherm Control Center (NCC) for monitoring, documentation and control see page 45

High-temperature furnace HT 64/16S with pneumatically driven and parallel lift door

Model	Tmax	Inner dimensions in mm			Volume	Outer dimensions[2] in mm			Connected	Electrical	Weight
	°C	w	d	h	in l	W	D	H	load kW	connection*	in kg
HT 04/16	1600	150	150	150	4	730	490	1400	5.2	3-phase[1]	150
HT 08/16	1600	150	300	150	8	730	640	1400	8.0	3-phase[1]	200
HT 16/16	1600	200	300	260	16	810	700	1500	12.0	3-phase[1]	270
HT 29/16	1600	275	300	350	29	975	740	1620	8.0	3-phase[1]	310
HT 40/16	1600	300	350	350	40	1000	800	1620	12.0	3-phase	380
HT 64/16	1600	400	400	400	64	1130	900	1670	18.0	3-phase	550
HT 128/16	1600	400	800	400	128	1130	1290	1670	26.0	3-phase	750
HT 160/16	1600	500	550	550	160	1250	1050	1900	21.0	3-phase	800
HT 276/16	1600	500	1000	550	276	1300	1600	1900	36.0	3-phase	1100
HT 450/16	1600	500	1150	780	450	1350	1740	2120	64.0	3-phase	1500
HT 04/17	1750	150	150	150	4	730	490	1400	5.2	3-phase[1]	150
HT 08/17	1750	150	300	150	8	730	640	1400	8.0	3-phase[1]	200
HT 16/17	1750	200	300	260	16	810	700	1500	12.0	3-phase[1]	270
HT 29/17	1750	275	300	350	29	975	740	1620	8.0	3-phase[1]	310
HT 40/17	1750	300	350	350	40	1000	800	1620	12.0	3-phase	380
HT 64/17	1750	400	400	400	64	1130	900	1670	18.0	3-phase	550
HT 128/17	1750	400	800	400	128	1130	1290	1670	26.0	3-phase	750
HT 160/17	1750	500	550	550	160	1250	1050	1900	21.0	3-phase	800
HT 276/17	1750	500	1000	550	276	1300	1600	1900	36.0	3-phase	1100
HT 450/17	1750	500	1150	780	450	1350	1740	2120	64.0	3-phase	1500
HT 04/18	1800	150	150	150	4	730	490	1400	5.2	3-phase[1]	150
HT 08/18	1800	150	300	150	8	730	640	1400	8.0	3-phase[1]	200
HT 16/18	1800	200	300	260	16	810	700	1500	12.0	3-phase[1]	270
HT 29/18	1800	275	300	350	29	975	740	1620	8.0	3-phase[1]	310
HT 40/18	1800	300	350	350	40	1000	800	1620	12.0	3-phase	380
HT 64/18	1800	400	400	400	64	1130	900	1670	18.0	3-phase	550
HT 128/18	1800	400	800	400	128	1130	1290	1670	26.0	3-phase	750
HT 160/18	1800	500	550	550	160	1250	1050	1900	21.0	3-phase	800
HT 276/18	1800	500	1000	550	276	1300	1600	1900	42.0	3-phase	1100
HT 450/18	1800	500	1150	780	450	1350	1740	2120	64.0	3-phase	1500

[1]Heating only between two phases

*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

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

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

High-temperature furnace HTC 40/16

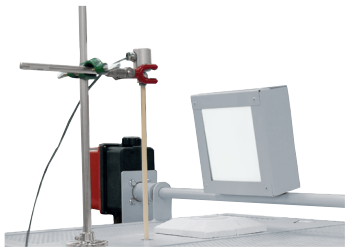
The high-temperature furnaces HTC 16/16 - HTC 450/16 are heated by vertically hung SiC rods, which makes them especially suitable for sintering processes up to a maximum operating temperature of 1550 °C. For some processes, e.g. for sintering zirconium oxide, the absence of interactivity between the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

- Tmax 1550 °C
- Dual shell housing with fan cooling for low shell temperatures
- Heating from both sides via vertically mounted SiC rods
- High-quality fiber insulation backed by special insulation
- Side insulation constructed with tongue and groove blocks provides for low heat loss to the outside
- Long-life roof insulation with special suspension
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Chain-guided parallel swivel door for defined opening and closing of the door without destroying the insulation

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

- Two-door design (front/back) for high-temperature furnaces > HTC 276/..
- Labyrinth sealing ensures the least possible temperature loss in the door area
- Reinforced floor as protection for bottom insulation
- Exhaust air opening in the furnace roof
- Heating elements switched via SCR‘s
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment like HT models see page 23



Exhaust air flap and charge thermocouple including a stand as additional equipment

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

[1]Heating only between two phases

*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

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

High-temperature furnace HFL 16/17 DB50

High-temperature furnace HFL 160/17

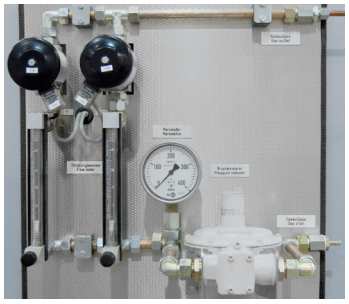
The high-temperature furnaces HFL 16/16 HFL 160/17 are characterized by their lining with robust light refractory bricks. This version is recommended for processes producing aggressive gases or acids, such as under glass melting.

Standard equipment like high-temperature furnaces HT, except:

- Tmax 1600 °C or 1700 °C
- Robust refractory brick insulation and special backing insulation
- Furnace floor made of lightweight refractory bricks accommodates high charge weights
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment like HT models see page 23

Protection grid in front of heating elements prevent against mechanical damages



Gas supply system for non-flammable protective or reaction gases

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

[1]Heating only between two phases

*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Ovens, also with Safety Technology According to EN 1539

Oven TR 60 with adjustable fan speed

Oven TR 240

Electrical rotating device as additional equipment

Extricable metal grids to load the oven in different layers

With their maximum working temperature of up to 300 °C and air circulation, the ovens achieve a perfect temperature uniformity which is much better than in ovens of most competitors. They can be used for various applications such as e.g. drying, sterilizing or warm storing. Ample warehousing of standard models provides for short delivery times.

- Tmax 300 °C
- Working temperature range: + 5 °C above room temperature up to 300 °C
- Ovens TR 30 - TR 240 designed as tabletop models
- Ovens TR 450 and TR 1050 designed as floor standing models
- Horizontal, air circulation results in temperature uniformity better than +/- 5 °C see page 41
- Stainless steel chamber, alloy 304 (AISI)/(DIN material no. 1.4301), rust-resistant and easy to clean
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Large handle to open and close the door
- Charging in multiple layers possible using removeable grids (number of removeable grids included, see table to the right)
- Large, wide-opening swing door, hinged on the right with quick release for models TR 30 - TR 450
- Double swing door with quick release for TR 1050
- TR 1050 equipped transport rollers
- Infinitely adjustable exhaust at the rear wall with operation from the front
- PID microprocessor control with self-diagnosis system
- Solid state relays provide for lownoise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Oven TR 450

Oven TR 1050 with double door

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the oven and load
- Infinitely adjustable fan speed of the air circulation fan
- Window for charge observing
- Further removeable grids with rails
- Side inlet
- Stainless steel collecting pan to protect the furnace chamber
- Door hinges on the left side
- Reinforced bottom plate
- Safety technology according to EN 1539 for charges containing liquid solvents (TR .. LS) up to model TR 240 LS, achievable temperature uniformity +/- 8 °C see page 41
- Transport castors for model TR 450
- Various modifications available for individual needs
- Upgrading available to meet the quality requirements of AMS 2750 E or FDA
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Oven TR 120 LS with safety technology according to EN 1539 for charges containing liquid solvents

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW[2]	Electrical connection*	Weight in kg	Minutes to Tmax[4]	Grids included	Grids max.	Max. total load[1]
TR 30	300	360	300	300	30	610	520	665	2.1	1-phase	45	25	1	4	80
TR 60	300	450	390	350	60	700	610	710	3.1	1-phase	90	25	1	4	120
TR 60 LS	260	450	360	350	57	700	680	710	5.2	3-phase	92	25	1	4	120
TR 120	300	650	390	500	120	900	610	860	3.1	1-phase	120	45	2	7	150
TR 120 LS	260	650	360	500	117	900	680	860	6.2	3-phase	122	45	2	7	150
TR 240	300	750	550	600	240	1000	780	970	3.1	1-phase	165	60	2	8	150
TR 240 LS	260	750	530	600	235	1000	850	970	6.2	3-phase	167	60	2	8	150
TR 450	300	750	550	1100	450	1000	780	1470	6.2	3-phase	235	60	3	15	180
TR 1050	300	1200	670	1400	1050	1470	940	1920	9.4	3-phase	450	80	4	14	250

[1]Max load per layer 30 kg

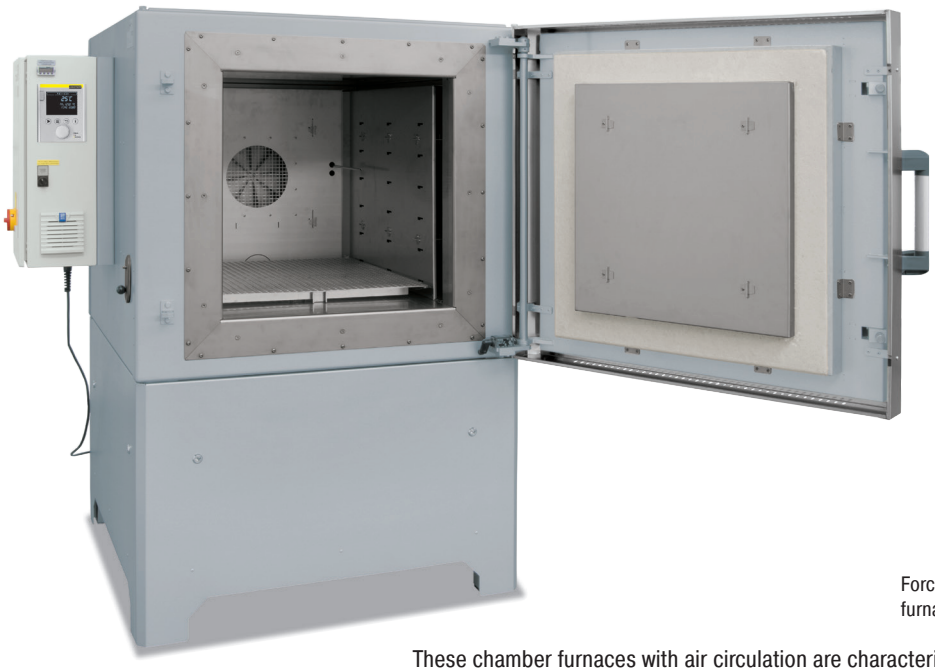
*Please see page 43 for more information about supply voltage

[2]If EN 1539 is ordered connected load will increase

[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request

[4]In the empty oven with closed flaps, connected to 230 V 1/N/PE resp. 400 V 3/N/PE

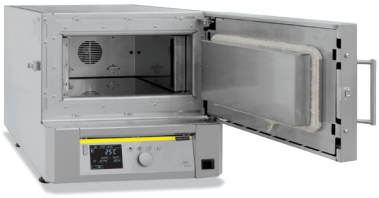
High-Temperature Ovens, Forced Convection Chamber Furnaces



Forced convection chamber furnace NA 250/45

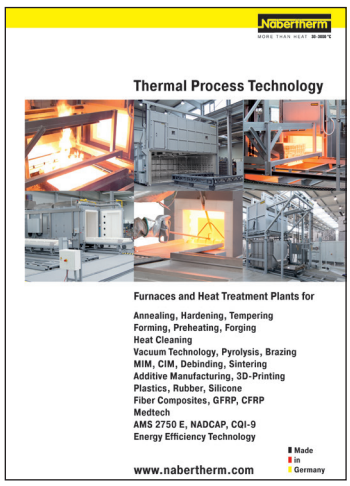
Forced convection chamber furnace NA 120/46 with lift door

These chamber furnaces with air circulation are characterized by their extremely high temperature uniformity. Hence, they are especially suitable for processes such as cooling, crystalizing, preheating, curing, but also for numerous processes in tool making. Due to the modular concept, the forced convection furnaces can be adjusted to the process requirements by adding suitable equipment.



Forced convection chamber furnace NA 15/65 as table-top model

- Tmax 450 °C, 650 °C, or 850 °C
- Horizontal air circulation
- Swing door hinged on the right
- Temperature uniformity up to +/- 4 °C according to DIN 17052-1 (model NA 15/65 up to +/- 5 °C) see page 41
- Optimum air flow and temperature uniformity through high circulation rates
- One frame sheet and rails for two additional trays included in the scope of delivery (NA 15/65 without frame sheet)
- Stainless steel air-baffles in the furnace for optimum air circulation
- Base frame included in the delivery, NA 15/65 designed as table-top model
- Air inlet and exhaust air flaps as additional equipment for using as drying oven
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42



For additional information about forced convection chamber furnaces please ask for our separate catalog!

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[3] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
NA 30/45	450	290	420	260	30	1040	1290	1385	3.6	1-phase	285
NA 60/45	450	350	500	350	60	1100	1370	1475	6.6	3-phase	350
NA 120/45	450	450	600	450	120	1250	1550	1550	9.8	3-phase	460
NA 250/45	450	600	750	600	250	1350	1650	1725	12.8	3-phase	590
NA 500/45	450	750	1000	750	500	1550	1900	1820	18.8	3-phase	750
NA 15/65[1]	650	295	340	170	15	470	790	460	3.3	1-phase	60
NA 30/65	650	290	420	260	30	870	1290	1385	7.0	3-phase[2]	285
NA 60/65	650	350	500	350	60	910	1390	1475	9.0	3-phase	350
NA 120/65	650	450	600	450	120	990	1470	1550	13.0	3-phase	460
NA 250/65	650	600	750	600	250	1170	1650	1680	21.0	3-phase	590
NA 500/65	650	750	1000	750	500	1290	1890	1825	28.0	3-phase	750
N 30/85 HA	850	290	420	260	30	607 + 255	1175	1315	6.0	3-phase[2]	195
N 60/85 HA	850	350	500	350	60	667 + 255	1250	1400	9.6	3-phase	240
N 120/85 HA	850	450	600	450	120	767 + 255	1350	1500	13.6	3-phase	310
N 250/85 HA	850	600	750	600	250	1002 + 255	1636	1860	21.0	3-phase	610
N 500/85 HA	850	750	1000	750	500	1152 + 255	1886	2010	31.0	3-phase	1030

[1]Table-top model

*Please see page 43 for more information about supply voltage

[2]Heating only between two phases

[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Clean Room Solutions

Clean room applications impose particularly high requirements to the design of the chosen furnace. If the complete furnace is operated in a clean room an essential contamination of the clean room atmosphere must be avoided. Especially, the particle contamination must be reduced to a minimum.

The specific application determines the choice of the required furnace technology. In many cases forced convection furnaces are required to achieve the necessary temperature uniformity at lower temperatures. For higher temperatures, Nabertherm has also delivered many furnaces with radiant heating.

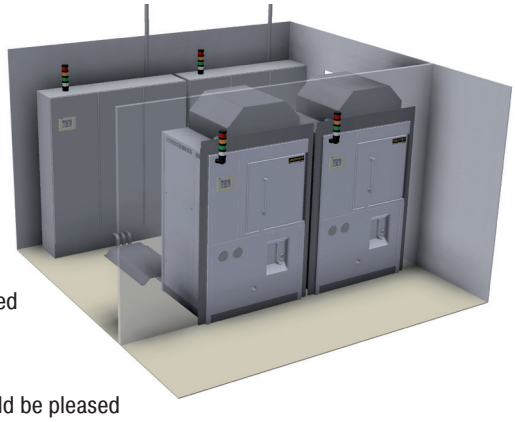
KTR 8000 designed as a production oven in the clean room with filters for air circulation

Furnace Installation in the Clean Room

If the complete furnace is supposed to be positioned in the clean room, then it is important that both the furnace chamber and the furnace housing as well as the controls provide for good protection against contamination. Surfaces must be easy to clean. The furnace chamber is tightly sealed to the insulation behind it. If necessary, additional equipment such as filters for the fresh air supply or the air circulation in the furnace can be used to improve the cleanliness class. It is recommended to install the switchgear and the furnace controls outside the clean room.

Furnace Installation in the Grey Room, Furnace Charging from the Clean Room

Optimal results with respect to cleanness will be achieved by placing the furnace in the grey room with charging from the clean room. This significantly reduces the amount of costly space needed in the clean room to a minimum. The front and the furnace interior in the clean room are designed for easy cleaning. With this configuration even the highest clean room classes can be achieved.



High-temperature furnace with loading from the clean room; switchgear and furnace installed in grey room

Sluice Furnace between Grey Room and Clean Room

Logistics between clean room and grey room can often be easily sorted out. Lock furnaces with one door in the grey room and the other door in the clean room are the perfect choice for these applications. The inner chamber as well as the furnace front in the clean room will be especially designed for lowest particle contamination.

Please contact us if you are looking for a heat treatment solution under clean room conditions. We would be pleased to quote for the oven or furnace model that meets best your requirements.

Hot-wall retort furnace NRA 1700/06 with charging frame for installation in grey room with charging door in clean room

Forced convection chamber oven NAC 250/45 with clean room specs

Compact Tube Furnaces

RD 30/200/11

Over-temperature limiter

The RD tube furnaces convince with their unbeatable price-performance ratio, very compact outer dimensions and their low weight. These all-rounders are equipped with a working tube which also serves as support for the heating wires. Thus, the working tube is part of the furnace heating which has the advantage that the furnaces achieve very high heat-up rates. The tube furnaces can be supplied for 1100 °C or 1300 °C.

Both models are designed for horizontal application. If the customer requires protective gas atmosphere, a separate working tube incl. gas supply system 1, e.g. made of quartz glass, must be inserted in the working tube.

- Tmax 1100 °C or 1300 °C
- Dual shell housing made of sheets of textured stainless steel
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Inner diameter of the tube: 30 mm, heated length: 200 mm
- Working tube made of C 530 material including two fiber plugs as standard
- Thermocouple type K (1100 °C) or type S (1300 °C)
- Solid state relays provide for low-noise operation of the heating
- Heating wires wound directly around the working tube resulting in very fast heat-up rates
- Defined application within the constraints of the operating instructions
- Controls description see page 42

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Gas supply system for non-flammable protective or reactive gas

Model	Tmax	Outer dimensions[3] in mm			Inner tube Ø	Heated length	Length constant temperature +/- 5 K	Connected load	Minutes	Electrical	Weight in
	°C[1]	W	D	H	in mm	in mm	in mm[1]	kW	to Tmax[2]	connection*	kg
RD 30/200/11	1100	350	200	350	30	200	65	1.5	20	1-phase	12
RD 30/200/13	1300	350	200	350	30	200	65	1.5	25	1-phase	12

[1]Values outside the tube. Difference to temperature inside the tube up to + 50 K
*Please see page 43 for more information about supply voltage
[2]If connected at 230 V 1/N/PE rsp. 400 V 3/N/PE
[3]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Tube furnace R 170/1000/13

Tube furnace R 50/250/13 with gas supply system 2

These compact 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 fiber plugs, these tube furnaces have an unbeatable price/performance ratio.

- Tmax 1200 °C or 1300 °C
- Single-zoned design as standard
- Dual shell housing made of sheets of textured stainless steel
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Outer tube diameter of 50 mm to 170 mm, heated length from 250 mm to 1000 mm
- Working tube of C 530 ceramic including two fiber plugs as standard equipment
- Tmax 1200 °C: Type N thermocouple
- Tmax 1300 °C: Type S thermocouple
- Solid state relays provide for lownoise operation
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Three-zoned design (heated length from 500 mm)
- Gas supply systems for protective gas or vacuum operation
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

Model	Tmax	Outer dimensions[4] in mm			Outer tube Ø	Heated length	Length constant temperature +/- 5 K in mm[1]		Tube length	Connected load	Electrical	Weight
	°C[1]	W[2]	D	H	in mm	in mm	single-zoned	three-zoned	in mm	kW	connection*	in kg
R 50/250/12	1200	434	340	508	50	250	80	-	450	1.6	1-phase	22
R 50/500/12	1200	670	340	508	50	500	170	250	700	2.3[3]	1-phase	34
R 120/500/12	1200	670	410	578	120	500	170	250	700	6.5	3-phase	44
R 170/750/12	1200	920	460	628	170	750	250	375	1070	10.0	3-phase	74
R 170/1000/12	1200	1170	460	628	170	1000	330	500	1400	11.5	3-phase	89
R 50/250/13	1300	434	340	508	50	250	80	-	450	1.6	1-phase	22
R 50/500/13	1300	670	340	508	50	500	170	250	700	2.3[3]	1-phase	34
R 120/500/13	1300	670	410	578	120	500	170	250	700	6.5	3-phase	44
R 170/750/13	1300	920	460	628	170	750	250	375	1070	10.0	3-phase	74
R 170/1000/13	1300	1170	460	628	170	1000	330	500	1400	11.5	3-phase	89

[1]Values outside the tube. Difference to temperature inside the tube up to + 50 K
[2]Without tube
[3]Only valid for single-zone version
*Please see page 43 for more information about supply voltage
[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Tube Furnaces with Stand for Horizontal or Vertical Operation

Tube furnace RT 50-250/11

Tube furnace 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 tube furnaces suitable for integration into existing process systems.

- Tmax 1100 °C, 1300 °C, or 1500 °C
- Compact design
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Vertical or horizontal operation freely adjustable
- Working height freely adjustable
- Working tube made of C 530 ceramic
- Type S thermocouple
- Operation also possible separate from stand if safety guidelines are observed
- Control system integrated in furnace base
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Model	Tmax	Outer dimensions[2] in mm			Inner tube Ø	Heated length	Length constant temperature +/- 5 K	Tube length	Connected load	Electrical	Weight in
	°C	W[1]	D	H	in mm	in mm	in mm[1]	in mm	kW	connection*	kg
RT 50-250/11	1100	350	380	740	50	250	80	360	1.8	1-phase	25
RT 50-250/13	1300	350	380	740	50	250	80	360	1.8	1-phase	25
RT 30-200/15	1500	445	475	740	30	200	70	360	1.8	1-phase	45

[1]Values outside the tube. Difference to temperature inside the tube up to + 50 K

*Please see page 43 for more information about supply voltage

[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

High-Temperature Tube Furnaces with SiC Rod Heating

Gas Atmosphere or Vacuum

Tube furnace RHTC 80-230/15 with manual gas supply system

These compact tube furnaces with SiC rod heating and integrated switchgear and controller can be used universally for many processes. With an easy to replace working tube as well as additional standard equipment options, these furnaces are flexible and can be used for a wide range of applications. The high-quality fiber insulation ensures fast heating and cooling times. The SiC heating rods installed parallel to the working tube ensure excellent temperature uniformity. The price-performance ratio for this temperature range is unbeatable.

- Tmax 1500 °C
- Dual shell housing made of sheets of textured stainless steel
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Active cooling of housing for low surface temperatures
- Type S thermocouple
- Solid state relays provide for low-noise operation
- Prepared for assembly of working tubes with water-cooled flanges
- Ceramic tube, C 799 quality
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Tube furnace RHTC 80-450/15

Additional equipment

- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load
- Fiber plugs
- Check valve at gas outlet avoids intrusion of false air
- Working tubes for operation with water-cooled flanges
- Display of inner tube temperature with additional thermocouple
- Alternative gas supply systems for protective gas or vacuum operation
- Process control and documentation via VCD software package for monitoring, documentation and control see page 45

SiC rod heating

Model	Tmax	Outer dimensions[4] in mm			Outer tube Ø/	Heated length	Length constant temperature +/- 5 K	Tube length	Connected load	Electrical	Weight in
	°C[3]	W	D	H	in mm	in mm	in mm[3]	in mm	kW	connection*	kg
RHTC 80-230/15	1500	600	440	585	80	230	80	600	7.5	3-phase[2]	50
RHTC 80-450/15	1500	820	440	585	80	450	150	830	11.3	3-phase[1]	70
RHTC 80-710/15	1500	1075	440	585	80	710	235	1080	13.8	3-phase[1]	90

[1]Heating only between two phases
[2]Heating only between phase 1 and neutral
[3]Values outside the tube. Difference to temperature inside the tube up to + 50 K
*Please see page 43 for more information about supply voltage
[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

High-Temperature Tube Furnaces for Horizontal and Vertical Operation up to 1800 °C

Gas Atmosphere or Vacuum

Tube furnace RHTH 120/600/17

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 fiber 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 non-flammable or flammable protective or reactive gases or under vacuum.

RHTV 50/150/17 vertical tube furnace with stand and gas supply system 2 as additional equipment

- Tmax 1600 °C, 1700 °C, or 1800 °C
- $MoSi_2$ heating elements, mounted vertically for easy replacement
- Insulation with vacuum-formed ceramic fiber plates
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Rectangular outer housing with slots for convection cooling
- Tube furnaces RHTV with frame for vertical operation
- Dual shell housing made of sheets of textured stainless steel
- Ceramic working tube made of material C 799 incl. fiber plugs for operation under air
- Type B thermocouple
- Power unit with low-voltage transformer and thyristor
- Over-temperature limiter with adjustable cutout temperature for thermal protection class 2 in accordance with EN 60519-2 as temperature limiter to protect the furnace and load and with selectable maximum temperature gradient as tube protection
- Switchgear and control unit separate from furnace in separate floor standing cabinet
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Additional equipment

- Charge control with temperature measurement in the working tube and in the furnace chamber outside the tube
- Display of inner tube temperature with additional thermocouple
- Gas tight flanges for protective gas and vacuum operation
- Manual or automatic gas supply system
- Three-zone control for optimization of temperature uniformity (only tube furnaces RHTH)
- Check valve at gas outlet avoids intrusion of false air
- Alternative working tubes designed for process requirements
- Process control and documentation via VCD software package or Nabertherm Control Center (NCC) for monitoring, documentation and control see page 45

Tube furnace RHTV 120/480/16 LBS with working tube closed at one side, protective gas and vacuum option as well as with electric screw drive of the lift table

Tube furnace RHTH 120/600/18

Over-temperature limiter

Model Horizontal design	Tmax °C[3]	Outer dimensions[4] in mm W[2]	 D	 H	Max. outer tube Ø in mm	Heated length in mm	Length constant temperature +/- 5 K in mm[3]	Tube length in mm	Connected load W	Electrical connection*	Weight in kg
RHTH 50/150/..	1600 or	470	480	640	50	150	50	380	5.4	3-phase[1]	70
RHTH 80/300/..	1700 or	620	550	640	80	300	100	530	9.0	3-phase[1]	90
RHTH 120/600/..	1800	920	550	640	120	600	200	830	14.4	3-phase[1]	110

Model Vertical design	Tmax °C[3]	Outer dimensions[4] in mm W	 D	 H[2]	Max. outer tube Ø in mm	Heated length in mm	Length constant temperature +/- 5 K in mm[3]	Tube length in mm	Connected load kW	Electrical connection*	Weight in kg
RHTV 50/150/..	1600 or	500	650	510	50	150	30	380	5.4	3-phase[1]	70
RHTV 80/300/..	1700 or	580	650	660	80	300	80	530	10.3	3-phase[1]	90
RHTV 120/600/..	1800	580	650	960	120	600	170	830	19.0	3-phase[1]	110

[1]Heating only between two phases
[2]Without tube
[3]Values outside the tube. Difference to temperature inside the tube up to + 50 K
*Please see page 43 for more information about supply voltage
[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Split-Type Tube Furnaces for Horizontal or Vertical Operation up to 1300 °C

Gas Atmosphere or Vacuum

Tube furnace RSV 170/1000/11 with gas supply system 2

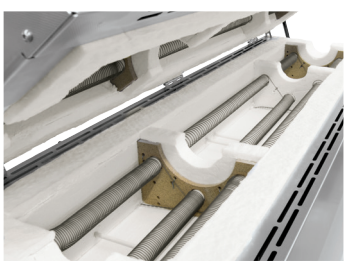
Tube furnace RSH 50/500/13

These tube furnaces can be used for horizontal (RSH) or vertical (RSV) operation. The split-type design makes it easy to change the working tube. It allows for a comfortable exchange of various working tubes (e.g. working tubes made of different materials).

Using the wide range of accessories these professional tube furnaces can be optimally tailored to your process. By upgrading the furnaces with different gas supply systems the operation in a protective gas atmosphere, under vacuum or under flammable protective or reactive gases is possible. Besides convenient standard controllers for process control modern PLC control systems are also available.

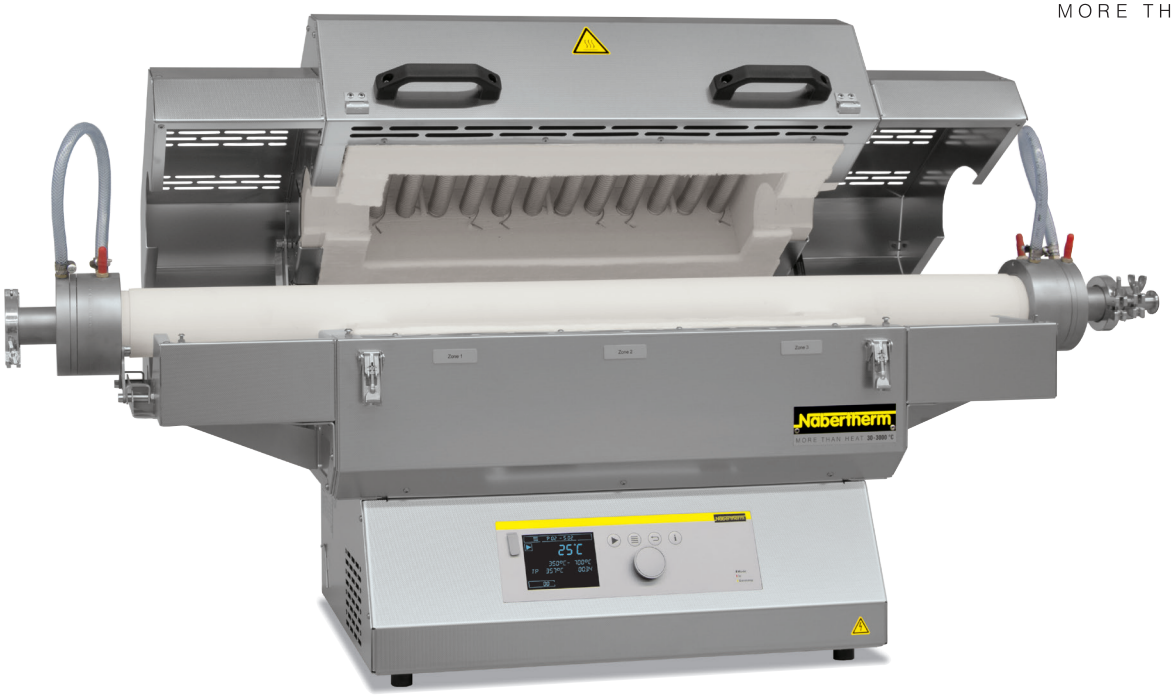
Gas supply system for non-flammable protective or reactive gas with shutoff valve and flow meter with regulator valve, optionally with magnetic valve

- Tmax 1100 °C or 1300 °C
- Dual shell housing made of sheets of textured stainless steel
- Only fiber materials are used which are not classified as carcinogenic according to TRGS 905, class 1 or 2
- Tmax 1100 °C: Type N thermocouple
- Tmax 1300 °C: Type S thermocouple
- Frame for vertical operation (RSV)
- Split-type design for simple insertion of the working tube
- Working tube made of material C 530 incl. fiber plugs for operation under air in scope of delivery
- Heating elements on support tubes provide for free radiation
- RSV: switchgear and control unit separate from furnace in own wall or standing cabinet
- RSH: switchgear and control unit integrated in furnace housing
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42



Tube furnace RSH 120/1000/11S, three-zone controlled, incl. zone separators to reach a temperature gradient

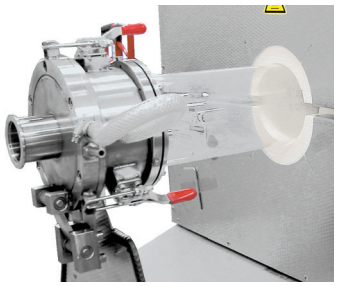
Tube furnace RS 120/750/13 with gas supply system 4, hydrogen applications



Tube furnace RSH 80/500/13 with gas tight tube and water-cooled flanges

Additional equipment

- Charge control with temperature measurement in the working tube and in the furnace chamber outside the tube
- Display of inner tube temperature with additional thermocouple
- Different gas supply systems for non-flammable or flammable protective or reactive gases and vacuum operation
- Three-zone control for optimization of temperature uniformity
- Cooling systems for accelerated cooling of the working tube and charge
- Check valve at gas outlet avoids intrusion of false air
- Base frame with integrated switchgear and controller
- Alternative working tubes designed for process requirements
- Process control and documentation via VCD software package or Nabertherm Control Center (NCC) for monitoring, documentation and control see page 45



Quartz glass and flanges for protective gas operation as optional equipment

Model	Tmax	Outer dimensions[5] in mm			Max. outer tube Ø	Heated length	Length constant temperature +/- 5 K in mm[1]		Tube length	Connected load kW[3]		Electrical	Weight in
	°C[1]	W[2]	D	H	in mm	in mm	single zoned	three zoned	in mm	1100 °C	1300 °C	connection*	kg
RSH 50/250/..		420	375	510	50	250	80	-	650	1.9	1.9	1-phase	25
RSH 50/500/..		670	375	510	50	500	170	250	850	3.4	3.4	1-phase[4]	36
RSH 80/500/..		670	445	580	80	500	170	250	850	6.6	6.6	3-phase[4]	46
RSH 80/750/..	1100	920	495	630	80	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSH 120/500/..	or	670	445	580	120	500	170	250	850	6.6	6.6	3-phase[4]	46
RSH 120/750/..	1300	920	495	630	120	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSH 120/1000/..		1170	495	630	120	1000	330	500	1350	13.7	13.7	3-phase[4]	91
RSH 170/750/..		920	495	630	170	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSH 170/1000/..		1170	495	630	170	1000	330	500	1350	13.7	13.7	3-phase[4]	91
RSV 50/250/..		545	590	975	50	250	80	-	650	1.9	1.9	1-phase	25
RSV 50/500/..		545	590	1225	50	500	170	250	850	3.4	3.4	3-phase[4]	36
RSV 80/500/..		615	590	1225	80	500	170	250	850	6.6	6.6	3-phase[4]	46
RSV 80/750/..	1100	665	590	1475	80	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSV 120/500/..	or	615	590	1225	120	500	170	250	850	6.6	6.6	3-phase[4]	46
RSV 120/750/..	1300	665	590	1475	120	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSV 120/1000/..		665	590	1725	120	1000	330	500	1350	13.7	13.7	3-phase[4]	91
RSV 170/750/..		665	590	1475	170	750	250	375	1100	10.6	12.0	3-phase[4]	76
RSV 170/1000/..		665	590	1725	170	1000	330	500	1350	13.7	13.7	3-phase[4]	91

[1]Values outside the tube. Difference to temperature inside the tube up to + 50 K
[2]Without tube
[3]At 415 volt
[4]At 3-phase execution an N conductor ist required (3/N/PE)
[5]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.
*Please see page 43 for more information about supply voltage

Melting Furnaces

Melting furnace K 4/10

Melting furnace KC 2/15

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 spout (not for KC) on the front of the furnace make exact dosing easy when pouring the melt. The melting furnaces are available for furnace chamber temperatures of 1000, 1300, or 1500 °C. This corresponds to melt temperatures of about 80 °C - 110 °C lower.

Melting furnace KC 2/15

- Tmax 1000 °C, 1300 °C, or 1500 °C, with melt temperature about 80 °C - 110 °C lower
- Crucible sizes of 0,75, 1,5 or 3 liters
- Crucible with integrated pouring spout of iso-graphite included with delivery
- Additional spout (not for KC), mounted at the furnace for exact pouring
- Compact bench-top design, simple emptying of crucible by tiltiing system with gas damper
- Crucible for heating up of melting furnace insulated with a hinged lid, lid opened when pouring
- Defined application within the constraints of the operating instructions
- Controls description see page 42

Additional equipment

- Other crucible types available, e.g. steel
- Design as bale-out furnace without tilting device, e.g. for lead melting
- Over-temperature limiter for the furnace chamber with automatic reset to protect against overtemperature. The limit controller switches off the heating when the pre-set limit temperature has been reached and does not switch it on again until the temperature falls below the setting again.
- Observation hole for melt

Model	Tmax °C	Crucible	Volume in l	Outer dimensions[4] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
K 1/10	1000	A 6	0.75	520	680	660	3.0	1-phase	85
K 2/10	1000	A10	1.50	520	680	660	3.0	1-phase	90
K 4/10	1000	A25	3.00	570	755	705	3.6	1-phase	110
K 1/13[2]	1300	A 6	0.75	520	680	660	3.0	1-phase	120
K 2/13[2]	1300	A10	1.50	520	680	660	3.0	1-phase	125
K 4/13[2]	1300	A25	3.00	570	755	705	5.5	3-phase[1]	170
KC 1/15[3]	1500	A6	0.75	580	630	580	10.5	3-phase	170
KC 2/15[3]	1500	A10	1.50	580	630	580	10.5	3-phase	170

[1]Heating only between two phases

*Please see page 43 for more information about supply voltage

[2]Outer dimensions of furnace, transformer in separate housing (500 x 570 x 300 mm)

[3]Switchgear and controller mounted in a floor standing cabinet

[4]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.

Fast-Firing Furnaces

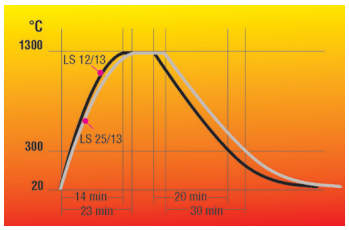
These fast-firing furnaces are ideal for simulation of typical fast-firing processes up to a maximum firing temperature of 1300 °C. The combination of high performance, low thermal mass and powerful cooling fans provides for cycle times from cold to cold up to 35 minutes with an opening temperature of approx. 300 °C.

- Tmax 1300 °C
- Very compact design
- Ceramic grid tubes as charge support
- Floor and lid heating
- Two-zone control, bottom and lid
- Integrated cooling fans, programmable to speed up charge cooling including housing cooling
- Programmable lid opening of approximately 60 mm for faster cooling without activating the fan
- Thermocouple type S for top and bottom zone
- Castors for easy furnace moving
- Defined application within the constraints of the operating instructions
- NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive
- Controls description see page 42

Fast-firing furnace LS 25/13

Model	Tmax °C	Inner dimensions in mm w	d	h	Volume in l	Outer dimensions[2] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
LS 12/13	1300	350	350	40	12	750	880	1090	15	3-phase[1]	150
LS 25/13	1300	500	500	100	25	900	1030	1150	22	3-phase[1]	160

[1]Heating only between two phases
*Please see page 43 for more information about supply voltage
[2]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.



Firing curves of fast-firing furnaces LS 12/13 and LS 25/13

Gradient or Lab Strand Annealing Furnaces

The furnace chamber of the gradient furnace GR 1300/13 is divided in six control zones of equal length. The temperature in each of the six heating zones is separately controlled. The gradient furnace is usually charged from the side through the parallel swivel door. A maximum temperature gradient of 400 °C can then be stabilized over the heated length of 1300 mm. On request the furnace also is designed as a lab strand annealing furnace with a second door on the opposite side. If the included fiber separator are used charging is carried-out from the top.

- Tmax 1300 °C
- Heated length: 1300 mm
- Heating elements on support tubes providing for free heat radiation in the kiln chamber
- Charging from the top or through the right side door
- Gas damper suspension of the lid
- 6-zone control
- Separate control of heating zones (each 160 mm long)
- Temperature gradient of 400 °C over the entire length of the kiln chamber, each zone can individually be controlled
- Fiber separators dividing the chamber in six equally sized chambers
- Defined application within the constraints of the operating instructions
- Controls description see page 42

Gradient furnace GR 1300/13S

Additional equipment

- Up to ten control zones
- Second parallel swivel door for use as lab strand annealing furnace
- Vertical instead of horizontal strand furnace
- Process control and documentation via Nabertherm Control Center (NCC) for monitoring, documentation and control see page 45

Furnace chamber of gradient furnace GR 1300/13 with second door as additional equipment

Model	Tmax °C	Inner dimensions in mm w	d	h	Outer dimensions[1] in mm W	D	H	Connected load kW	Electrical connection*	Weight in kg
GR 1300/13	1300	1300	100	60	1660	740	1345	18	3-phase	300

[1]External dimensions vary when furnace is equipped with additional equipment. Dimensions on request.
*Please see page 43 for more information about supply voltage

Catalytic and Thermal Post Combustion Systems, Exhaust Gas Washer

Standard laboratory muffle furnace L 5/11
with catalyst KAT 50 see page 14

For exhaust gas cleaning, in particular in debinding, Nabertherm offers exhaust gas cleaning systems tailored to the process. The afterburning system is permanently connected to the exhaust gas fitting of the furnace and accordingly integral part of the control system and the safety matrix of the furnace. For existing furnaces, independent exhaust gas cleaning systems are also available that can be separately controlled and operated.

Catalytic post combustion systems (KNV)

Catalytic exhaust cleaning is recommended due to energetic reasons when only pure hydrocarbon compounds must be cleaned during the debinding process in air. They are recommended for small to medium exhaust gas amounts.

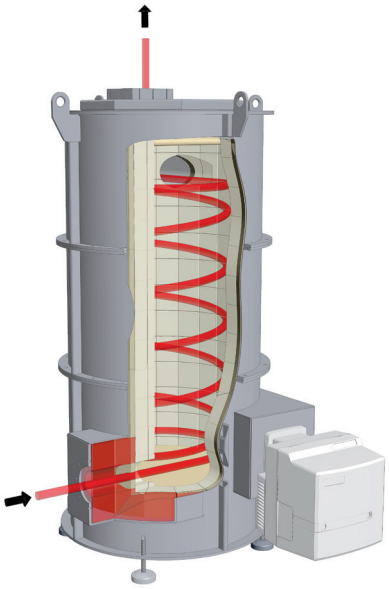
- Perfectly suited for debinding processes in air with only organic exhaust gases
- Decomposition of gases in carbon dioxide and water
- Integrated in a compact stainless steel housing
- Electric heating provides for preheating of the exhaust gas to the optimal reaction temperature for catalytic treatment
- Cleaning in different layers of catalytic honeycombs within the system
- Thermocouples for measuring the temperatures of raw gas, reaction honeycombs and discharge
- Over-temperature limiter with adjustable cutout temperature protects the catalyst
- Tight connection between the exhaust gas outlet of the debinding furnace and the exhaust gas fan with corresponding integration into the overall system with respect to control and safety technology
- Catalyst dimensioned in relation to the exhaust gas flow
- Measuring port for clean gas measurements (FID)

Chamber furnace NA 500/65 DB200 with catalytic post combustion system

Thermal post combustion systems (TNV)

Thermal post combustion systems are used if large volumes of exhaust gas from the debinding process in air must be cleaned and/or if there is a risk that the exhaust gases might damage the catalyst. Thermal post combustion is also used for debinding applications under non-flammable or flammable protective or reaction gases.

- Optimally suited for debinding processes in air with large exhaust gas flow, erratic large exhaust gas volumes, large volume flow or for debinding processes under non-flammable or flammable protective or reaction gases
- Gas-fired to burn the exhaust gases
- Burn-off at temperatures up to 850 °C provides for thermal decomposition of the exhaust gases
- Heating with compact gas burner with automatic firing device
- Thermocouples in the combustion chamber and in the raw gas inlet
- Over-temperature limiter for protecting the thermal post combustion
- Design depending on the exhaust gas flow
- Measuring port for clean gas measurements (FID)



Scheme of a thermal post combustion system

Exhaust Gas Washer

An exhaust gas washer will be often used if the generated gases cannot be effectively treated with a thermal post combustion system or with a torch. To clean, detox or decontaminate the exhaust gas stream a liquid us used to wash or neutralize unwanted pollutants. The exhaust gas washer can be adapted to the process by designing its liquid distribution and contact area and by selecting the most suitable washing liquid. Liquids may simply be water or special reagents or even suspensions to successfully remove unwanted gases, liquids or particles from the exhaust gas.

Temperature Uniformity and System Accuracy

Temperature uniformity is defined as the maximum temperature deviation in the work space of the furnace. There is a general difference between the furnace chamber and the work space. The furnace chamber is the total volume available in the furnace. The work space is smaller than the furnace chamber and describes the volume which can be used for charging.

Holding frame for measurement of temperature uniformity

Specification of Temperature Uniformity in +/- K in the Standard Furnace

In the standard design the temperature uniformity is specified in +/- K at a defined set-temperature with the work space of the empty furnace during the dwell time. In order to make a temperature uniformity survey the furnace should be calibrated accordingly. As standard our furnaces are not calibrated upon delivery.

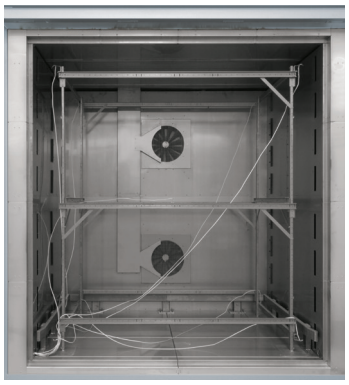
Calibration of the Temperature Uniformity in +/- K

If an absolute temperature uniformity at a reference temperature or at a defined reference temperature range is required, the furnace must be calibrated appropriately. If, for example, a temperature uniformity of +/- 5 K at a set temperature of 750 °C is required, it means that measured temperatures may range from a minimum of 745 °C to a maximum of 755 °C in the work space.

System Accuracy

Tolerances may occur not only in the work space, they also exist with respect to the thermocouple and in the controls. If an absolute temperature uniformity in +/- K at a defined set temperature or within a defined reference working temperature range is required, the following measures have to be taken:

- Measurement of total temperature deviation of the measurement line from the controls to the thermocouple
- Measurement of temperature uniformity within the work space at the reference temperature or within the reference temperature range
- If necessary, an offset is set at the controls to adjust the displayed temperature at the controller to the real temperature in the furnace
- Documentation of the measurement results in a protocol



Pluggable frame for measurement for forced convection chamber furnace N 7920/45 HAS

Temperature Uniformity in the Work Space incl. Protocol

In standard furnaces a temperature uniformity is guaranteed as +/- K without measurement of temperature uniformity. However, as additional feature, a temperature uniformity measurement at a reference temperature in the work space compliant with DIN 17052-1 can be ordered. Depending on the furnace model, a holding frame which is equivalent in size to the work space is inserted into the furnace. This frame holds thermocouples at 11 defined measurement positions. The measurement of the temperature uniformity is performed at a reference temperature specified by the customer at a pre-defined dwell time. If necessary, different reference temperatures or a defined reference working temperature range can also be calibrated.

The system accuracy is defined by adding the tolerances of the controls, the thermocouple and the work space

Precision of the controls, e.g. +/- 1 K

Deviation of thermocouple, e.g. +/- 1.5 °C

Deviation from measuring point to the average temperature in the work space e.g. +/-3 °C

Process Control and Documentation

B400/C440/P470

B410/C450/P480

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

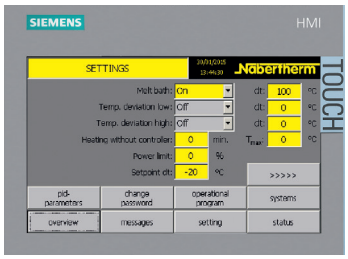
Standard Controllers

Our extensive line of standard controllers satisfies most customer requirements. D60Based on the specific furnace model, the controller regulates the furnace temperature reliably and is equipped with an integrated USB-interface for documentation of process data (NTLog/NTGraph).

The standard controllers are developed and fabricated within the Nabertherm group. When developing controllers, our focus is on ease of use. The user can choose between 17 languages. 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 PID microprocessor control with self-diagnosis system, we have a solution to meet your requirements.

HiProSystems Control and Documentation

This professional process control with PLC controls for single and multi-zone furnaces is based on Siemens hardware and can be adapted and upgraded extensively. HiProSystems control is used when more than two process-dependent functions, such as exhaust air flaps, 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 service is required. It is flexible and is easily tailored to your process or documentation needs.



H1700 with colored, tabular depiction

Alternative User Interfaces for HiProSystems

Process control H500/H700

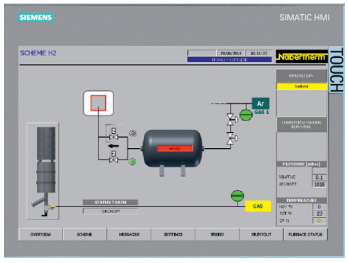
This basic panel accommodates most basic needs and is very easy to use. Firing cycle data and the extra functions activated are clearly displayed in a table. Messages appear as text. Data can be stored on a USB stick using the „NTLog Comfort“ option (not available for all H700).

Process control H1700

Customized versions can be realized in addition to the scope of services of the H500/H700

Process control H3700

Display of functions on a large 12‘‘ display. Display of basic data as online trend or as a graphical system overview. Scope as H1700



H3700 with colored graphic presentation

Control, Visualisation and Documentation with Nabertherm Control Center NCC

Upgrading the HiProSystems-Control individually into a PC-based 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.):

- Recommended for heat treatment processes with extensive requirements in respect to documentation e.g. for metals, technical ceramics or in the medicine field
- Software extension can be used also in accordance with the AMS 2750 E (NADCAP)
- Documentation according to the requirements of Food and Drug Administration (FDA), Part 11, EGV 1642/03 possible
- Charge data can be read in via barcodes
- Interface for connection to overriding systems
- Connection to mobile phone or stationary network for malfunction message transmission via SMS
- Control from various locations over the network
- Measurement range calibration up to 18 temperatures per measuring point for use at different temperatures. For norm-relevant applications a multilevel calibration is possible.

Assignment of Standard Controllers to Furnace Families

	L1/12	L 3 - LT 40	LE 1/11 - LE 14/11	L 9/11/SKM	LV, LVT	L../11 BO	L(T) 9/../SW	N .. CUP	N 7/H - N 87/H	LH 15/12 - LF 120/14	LHTC(T)	LHT ../.. (D)	LHT 01/17 LB - LHT 16/17 LB	LHT 04/16 SW + LHT 04/17 SW	HT, HFL	HTC 16/16 - HTC 450/16	TR	TR .. LS	KTR	NA 15/65	NA 30/45 - N 500/85 HA	NA-I, NA-SI	N(B) .. BO	RD	R	RT	RHTC	RHTH/RHTV	RSH/RSV	RSRB, RSRC	K	KC	LS	GR	NRA 17/06 - NRA 1000/11	NR, NRA .. IDB	NR, NRA .. H_2	(S)VHT
Catalog page	4	4,7,8	6	9	10	12	13	15	16	19	20	21	22	23	24,27	26	28	28	30	34	34	35	36	38	39	40	41	42	44	46	56	56	57	57	58	60	60	63
Controller																																						
R7	●		●														●							●							●							
3216	○																							○														
3504								○									○		○		○				○		○	○		○	○				○			
3508																																●						
B400								●	●	●									●		●	●								●								
B410		●		●	●		●				●						○			●					●	●	●		●									
C440									○	○									○		○	○								○								
C450		○		○	○	●	○				○						○	●		○					○	○	○		○									
P470									○	○		●	●	●	●[3]	●[3]			○		○	○						●		○			●[3]		●			●[3]
P480		○		○	○	○	○				○						○			○					○	○	○		○	○								
H500/PLC										○					●[3]	●[3]					○	○						○	○	○			○					
H700/PLC															○													○	○	○								●[3]
H1700/PLC															○	○			○		○	○	●											●		●		
H3700/PLC															○	○			○		○	○						○	○	○				○	○		●	○
NCC										○					○	○			○		○	○						○	○	○					○	○	○	○

Functionality of the Standard Controllers	R7	3216	3208	B400/ B410	C440/ C450	P470/ P480	3504	H500	H700	H1700	H3700	NCC
Number of programs	1	1		5	10	50	25	20	1/10[3]	10	10	50
Segments	1	8		4	20	40	500[3]	20	20	20	20	20
Extra functions (e.g. fan or autom. flaps) maximum				2	2	2-6	2-8[3]	3[3]	○[3]	6/2[3]	8/2[3]	16/4[3]
Maximum number of control zones	1	1	1	1	1	3	2[1,2]	1-3[3]	○[3]	8	8	8
Drive of manual zone regulation				●	●	●						
Charge control/bath control						●	○	○	○	○	○	○
Auto tune		●	●	●	●	●	●					
Real-time clock				●	●	●		●	●	●	●	●
Plain, blue-white LC-display				●	●	●						
Graphic color display								4" 7"	7"	7"	12"	19"
Status messages in clear text			●	●	●	●	●	●	●	●	●	●
Data entry via touchpanel								●	●	●	●	
Data input via jog dial and buttons				●	●	●						
Entering program names (i.e.“Sintering“)				●	●	●						●
Keypad lock				●	●	●	●					
User administration				●	●	●		○	○	○	○	●
Skip-button for segment jump				●	●	●		●	●	●	●	●
Program entry in steps of 1 °C or 1 min.	●	●	●	●	●	●	●	●	●	●	●	●
Start time configurable (e.g. to use night power rates)				●	●	●		●	●	●	●	●
Switch-over °C/°F	○	○	○	●	●	●	○	●	●[3]	●[3]	●[3]	●[3]
kWh meter				●	●	●						
Operating hour counter				●	●	●		●	●	●	●	●
Set point output			○	●	●	●	○		○	○	○	○
NTLog Comfort for HiProSystems: recording of process data on an external storage medium								○	○	○	○	
NTLog Basic for Nabertherm controller: recording of process data with USB-flash drive				●	●	●						
Interface for VCD software				○	○	○						
Malfunction memory				●	●	●		●	●	●	●	●
Number of selectable languages				17	17	17						

[1] Not for melt bath control
[2] Control of additional separate slave regulators possible
[3] Depending on the design

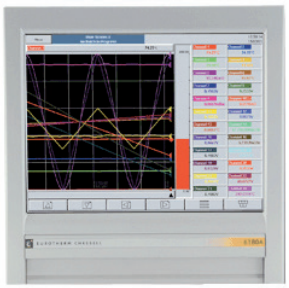
● Standard
○ Option

Mains Voltages for Nabertherm Furnaces

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

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

The connecting rates in the catalog refer to the standard furnace with 400 V (3/N/PE) respectively 230 V (1/N/PE).

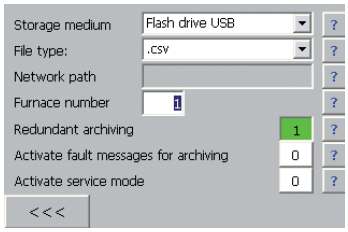


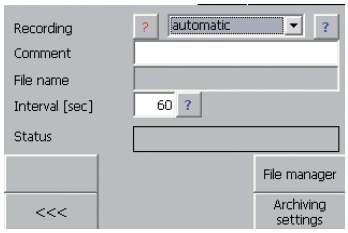
Temperature recorder

Temperature Recorder

Besides the documentation via the software which is connected to the controls, Nabertherm offers different temperature recorders which can be used with respect to the application.

	Model 6100e	Model 6100a	Model 6180a
Data input using touch panel	x	x	x
Size of colour display in inch	5.5	5.5	12.1
Number of thermocouple inputs	3	18	48
Data read-out via USB-stick	x	x	x
Input of charge data		x	x
Evaluation software included	x	x	x
Applicable for TUS-measurements acc. to AMS 2750 E			x





Data storing of Nabertherm controllers with NTLog Basic

NTLog Basic allows for recording of process data of the connected Nabertherm Controller (B400, B410, C440, C450, P470, P480) on a USB stick.

The process documentation with NTLog Basic requires no additional thermocouples or sensors. Only data recorded which are available in the controller.

The data stored on the USB stick (up to 80,000 data records, format CSV) can afterwards be evaluated on the PC either via NTGraph or a spreadsheet software used by the customer (e.g. MS Excel).

For protection against accidental data manipulation the generated data records contain checksums.

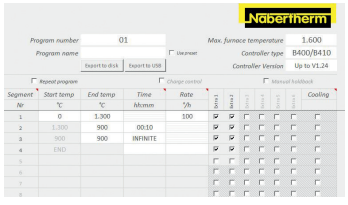
NTLog Comfort for data recording of a Siemens PLC

Data storing of HiProSystems with NTLog Comfort

The extension module NTLog Comfort offers the same functionality of NTLog Basic module. Process data from a HiProSytems control are read out and stored in real time on a USB stick (not available for all H700 systems). The extension module NTLog Comfort can also be connected using an Ethernet connection to a computer in the same local network so that data can be written directly onto this computer.

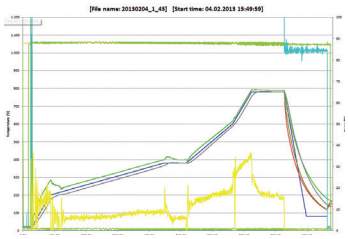
Visualization with NTGraph for Single-Furnace Control

The process data from NTLog can be visualized either using the customer‘s own spreadsheet program (e.g. MS-Excel) or NTGraph (Freeware). With NTGraph Nabertherm provides for an additional user-friendly tool free of charge for the visualization of the data generated by NTLog. Prerequisite for its use is the installation of the program MS-Excel for Windows (version 2003/2010/2013). After data import presentation as diagram, table or report can be chosen. The design (color, scaling, reference labels) can be adapted by using prepared sets. NTGraph is available in seven languages (DE/EN/FR/SP/IT/CH/RU). In addition, selected texts can be generated in other languages.



Software NTEdit for Entering Programs on the PC

By using the software NTEdit (Freeware) the input of the programs becomes clearer and thus easier. The program can be enttered on customers PC and then be imported into the controller with a USB stick. The display of the set curve is tabular or graphical. The program import in NTEdit is also possible. With NTEdit Nabertherm provides a user-friendly free tool. A prerequisite for the use is the client installation of MS-Excel for Windows (2007/2010/2013). NTEdit is available in eight languages (DE/EN/FR/SP/IT/CH/RU/PT).



NTGraph, a freeware for the easy-to-read analysis of recorded data using MS Excel

VCD-Software for Visualization, Control and Documentation

Documentation and reproducibility are more and more important for quality assurance. The powerful VCD software represents an optimal solution for single multi furnace systems as well as charg documentation on the basis of Nabertherm controllers.

The VCD software is used to record process data from the controllers B400/B410, C440/C450 and P470/P480. Up to 400 different heat treatment programs can be stored. The controllers are started and stopped via the software at a PC. The process is documented and archived accordingly. The data display can can be carried-out in a diagram or as data table. Even a transfer of process data to MS Excel (.csv format *) or the generation of reports in PDF format is possible.

Example lay-out with 3 furnaces

Features

- Available for controllers B400/B410/C440/C450/P470/P480
- Suitable for operating systems Microsoft Windows 7 or 8/8.1 or 10 (32/64 Bit)
- Simple installation
- Setting, Archiving and print of programs and graphics
- Operation of controllers via PC
- Archiving of process curves from up to 16 furnaces (also multi-zone controlled)
- Redundant saving of archives on a server drive
- Higher security level due to binary data storage
- Free input of charge date with comfortable search function
- Possibility to evaluate data, files can be converted to Excel
- Generation of a PDF-report
- 17 languages selectable

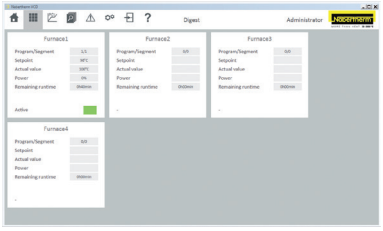
Extension package 1 for display of an additional temperature measuring point, independant of the furnace controls

- Connection of an independant thermocouple, type S, N or K with temperature display on controller C6D, e. g. for documentation of charge temperature
- Conversion and transmission of measured values to the VCD software
- For data evaluation, please see VCD-software features
- Display of measured temperature directly on the extension package

Extension package 2 for the connection of up to three, six or nine measuring point, independant of the furnace controls

- Connection of three thermocouples, tpye K, S, N or B to the included connecting box
- Possible extension of up to two or three connecting boxes with up to nine measuring points
- Conversion and transmission of measured values to the VCD software
- Data evaluation, see VCD features

VCD Software for Control, Visualisation and Documentation



Graphic display of main overview (version with 4 furnaces)

Product Name	Nabertherm Cat. Nr.	VWR Cat. No.
Page 5:		
FURNACE MUFFLE L3/11 B410 1100C 120 V	L-031K1RN-120	75993-730
FURNACE MUFFLE L3/11 B410 1100C 208 V	L-031K1RN-208	75993-732
FURNACE MUFFLE L3/11 B410 1100C 240 V	L-031K1RN-240	75993-734
FURNACE MUFFLE L3/11 C450 1100C 120 V	L-031K1TN-120	75994-542
FURNACE MUFFLE L3/11 C450 1100C 208 V	L-031K1TN-208	75994-544
FURNACE MUFFLE L3/11 C450 1100C 240 V	L-031K1TN-240	75994-546
FURNACE MUFFLE L5/11 B410 1100C 120 V	L-051K1RN-120	75993-742
FURNACE MUFFLE L5/11 B410 1100C 208 V	L-051K1RN-208	75993-744
FURNACE MUFFLE L5/11 B410 1100C 240 V	L-051K1RN-240	75993-746
FURNACE MUFFLE L5/11 C450 1100C 120 V	L-051K1TN-120	75994-554
FURNACE MUFFLE L5/11 C450 1100C 208 V	L-051K1TN-208	75994-556
FURNACE MUFFLE L5/11 C450 1100C 240 V	L-051K1TN-240	75994-558
FURNACE MUFFLE L9/11 B410 1100C 208 V	L-091K1RN-208	75993-752
FURNACE MUFFLE L9/11 B410 1100C 240 V	L-091K1RN-240	75994-508
FURNACE MUFFLE L9/11 C450 1100C 240 V	L-091K1TN-240	75994-812
FURNACE MUFFLE L9/11/C450 1100 C 208 V	L-091K1TN-208	75994-308
FURNACE MUFFLE L15/11/B410 1100C 208V	L-151K1RN-208	75994-514
FURNACE MUFFLE L15/11/B410 1100C 240V	L-151K1RN-240	75994-516
FURNACE MUFFLE L15/11/C450 1100C 208V	L-151K1TN-208	75993-780
FURNACE MUFFLE L15/11/C450 1100C 240V	L-151K1TN-240	75993-782
FURNACE MUFFLE L24/11/B410 1100C 480V	L-241K1RN-480	75994-796
FURNACE MUFFLE L24/11/C450 1100C 480V	L-241K1TN-480	75993-786
FFURNACE MUFFLE L40/11/B410 1100C 480V	L-401K1RN-480	75994-800
FURNACE MUFFLE L40/11/C450 1100C 480V	L-401K1TN-480	75993-790
FURNACE MUFFLE L1/12 3216 1200C 120 V	L-012K2EN-120	75993-678
FURNACE MUFFLE L1/12 3216 1200C 208 V	L-012K2EN-208	75993-680
FURNACE MUFFLE L1/12 3216 1200C 240 V	L-012K2EN-240	75993-682
FURNACE MUFFLE L1/12/R7 TEMP 1200C 120V	L-012K27N-120	75993-684
FURNACE MUFFLE L1/12/R7 TEMP 1200C 208V	L-012K27N-208	75993-686
FURNACE MUFFLE L1/12/R7 TEMP 1200C 240V	L-012K27N-240	75993-688
FURNACE MUFFLE L3/12 B410 1200C 120 V	L-031K2RN-120	75994-764
FURNACE MUFFLE L3/12 B410 1200C 208 V	L-031K2RN-208	75994-766
FURNACE MUFFLE L3/12 B410 1200C 240 V	L-031K2RN-240	75994-768
FURNACE MUFFLE L3/12 C450 1200C 120 V	L-031K2TN-120	75994-770
FURNACE MUFFLE L3/12 C450 1200C 208 V	L-031K2TN-208	75994-772
FURNACE MUFFLE L3/12 C450 1200C 240 V	L-031K2TN-240	75994-774
FURNACE MUFFLE L5/12 B410 1200C 120 V	L-051K2RN-120	75994-502
FURNACE MUFFLE L5/12 B410 1200C 208 V	L-051K2RN-208	75994-504
FURNACE MUFFLE L5/12 B410 1200C 240 V	L-051K2RN-240	75994-506
FURNACE MUFFLE L5/12 C450 1200C 120 V	L-051K2TN-120	75993-694
FURNACE MUFFLE L5/12 C450 1200C 208 V	L-051K2TN-208	75993-696
FURNACE MUFFLE L5/12 C450 1200C 240 V	L-051K2TN-240	75993-698
FURNACE MUFFLE L9/12 B410 1200C 208 V	L-091K2RN-208	75994-298
FURNACE MUFFLE L9/12 B410 1200C 240 V	L-091K2RN-240	75994-300
FURNACE MUFFLE L9/12 C450 1200C 208 V	L-091K2TN-208	75994-302
FURNACE MUFFLE L9/12 C450 1200C 240 V	L-091K2TN-240	75994-786
FURNACE MUFFLE L15/12/B410 1200C 208V	L-151K2RN-208	75993-706
FURNACE MUFFLE L15/12/B410 1200C 240V	L-151K2RN-240	75993-708
FURNACE MUFFLE L15/12/C450 1200C 208V	L-151K2TN-208	75993-710
FURNACE MUFFLE L15/12/C450 1200C 240V	L-151K2TN-240	75993-712
FURNACE MUFFLE L24/12/B410 1200C 480V	L-241K2RN-480	75994-790
FURNACE MUFFLE L24/12/C450 1200C 480V	L-241K2TN-480	75994-792
FURNACE MUFFLE L40/12/B410 1200C 480V	L-401K2RN-480	75993-720
FURNACE MUFFLE L40/12/C450 1200C 480V	L-401K2TN-480	75993-722
FURNACE MUFFLE LT3/11/B410 1100C 120V	L-031H1RN-120	75993-724
FURNACE MUFFLE LT3/11/B410 1100C 208V	L-031H1RN-208	75993-726
FURNACE MUFFLE LT3/11/B410 1100C 240V	L-031H1RN-240	75993-728
FURNACE MUFFLE LT3/11/C450 1100C 120V	L-031H1TN-120	75994-536
FURNACE MUFFLE LT3/11/C450 1100C 208V	L-031H1TN-208	75994-538
FURNACE MUFFLE LT3/11/C450 1100C 240V	L-031H1TN-240	75994-540

Product Name	Nabertherm Cat. Nr.	VWR Cat. No.
FURNACE MUFFLE LT3/12/B410 1200C 120V	L-031H2RN-120	75993-690
FURNACE MUFFLE LT3/12/B410 1200C 208V	L-031H2RN-208	75994-754
FURNACE MUFFLE LT3/12/B410 1200C 240V	L-031H2RN-240	75994-756
FURNACE MUFFLE LT3/12/C450 1200C 120V	L-031H2TN-120	75994-758
FURNACE MUFFLE LT3/12/C450 1200C 208V	L-031H2TN-208	75994-760
FURNACE MUFFLE LT3/12/C450 1200C 240V	L-031H2TN-240	75994-762
FURNACE MUFFLE LT5/11/B410 1100C 120V	L-051H1RN-120	75993-736
FURNACE MUFFLE LT5/11/B410 1100C 208V	L-051H1RN-208	75993-738
FURNACE MUFFLE LT5/11/B410 1100C 240V	L-051H1RN-240	75993-740
FURNACE MUFFLE LT5/11/C450 1100C 120V	L-051H1TN-120	75994-548
FURNACE MUFFLE LT5/11/C450 1100C 208V	L-051H1TN-208	75994-550
FURNACE MUFFLE LT5/11/C450 1100C 240V	L-051H1TN-240	75994-552
FURNACE MUFFLE LT5/12/B410 1200C 120V	L-051H2RN-120	75994-776
FURNACE MUFFLE LT5/12/B410 1200C 208V	L-051H2RN-208	75993-692
FURNACE MUFFLE LT5/12/B410 1200C 240V	L-051H2RN-240	75994-494
FURNACE MUFFLE LT5/12/C450 1200C 120V	L-051H2TN-120	75994-496
FURNACE MUFFLE LT5/12/C450 1200C 208V	L-051H2TN-208	75994-498
FURNACE MUFFLE LT5/12/C450 1200C 240V	L-051H2TN-240	75994-500
FURNACE MUFFLE LT9/11/B410 1100C 208V	L-091H1RN-208	75993-748
FURNACE MUFFLE LT9/11/B410 1100C 240V	L-091H1RN-240	75993-750
FURNACE MUFFLE LT9/11/C450 1100C 208V	L-091H1TN-208	75994-560
FURNACE MUFFLE LT9/11/C450 1100C 240V	L-091H1TN-240	75994-562
FURNACE MUFFLE LT9/12/B410 1200C 208V	L-091H2RN-208	75994-778
FURNACE MUFFLE LT9/12/B410 1200C 240V	L-091H2RN-240	75994-780
FURNACE MUFFLE LT9/12/C450 1200C 208V	L-091H2TN-208	75994-782
FURNACE MUFFLE LT9/12/C450 1200C 240V	L-091H2TN-240	75994-784
FURNACE MUFFLE LT15/11/B410 1100C 208V	L-151H1RN-208	75994-510
FURNACE MUFFLE LT15/11/B410 1100C 240V	L-151H1RN-240	75994-512
FURNACE MUFFLE LT15/11/C450 1100C 208V	L-151H1TN-208	75994-814
FURNACE MUFFLE LT15/11/C450 1100C 240V	L-151H1TN-240	75993-778
FURNACE MUFFLE LT15/12/B410 1200C 208V	L-151H2RN-208	75994-788
FURNACE MUFFLE LT15/12/B410 1200C 240V	L-151H2RN-240	75993-700
FURNACE MUFFLE LT15/12/C450 1200C208V	L-151H2TN-208	75993-702
FURNACE MUFFLE LT15/12/C450 1200C240V	L-151H2TN-240	75993-704
FURNACE MUFFLE LT24/11/B410 1100C 480V	L-241H1RN-480	75994-518
FURNACE MUFFLE LT24/11/C450 1100C 480V	L-241H1TN-480	75993-784
FURNACE MUFFLE LT24/12/B410 1200C 480V	L-241H2RN-480	75993-714
FURNACE MUFFLE LT24/12/C450 1200C 480V	L-241H2TN-480	75993-716
FURNACE MUFFLE LT40/11/B410 1100C 480V	L-401H1RN-480	75994-798
FURNACE MUFFLE LT40/11/C450 1100C 480V	L-401H1TN-480	75993-788
FURNACE MUFFLE LT40/12/B410 1200C 480V	L-401H2RN-480	75994-794
FURNACE MUFFLE LT40/12/C450 1200C 480V	L-401H2TN-480	75993-718
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FURNACE MUF LE1/11/R7 CMPCT 1110C 204V	LE012K17N-240	75993-654
FURNACE MUF LE1/11/R7 CMPCT 1110C 208V	LE012K17N-208	75993-652
FURNACE MUFFLE LE1/11/R7 1100DEG C 120V	LE012K17N-120	75994-476
FURNACE MUF LE2/11/R7 CMPCT 1110C 120V	LE021K17N-120	75993-656
FURNACE MUF LE2/11/R7 CMPCT 1110C 208V	LE021K17N-208	75993-658
FURNACE MUFFLE LE2/11/R7 1100DEG C 240V	LE021K17N-240	75994-478
FURNACE MUFFLE LE6/11/R7 1100DEG C 120V	LE061K17N-120	75994-480
FURNACE MUFFLE LE6/11/R7 1100DEG C 208V	LE061K17N-208	75994-482
FURNACE MUFFLE LE6/11/R7 1100DEG C 240V	LE061K17N-240	75994-484
FURNACE MUFFLE LE14/11/R7 1100C 208V 14L	LE141K17N-208	75994-486
FURNACE MUFFLE LE14/11/R7 1100C 240V 14L	LE141K17N-240	75994-488
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FURNACE MUFFLE L5/13 B410 1300C 120 V	L-051S3RN-120	75994-720
FURNACE MUFFLE L5/13 B410 1300C 208 V	L-051S3RN-208	75994-722
FURNACE MUFFLE L5/13 B410 1300C 240 V	L-051S3RN-240	75994-724
FURNACE MUFFLE L5/13 C450 1300C 120 V	L-051S3TN-120	75994-726
FURNACE MUFFLE L5/13 C450 1300C 208 V	L-051S3TN-208	75994-490
FURNACE MUFFLE L5/13 C450 1300C 240 V	L-051S3TN-240	75994-492

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FURNACE MUFFLE LT5/13/B410 1300C 120V	L-051T3RN-120	75993-660
FURNACE MUFFLE LT5/13/B410 1300C 208V	L-051T3RN-208	75993-662
FURNACE MUFFLE LT5/13/B410 1300C 240V	L-051T3RN-240	75994-728
FURNACE MUFFLE LT5/13/C450 1300C 120V	L-051T3TN-120	75994-730
FURNACE MUFFLE LT5/13/C450 1300C 208V	L-051T3TN-208	75994-732
FURNACE MUFFLE LT5/13/C450 1300C 240V	L-051T3TN-240	75994-734
FURNACE MUFFLE L9/13 B410 1300C 208 V	L-091S3RN-208	75994-736
FURNACE MUFFLE L9/13 B410 1300C 240 V	L-091S3RN-240	75994-738
FURNACE MUFFLE L9/13 C450 1300C 208 V	L-091S3TN-208	75994-740
FURNACE MUFFLE L9/13 C450 1300C 240 V	L-091S3TN-240	75993-664
FURNACE MUFFLE LT9/13/B410 1300C 208V	L-091T3RN-208	75993-666
FURNACE MUFFLE LT9/13/B410 1300C 240V	L-091T3RN-240	75993-668
FURNACE MUFFLE LT9/13/C450 1300C 208V	L-091T3TN-208	75993-670
FURNACE MUFFLE LT9/13/C450 1300C 240V	L-091T3TN-240	75993-672
FURNACE MUFFLE L15/13/B410 1300C 208V	L-151S3RN-208	75993-674
FURNACE MUFFLE L15/13/B410 1300C 240V	L-151S3RN-240	75994-742
FURNACE MUFFLE L15/13/C450 1300C 208V	L-151S3TN-208	75994-744
FURNACE MUFFLE L15/13/C450 1300C 240V	L-151S3TN-240	75994-746
FURNACE MUFFLE LT15/13/B410 1300C208V	L-151T3RN-208	75994-748
FURNACE MUFFLE LT15/13/B410 1300C240V	L-151T3RN-240	75994-750
FURNACE MUFFLE LT15/13/C450 1300C 240V	L-151T3TN-240	75993-676
FURNACE MUFFLE LT15/13/C450 1300C208V	L-151T3TN-208	75994-752
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FURNACE ASHING LV3/11 B410 1100C 208V	LV031K1RN-208	75994-586
FURNACE ASHING LV3/11 B410 1100C 240V	LV031K1RN-240	75993-816
FURNACE ASHING LV5/11 B410 1100C 208V	LV051K1RN-208	75993-822
FURNACE ASHING LV5/11 B410 1100C 240V	LV051K1RN-240	75993-824
FURNACE ASHING LV5/11 C450 1100C 208V	LV051K1TN-208	75993-826
FURNACE ASHING LV5/11 C450 1100C 240V	LV051K1TN-240	75993-828
FURNACE ASHING LV9/11 B410 1100C 208V	LV091K1RN-208	75993-830
FURNACE ASHING LV9/11 B410 1100C 240V	LV091K1RN-240	75993-832
FURNACE ASHING LV9/11 C450 1100C 208V	LV091K1TN-208	75993-834
FURNACE ASHING LV9/11 C450 1100C 240V	LV091K1TN-240	75993-836
FURNACE ASHING LV15/11 B410 1100C 208V	LV151K1RN-208	75993-814
FURNACE ASHING LV15/11 B410 1100C 240V	LV151K1RN-240	75994-580
FURNACE ASHING LV15/11 C450 1100C 208V	LV151K1TN-208	75994-582
FURNACE ASHING LV15/11 C450 1100C 240V	LV151K1TN-240	75994-584
FURNACE ASHING LVT 3/11 C450 1100C 208V	LV031H1TN-208	75993-838
FURNACE ASHING LVT 3/11 C450 1100C 480V	LV031H1TN-240	75994-588
FURNACE ASHING LVT3/11 B410 1100C 208V	LV031H1RN-208	75994-602
FURNACE ASHING LVT3/11 B410 1100C 240V	LV031H1RN-240	75993-840
FURNACE ASHING LVT5/11 B410 1100C 208V	LV051H1RN-208	75993-842
FURNACE ASHING LVT5/11 B410 1100C 240V	LV051H1RN-240	75993-844
FURNACE ASHING LVT5/11 C450 1100C 208V	LV051H1TN-208	75993-846
FURNACE ASHING LVT5/11 C450 1100C 240V	LV051H1TN-240	75993-848
FURNACE ASHING LVT 9/11 C450 1100C 208V	LV091H1TN-208	75994-590
FURNACE ASHING LVT 9/11 C450 1100C 240V	LV091H1TN-240	75994-592
FURNACE ASHING LVT9/11 B410 1100C 208V	LV091H1RN-208	75993-850
FURNACE ASHING LVT9/11 B410 1100C 240V	LV091H1RN-240	75993-852
FURNACE ASHING LVT15/11 B410 1100C 208V	LV151H1RN-208	75994-594
FURNACE ASHING LVT15/11 B410 1100C 240V	LV151H1RN-240	75994-596
FURNACE ASHING LVT15/11 C450 1100C 208V	LV151H1TN-208	75994-598
FURNACE ASHING LVT15/11 C450 1100C 240V	LV151H1TN-240	75994-600
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FURNACE MUFFLE L9/11/SKM B410 1100C 208V	LM091K1RN-208	75993-922
FURNACE MUFFLE L9/11/SKM B410 1100C 240V	LM091K1RN-240	75993-924
FURNACE MUFFLE L9/11/SKM C450 1100C 208V	LM091K1TN-208	75993-926
FURNACE MUFFLE L9/11/SKM C450 1100C 240V	LM091K1TN-240	75994-634
FURNACE MUF LT9/11/SKM B410 1100C 208V	LM091H1RN-208	75994-636
FURNACE MUF LT9/11/SKM B410 1100C 240V	LM091H1RN-240	75994-638
FURNACE MUF LT9/11/SKM C450 1100C 208V	LM091H1TN-208	75994-640
FURNACE MUF LT9/11/SKM C450 1100C 240V	LM091H1TN-240	75994-642

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FURNACE MUFFLE L9/11/SW B410 1100C 208V	LW091K1RN-208	75994-644
FURNACE MUFFLE L9/11/SW B410 1100C 240V	LW091K1RN-240	75993-928
FURNACE MUFFLE L9/11/SWC450 1100C 208V	LW091K1TN-208	75993-930
FURNACE MUFFLE L9/11/SWC450 1100C 240V	LW091K1TN-240	75993-932
FURNACE MUFFLE L9/12/SW B410 1200C 208V	LW091K2RN-208	75993-934
FURNACE MUFFLE L9/12/SW B410 1200C 240V	LW091K2RN-240	75993-936
FURNACE MUFFLE L9/12/SWC450 1200C 208V	LW091K2TN-208	75993-938
FURNACE MUFFLE L9/12/SWC450 1200C 240V	LW091K2TN-240	75993-940
FURNACE MUFFLE LT9/11/SW B410 1100C 208V	LW091H1RN-208	75993-942
FURNACE MUFFLE LT9/11/SW B410 1100C 240V	LW091H1RN-240	75993-944
FURNACE MUFFLE LT9/11/SW C450 1100C 208V	LW091H1TN-208	75993-946
FURNACE MUFFLE LT9/11/SW C450 1100C 240V	LW091H1TN-240	75993-948
FURNACE MUFFLE LT9/12/SW B410 1200C 208V	LW091H2RN-208	75993-950
FURNACE MUFFLE LT9/12/SW B410 1200C 240V	LW091H2RN-240	75993-952
FURNACE MUFFLE LT9/12/SW C450 1200C 208V	LW091H2TN-208	75993-954
FURNACE MUFFLE LT9/12/SW C450 1200C 240V	LW091H2TN-240	75993-956
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FURNACE ASSAY/ASH N25/13 CUP 1300C 480V	001490500-480	75994-338
FURNACE ASSAY/ASH N4CUP B400 1300C 480V	001490300-480	75994-340
FURNACE ASSAY/ASH N8CUP B400 1300C 480V	001490400-480	75994-336
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FURNACE HARDENING N7/H B400 1280C 208V	N01H0NBNA-208	75993-984
FURNACE HARDENING N7/H C440 1280C 208V	N01H0NCNA-208	75993-980
FURNACE HARDENING N7/H C440 1280C 240V	N01H0NCNA-240	75993-982
FURNACE HARDENING N11/H C440 1280C 208V	N02H0NCNA-208	75993-960
FURNACE HARDENING N11/H C440 1280C 240V	N02H0NCNA-240	75993-962
FURNACE HARDENING N11/HR B400 1280C 480V	N02R0NBNE-480	75993-964
FURNACE HARDENING N11/HR C440 1280C 480V	N02R0NCNE-480	75993-958
FURNACE HARDENING N11H B400 1280C 208V	N02H0NBNA-208	75993-966
FURNACE HARDENING N11H B400 1280C 240V	N02H0NBNA-240	75993-968
FURNACE HARDENING N17/HR B400 1280C 480V	N03R0NBNE-480	75994-850
FURNACE HARDENING N17HR C440 1280C 480V	N03R0NCNE-480	75994-310
FURNACE HARDENING N31/H B400 1280C 480V	N04H0NBNE-480	75994-312
FURNACE HARDENING N31/H C440 1280C 480V	N04H0NCNE-480	75993-970
FURNACE HARDENING N41/H B400 1280C 480V	N05H0NBNE-480	75993-974
FURNACE HARDENING N41/H C440 1280C 480V	N05H0NCNE-480	75993-972
FURNACE HARDENING N61/H B400 1280C 480V	N06H0NBNE-480	75993-976
FURNACE HARDENING N61/H C440 1280C 480V	N06H0NCNE-480	75993-978
FURNACE HARDENING N87/H B400 1280C 480V	N07H0NBNE-480	75993-988
FURNACE HARDENING N87/H C440 1280C 480V	N07H0NCNE-480	75993-986
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FURNACE CHAMBER LH 15/14 B400 1400C 480V	LH0240NBNE-480	75993-900
FURNACE CHAMBER LH15/12 B400 1200C 480V	LH0220NBNE-480	75993-896
FURNACE CHAMBER LH15/12 C440 1200C 480V	LH0220NCNE-480	75993-904
FURNACE CHAMBER LH15/13 B400 1300C 480V	LH0230NBNE-480	75993-898
FURNACE CHAMBER LH15/13 C440 1300C 480V	LH0230NCNE-480	75994-610
FURNACE CHAMBER LH15/14 C440 1400C 480V	LH0240NCNE-480	75993-906
FURNACE CHAMBER LH30/12 B400 1200C 480V	LH0320NBNE-480	75993-920
FURNACE CHAMBER LH30/12 C440 1200C 480V	LH0320NCNE-480	75993-912
FURNACE CHAMBER LH30/13 B400 1300C 480V	LH0330NBNE-480	75993-914
FURNACE CHAMBER LH30/13 C440 1300C 480V	LH0330NCNE-480	75994-612
FURNACE CHAMBER LH30/14 B400 1400C 480V	LH0340NBNE-480	75994-614
FURNACE CHAMBER LH30/14 C440 1400C 480V	LH0340NCNE-480	75993-862
FURNACE CHAMBER LH60/12 C440 1200C 480V	LH0620NCNE-480	75993-916
FURNACE CHAMBER LH60/13 B400 1300C 480V	LH0630NBNE-480	75993-918
FURNACE CHAMBER LH60/13 C440 1300C 480V	LH0630NCNE-480	75993-864
FURNACE CHAMBER LH60/14 B400 1400C 480V	LH0640NBNE-480	75993-866
FURNACE CHAMBER LH60/14 C440 1400C 480V	LH0640NCNE-480	75994-616

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FURNACE CHAMBER LH120/12 C440 1200C 480V	LH1220NCNE-480	75993-902
FURNACE CHAMBER LH120/13 B400 1300C 480V	LH1230NBNE-480	75994-848
FURNACE CHAMBER LH120/13 C440 1300C 480V	LH1230NCNE-480	75994-604
FURNACE CHAMBER LH120/14 B400 1400C 480V	LH1240NBNE-480	75994-606
FURNACE CHAMBER LH120/14 C440 1400C 480V	LH1240NCNE-480	75994-608
FURNACE CHAMBER LH216/12 B400 1200C 480V	LH2120NBNE-480	75994-618
FURNACE CHAMBER LH216/12 C440 1200C 480V	LH2120NCNE-480	75994-620
FURNACE CHAMBER LH216/13 B400 1300C 480V	LH2130NBNE-480	75994-622
FURNACE CHAMBER LH216/13 C440 1300C 480V	LH2130NCNE-480	75994-624
FURNACE CHAMBER LH216/14 B400 1400C 480V	LH2140NBNE-480	75993-908
FURNACE CHAMBER LH216/14 C440 1400C 480V	LH2140NCNE-480	75993-910
FURNACE CHAMBER LF 15/13 B400 1300C 480V	LF0230NBNE-480	75994-630
FURNACE CHAMBER LF15/13 C440 1300C 480V	LF0230NCNE-480	75993-878
FURNACE CHAMBER LF15/14 B400 1400C 480V	LF0240NBNE-480	75993-880
FURNACE CHAMBER LF15/14 C440 1400C 480V	LF0240NCNE-480	75993-882
FURNACE CHAMBER LF 30/13 B400 1300C 480V	LF0330NBNE-480	75994-632
FURNACE CHAMBER LF30/13 C440 1300C 480V	LF0330NCNE-480	75993-884
FURNACE CHAMBER LF30/14 B400 1400C 480V	LF0340NBNE-480	75993-886
FURNACE CHAMBER LF30/14 C440 1400C 480V	LF0340NCNE-480	75993-888
FURNACE CHAMBER LF 60/13 B400 1300C 480V	LF0630NBNE-480	75993-868
FURNACE CHAMBER LF60/13 C440 1300C 480V	LF0630NCNE-480	75993-890
FURNACE CHAMBER LF60/14 B400 1400C 480V	LF0640NBNE-480	75993-892
FURNACE CHAMBER LF60/14 C440 1400C 480V	LF0640NCNE-480	75993-894
FURNACE CHAMBER LF120/13 B400 1300C 480V	LF1230NBNE-480	75993-870
FURNACE CHAMBER LF120/13 C440 1300C 480V	LF1230NCNE-480	75993-872
FURNACE CHAMBER LF120/14 B400 1400C 480V	LF1240NBNE-480	75993-874
FURNACE CHAMBER LF120/14 C400 1400C 480V	LF1240NCNE-480	75993-876
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FURNACE SIC-ROD HTCT 01/16 C 450 208V	LC012H6DN-208	75994-854
FURNACE SIC-ROD HTCT 01/16 C 450 240V	LC012H6DN-240	75994-000
FURNACE SIC-ROD HTCT 03/14 1400C 480V	LC032K4DN-480	75993-990
FURNACE SIC-ROD HTCT 03/14 C450 480 V	LC032H4DN-480	75993-992
FURNACE SIC-ROD HTCT 03/15 1500C 480V	LC032K5DN-480	75993-994
FURNACE SIC-ROD HTCT 03/16 1600C 480V	LC032K6DN-480	75993-996
FURNACE SIC-ROD HTCT 08/14 1400C 480V	LC082K4DN-480	75993-998
FURNACE SIC-ROD HTCT 08/14 C450 480 V	LC082H4DN-480	75994-314
FURNACE SIC-ROD HTCT 08/15 C450 480 V	LC082H5DN-480	75994-002
FURNACE SIC-ROD HTCT 08/16 C450 480 V	LC082K6DN-480	75994-852
FURNACE SIC-ROD HTC08/15 C450 1500C 480V	LC082K5DN-480	75994-316
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FURNACE HI-TEMP LHT01/17 D P470 208 V	LHT107PN1-208	75994-032
FURNACE HI-TEMP LHT01/17 D P470 240 V	LHT107PN1-240	75994-034
FURNACE HIGH TEMP LHT 02/16 1600C 208V	LHT216PN-208	75994-004
FURNACE HIGH TEMP LHT 02/16 1600C 240V	LHT216PN-240	75994-006
FURNACE HIGH TEMP LHT 02/17 1700C 208V	LHT217PN-208	75994-016
FURNACE HIGH TEMP LHT 02/17 1700C 240V	LHT217PN-240	75994-018
FURNACE HI-TEMP LHT02/18 P470 1800C 208V	LHT218PN-208	75994-020
FURNACE HI-TEMP LHT02/18 P470 1800C 240V	LHT218PN-240	75994-022
FURNACE HIGH TEMP LHT 03/17D 1650C 208V	LHT317PN1-208	75994-856
FURNACE HIGH TEMP LHT 03/17D 1650C 240V	LHT317PN1-240	75994-318
OVEN HIGH TEMP LHT 03/17D 650DEG C 480V	NA--1261D2-480	75993-794
FURNACE HIGH TEMP LHT 04/16 1600C 480V	LHT416PN-480	75994-008
FURNACE HI-TEMP LHT04/17 P470 1700C 480V	LHT417PN-480	75994-024
FURNACE HI-TEMP LHT04/18 P470 1800C 480V	LHT418PN-480	75994-026
FURNACE HIGH-TEMP LHT 08 P470 1600C 480V	LHT816PN-480	75994-010
FURNACE HI-TEMP LHT08/17 P470 1700C 480V	LHT817PN-480	75994-028
FURNACE HI-TEMP LHT08/18 P470 1800C 480V	LHT818PN-480	75994-030
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FURNACE HI TEMP HT04/16/P470 1600C 480V	HT0126QNA-480	75994-156
FURNACE HI TEMP HT04/17/P470 1750C 480V	HT0127QNA-480	75994-342
FURNACE HI TEMP HT04/18/P470 1800C 480V	HT0128QNA-480	75994-186

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FURNACE HI TEMP HT08/16/P470 1600C 480V	HT0226QNA-480	75994-158
FURNACE HI TEMP HT08/17/P470 1750C 480V	HT0227QNA-480	75994-344
FURNACE HI TEMP HT08/18/P470 1800C 480V	HT0228QNA-480	75994-188
FURNACE HI TEMP HT16/16/P470 1600C 480V	HT0326QNA-480	75994-160
FURNACE HI TEMP HT16/17/P470 1750C 480V	HT0327QNA-480	75994-346
FURNACE HI TEMP HT 16/18/P470 1800C 480V	HT0328QNA-480	75994-190
FURNACE HI TEMP HT40/16/P470 1600C 480V	HT0426QNA-480	75994-162
FURNACE HI TEMP HT40/17/P470 1750C 480V	HT0427QNA-480	75994-174
FURNACE HI TEMP HT 40/18/P470 1800C 480V	HT0428QNA-480	75994-192
FURNACE HI TEMP HT64/16/P470 1600C 480V	HT0626QNA-480	75994-164
FURNACE HI TEMP HT64/17/P470 1750C 480V	HT0627QNA-480	75994-176
FURNACE HI TEMP HT128/16/P470 1600C 480V	HT1226QNA-480	75994-166
FURNACE HI TEMP HT128/17/P470 1750C 480V	HT1227QNA-480	75994-178
FURNACE HI TEMP HT160/16/P470 1600C 480V	HT1626QNA-480	75994-168
FURNACE HI TEMP HT160/17/P470 1750C 480V	HT1627QNA-480	75994-180
FURNACE HI TEMP HT276/16/P470 1600C 480V	HT2726QNA-480	75994-170
FURNACE HI TEMP HT276/17/P470 1750C 480V	HT2727QNA-480	75994-182
FURNACE HI TEMP HT450/16/P470 1600C 480V	HT4526QNA-480	75994-172
FURNACE HI TEMP HT450/17/P470 1750C 480V	HT4527QNA-480	75994-184
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FURNACE HI TEMP HTC16/16/P470 1600C 480V	HC0326QNA-480	75994-210
FURNACE HI TEMP HTC40/16/P470 1600C 480V	HC0426QNA-480	75994-212
FURNACE HI TEMP HTC64/16/P470 1600C 480V	HC0626QNA-480	75994-214
FURNACE HIGH TEMP HTC 128/16 1600C 480V	HC1226QNA-480	75994-216
OVEN HIGH TEMP HTC 128/16 650DEG C 480V	NA--1261C2-480	75993-792
FURNACE HIGH TEMP HTC 160/16 1600C 480V	HC1626QNA-480	75994-646
FURNACE HIGH TEMP HTC 276/16 1300C 480V	101460120-480	75994-154
FURNACE HIGH TEMP HTC 276/16 1600C 480V	HC2726QNA-480	75994-648
FURNACE HIGH TEMP HTC 450/16 1600C 480V	HC4526QNA-480	75994-650
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FURNACE HI TEMP HFL16/16/P470 1600C 480V	HF0326QNA-480	75994-194
FURNACE HI TEMP HFL16/17/P470 1700C 480V	HF0327QNA-480	75994-202
FURNACE HI TEMP HFL40/16/P470 1600C 480V	HF0426QNA-480	75994-196
FURNACE HI TEMP HFL401/7/P470 1700C 480V	HF0427QNA-480	75994-204
FURNACE HI TEMP HFL64/16/P470 1600C 480V	HF0626QNA-480	75994-198
FURNACE HI TEMP HFL64/17/P470 1700C 480V	HF0627QNA-480	75994-206
FURNACE HIGH TEMP HFL 160/16 1600C 480V	HF1626QNA-480	75994-200
FURNACE HIGH TEMP HFL 160/17 1700C 480V	HF1627QNA-480	75994-208
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OVEN DRYING TR60 B410 300C 208V 3KW2 60L	TR-062BN-208	75993-768
OVEN DRYING TR60 B410 300C 240V 3KW2 60L	TR-062BN-240	75993-770
OVEN DRYING TR60 C450 300C 208V 3KW2 60L	TR-062CN-208	75993-772
OVEN DRYING TR60 C450 300C 240V 3KW2 60L	TR-062CN-240	75993-774
OVEN DRYING TR60 R7 300C 208V 3KW2 60L	TR-062RN-208	75993-760
OVEN DRYING TR60 R7 300DEG C 240V 60 L	TR-062RN-240	75994-808
OVEN DRYG TRS60C450 KW2-6 480V 260C 57L	TRS062CN-480	75994-530
OVEN DRYING TR120 B410 300C 208V 120L	TR-122BN-208	75993-762
OVEN DRYING TR120 B410 300C 240V 120L	TR-122BN-240	75993-764
OVEN DRYING TR120 C450 300C 208V 120L	TR-122CN-208	75993-776
OVEN DRYING TR120 C450 300C 240V 120 L	TR-122CN-240	75994-520
OVEN DRYING TR120 R7 300C 208V 3KW2 120L	TR-122RN-208	75994-804
OVEN DRYING TR120 R7 300C 240V 3KW2 120L	TR-122RN-240	75994-806
OVEN DRYING TRS120C450 EN 480V 260C 117L	TRS122CN-480	75994-532
OVEN DRYING TR240 B410 300C 208V 240 L	TR-242BN-208	75994-304
OVEN DRYING TR240 B410 300C 240V 240 L	TR-242BN-240	75994-306
OVEN DRYING TR240 C450 300C 208V 240 L	TR-242CN-208	75994-522
OVEN DRYING TR240 C450 300C 240V 240 L	TR-242CN-240	75994-524
OVEN DRYING TR240 R7 300C 208V 3KW2 240L	TR-242RN-208	75993-754
OVEN DRYING TR240 R7 300C 240V 3KW2 240L	TR-242RN-240	75993-756
OVEN DRYING TRS240C450 EN 480V 260C 235L	TRS242CN-480	75994-534
OVEN DRYING TR450 B410 300C 480V 450 L	TR-452BN-480	75994-810
OVEN DRYING TR450 C450 300C 480V 450 L	TR-452CN-480	75994-526
OVEN DRYING TR450 R7 300C 480V 6KW2 450L	TR-452RN-480	75993-758

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OVEN DRYING TR1050 B410 300C 480V 1050L	TR-902BN-480	75993-766
OVEN DRYING TR1050 R7 300C 480V 1050 L	TR-902RN-480	75994-802
OVEN DRYING TR1050C450 300C 480V 1050 L	TR-902CN-480	75994-528
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FURNACE FORCED CONVECTION B400 240V 15 L	NA--0161B1-240	76181-258
FURNACE FORCED CONVECTION C440 208V 15 L	NA--0161C1-208	76181-260
FURNACE FORCED CONVECTION C440 240V 15 L	NA--0161C1-240	76181-262
FURNACE AIR CIRC NA30/45 B400 450C 480V	NA--0341D1-480	75994-836
FURNACE AIR CIRC NA30/45 C440 450C 480V	NA--0341C1-480	75994-838
FURNACE NA 30/65 480V 650C CONTROL C440	NA--0361C2-480	75994-830
FURNACE NA 30/65 W/CTRL B400 650C 480V	NA--0361D2-480	75994-828
FURNACE AIR CIRC N30/85HA B400 850C 480V	001337100-480	75994-564
FURNACE AIR CIRC N30/85HA P470 850C 480V	001337160-480	75994-566
FURNACE AIR CIRC NA60/45 B400 450C 480V	NA--0641D2-480	75994-840
FURNACE AIR CIRC NA60/45 C440 450C 480V	NA--0641C2-480	75994-842
FURNACE CHAMBER NA 60/65 B400 480V 60L	NA--0661D2-480	75994-574
FURNACE CHAMBER NA 60/65 C440 480V 60L	NA--0661C2-480	75994-576
FURNACE AIR CIRC N60/85HA B400 850C 480V	001337200-480	75994-578
FURNACE AIR CIRC N60/85HA P470 850C 480V	001337260-480	75993-804
FURNACE AIR CIRC NA120/45 B400 450C 480V	NA--1241D2-480	75993-806
FURNACE AIR CIRC NA120/45 C440 450C 480V	NA--1241C2-480	75993-808
FURNACE AIR CIRC N120/85HA 850C 480 V	001337300-480	75993-796
FURNACE AIR CIRC N120/85HA P470 480 V	001337360-480	75993-798
FURNACE AIR CIRC NA250/45 B400 450C 480V	NA--2541D2-480	75994-832
FURNACE AIR CIRC NA250/45 C440 450C 480V	NA--2541C2-480	75994-834
FURNACE NA 250/65 W/CONTROL B400 480V	NA--2561D2-480	75994-822
FURNACE NA 250/65 W/CONTROL C440 480V	NA--2561C2-480	75994-820
FURNACE AIR CIRC N250/85HA 850C 480 V	001337400-480	75994-824
FURNACE AIR CIRC N250/85HA P470 480 V	001337460-480	75994-826
FURNACE AIR CIRC NA500/45 B400 450C 480V	NA--5041D2-480	75993-810
FURNACE AIR CIRC NA500/45 C440 450C 480V	NA--5041C2-480	75993-812
FURNACE AIR CIRC N500/85HA 850C 480 V	001337500-480	75994-570
FURNACE AIR CIRC N500/85HA P470 480 V	001337560-480	75994-572
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FURNACE TUBE RD30/200/11 R7 1100C 240V	RD30A171A-240	75994-084
FURNACE TUBE RD30/200/13 R7 1300C 208V	RD30A173A-208	75994-086
FURNACE TUBE RD30/200/13 R7 1300C 240V	RD30A173A-240	75994-088
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FURNACE TUBE R50/250/12 B410 1200C 240V	R-151B2AN-240	75994-116
FURNACE TUBE R50/250/12 C450 1200C 208V	R-151C2AN-208	75994-118
FURNACE TUBE R50/250/12 C450 1200C 240V	R-151C2AN-240	75994-120
FURNACE TUBE R50/250/13 B410 1300C 208V	R-151B3AN-208	75994-122
FURNACE TUBE R50/250/13 B410 1300C 240V	R-151B3AN-240	75994-124
FURNACE TUBE R50/250/13 C450 1300C 208V	R-151C3AN-208	75994-126
FURNACE TUBE R50/250/13 C450 1300C 240V	R-151C3AN-240	75994-128
FURNACE TUBE R50/500/12 B410 1200C 208V	R-251B2AN-208	75994-130
FURNACE TUBE R50/500/12 B410 1200C 240V	R-251B2AN-240	75994-132
FURNACE TUBE R50/500/12 C450 1200C 208V	R-251C2AN-208	75994-134
FURNACE TUBE R50/500/12 C450 1200C 240V	R-251C2AN-240	75994-136
FURNACE TUBE R50/500/12 P480 3Z 208 V	R-251P2AN3-208	75994-138
FURNACE TUBE R50/500/12 P480 3Z 240 V	R-251P2AN3-240	75994-140
FURNACE TUBE R50/500/13 B410 1300C 208V	R-251B3AN-208	75994-142
FURNACE TUBE R50/500/13 B410 1300C 240V	R-251B3AN-240	75994-144
FURNACE TUBE R50/500/13 C450 1300C 208V	R-251C3AN-208	75994-146
FURNACE TUBE R50/500/13 C450 1300C 240V	R-251C3AN-240	75994-148
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FURNACE TUBE R50/500/13 P480 1300C 240V	R-251P3AN3-240	75994-152
FURNACE TUBE R120/500 P480 3Z 1200C 480V	R-321P2AN3-480	75994-326
FURNACE TUBE R120/500/12 B410 1200C 480V	R-321B2AN-480	75994-090
FURNACE TUBE R120/500/12 C450 1200C 480V	R-321C2AN-480	75994-324
FURNACE TUBE R120/500/13 B410 1300C 480V	R-321B3AN-480	75994-328

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FURNACE TUBE R120/500/13 C450 1300C 480V	R-321C3AN-480	75994-330
FURNACE TUBE R120/500P480 3Z 1300C 480V	R-321P3AN3-480	75994-332
FURNACE TUBE R170/1000/12 3Z 1200C 480V	R-571P2AN3-480	75994-094
FURNACE TUBE R170/1000/13 3Z 1300C 480V	R-571P3AN3-480	75994-100
FURNACE TUBE R170/750 P480 3Z 1200C 480V	R-471P2AN3-480	75994-106
FURNACE TUBE R170/750/12 B410 1200C 480V	R-471B2AN-480	75994-102
FURNACE TUBE R170/750/12 C450 1200C 480V	R-471C2AN-480	75994-104
FURNACE TUBE R170/750/13 B410 1300C 480V	R-471B3AN-480	75994-108
FURNACE TUBE R170/750/13 C450 1300C 480V	R-471C3AN-480	75994-110
FURNACE TUBE R170/750P480 3Z 1300C 480V	R-471P3AN3-480	75994-112
FURNACE TUB R170/1000/12 B410 1200C 480V	R-571B2AN-480	75994-334
FURNACE TUB R170/1000/12 C450 1200C 480V	R-571C2AN-480	75994-092
FURNACE TUB R170/1000/13 B410 1300C 480V	R-571B3AN-480	75994-096
FURNACE TUB R170/1000/13 C450 1300C 480V	R-571C3AN-480	75994-098
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FURNACE TUBE RT30/200/15 B410 1500C 240V	RT331BAN-240	75994-060
FURNACE TUBE RT30/200/15 C450 1500C 208V	RT331CAN-208	75994-062
FURNACE TUBE RT30/200/15 C450 1500C 240V	RT331CAN-240	75994-064
FURNACE TUBE RT50/250/11 B410 1100C 208V	RT511BAN-208	75994-066
FURNACE TUBE RT50/250/11 B410 1100C 240V	RT511BAN-240	75994-068
FURNACE TUBE RT50/250/11 C450 1500C 208V	RT511CAN-208	75994-070
FURNACE TUBE RT50/250/11 C450 1500C 240V	RT511CAN-240	75994-072
FURNACE TUBE RT50/250/13 B410 1300C 208V	RT521BAN-208	75994-074
FURNACE TUBE RT50/250/13 B410 1300C 240V	RT521BAN-240	75994-076
FURNACE TUBE RT50/250/13 C450 1500C 208V	RT521CAN-208	75994-078
FURNACE TUBE RT50/250/13 C450 1500C 240V	RT521CAN-240	75994-080
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FURNACE TUBE RHTC 80/230C450 1500C 480V	001731200-480	75993-856
FURNACE TUBE RHTC 80/450B410 1500C 480V	001731300-480	75993-858
FURNACE TUBE RHTC 80/450C450 1500C 480V	001731400-480	75993-860
FURNACE TUBE RHTC 80/710B410 1500C 480V	001731500-480	75994-844
FURNACE TUBE RHTC 80/710C450 1500C 480V	001731600-480	75994-846
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FURNACE HIGH-TEMPERATURE VERT 480V 300MM	001484830-480	75994-654
FURNACE HORZ 1600C 480V 470X480X640MM	001484410-480	75994-218
FURNACE HORZ 1600C 480V 500X650X510MM	001484710-480	75994-236
FURNACE HORZ 1600C 480V 580X650X660MM	001484730-480	75994-238
FURNACE HORZ 1600C 480V 580X650X960MM	001484750-480	75994-240
FURNACE HORZ 1600C 480V 620X550X640MM	001484430-480	75994-220
FURNACE HORZ 1600C 480V 920X550X640MM	001484450-480	75994-222
FURNACE HORZ 1700C 480V 470X480X640MM	001484510-480	75994-224
FURNACE HORZ 1700C 480V 620X550X640MM	001484530-480	75994-226
FURNACE HORZ 1700C 480V 920X550X640MM	001484550-480	75994-228
FURNACE HORZ 1800C 480V 470X480X640MM	001484610-480	75994-230
FURNACE HORZ 1800C 480V 620X550X640MM	001484630-480	75994-232
FURNACE HORZ 1800C 480V 920X550X640MM	001484650-480	75994-234
FURNACE TUBE RHTV 50/150 1800DEG C 480V	001484910-480	75994-350
FURNACE TUBE RHTV 80/300 1800DEG C 480V	001484930-480	75994-352
FURNACE TUBE RHTV120/600 1700DEG C 480V	001484850-480	75994-348
FURNACE TUBE RHTV120/600 1800DEG C 480V	001484950-480	75994-354
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FURNACE TUBE RSH 50/250 1300DEG C 240V	RS151B3AN-240	75994-358
FURNACE RSH 50/500 1100C 208V W/CONTROL	RS251B2AN-208	75994-860
FURNACE RSH 50/500/11 1100C 208V 50MM	RS251P2AN3-208	75994-272
FURNACE TUBE RSH 80/500 1100DEG C 480V	RS381B2AN-480	75994-360
FURNACE TUBE RSH 80/500 B400 1300C 480V	RS381B3AN-480	75994-658
FURNACE TUBE RSH 80/500 P480 1100C 480V	RS381P2AN3-480	75994-656
FURNACE RSH 80/750/11 1100C 480V 80MM	RS481P2AN3-480	75994-246
FURNACE RSH 120/750/13 1300C 480V 120MM	RS421B3AN-480	75994-264
FURNACE TUB RSH 120/1000 B400 1100C 480V	RS521B2AN-480	75994-662
FURNACE TUB RSH 120/1000 B400 1300C 480V	RS521B3AN-480	75994-666
FURNACE TUB RSH 120/1000 P480 1100C 480V	RS521P2AN3-480	75994-664

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FURNACE TUB RSH 120/1000 P480 1300C 480V	RS521P3AN3-480	75994-668
FURNACE TUBE RSH 120/750 P480 1300C 480V	RS421P3AN3-480	75994-660
FURNACE TUBE RSH 170/750 B400 1100C 480V	RS471B2AN-480	75994-670
FURNACE TUBE RSH 170/750 B400 1300C 480V	RS471B3AN-480	75994-674
FURNACE TUBE RSH 170/750 P480 1100C 480V	RS471P2AN3-480	75994-672
FURNACE TUB RSH 170/1000 HORZ 1100C 480V	RS571P2AN3-480	75994-362
FURNACE TUB RSH 170/1000 HORZ 1300C 480V	RS571B3AN-480	75994-364
FURNACE RSH 170/1000 W/CTRL 1300C 480V	RS571P3AN3-480	75994-858
FURNACE RSH 170/750/13 1300C 480V 120MM	RS471P3AN3-480	75994-266
FURNACE RSH 500/11 1100C 240V B400 50MM	RS251B2AN-240	75994-270
FURNACE RSH 500/11 1100C 240V P480 50MM	RS251P2AN3-240	75994-274
FURNACE RSH 500/11 1100C 480V B400 120MM	RS321B2AN-480	75994-252
FURNACE RSH 500/11 1100C 480V P480 120MM	RS321P2AN3-480	75994-258
FURNACE RSH 500/13 1300C 480V B400 120MM	RS321B3AN-480	75994-254
FURNACE RSH 500/13 1300C 480V B400 50MM	RS251B3AN-208	75994-276
FURNACE RSH 500/13 1300C 480V P480 120MM	RS321P3AN3-480	75994-256
FURNACE RSH 500/13 1300C 480V P480 50MM	RS251B3AN-240	75994-278
FURNACE RSH 750/11 1100C 480V B400 120MM	RS421B2AN-480	75994-260
FURNACE RSH 750/11 1100C 480V P480 120MM	RS421P2AN3-480	75994-262
FURNACE TUBE RSV 50/250 B400 1300C 208V	RI151B3AN-208	75994-698
FURNACE TUBE RSV 50/250 B400 1300C 240V	RI151B3AN-240	75994-700
FURNACE RSV 50/250/11 1100C 208V 50MM	RI151B2AN-208	75994-284
FURNACE RSV 50/250/11 1100C 240V 50MM	RI151B2AN-240	75994-286
FURNACE RSV 50/500/11 1100C 480V 50MM	RI251B2AN-480	75994-288
FURNACE TUBE RSV 50/500 B400 1300C 480V	RI251B3AN-480	75994-702
FURNACE TUBE RSV 50/500 P480 1300C 480V	RI251P3AN3-480	75994-862
FURNACE TUBE RSV 50/500P480 1100C 480V	RI251P2AN3-480	75994-676
FURNACE TUBE RSV 80/500 B400 1300C 480V	RI381B3AN-480	75994-864
FURNACE TUBE RSV 80/500 P480 1300C 480V	RI381P3AN3-480	75994-366
FURNACE TUBE RSV 80/500B400 1100C 480V	RI381B2AN-480	75994-678
FURNACE TUBE RSV 80/500P480 1100C 480V	RI381P2AN3-480	75994-680
FURNACE TUBE RSV 80/750 B400 1300C 480V	RI481B3AN-480	75994-368
FURNACE TUBE RSV 80/750 P480 1300C 480V	RI481P3AN3-480	75994-370
FURNACE TUBE RSV 80/750B400 1100C 480V	RI481B2AN-480	75994-682
FURNACE RSV 80/750/11 1100C 480V 80MM	RI481P2AN3-480	75994-290
FURNACE TUBE RSV 120/500 B400 1300C 480V	RI321B3AN-480	75994-372
FURNACE TUBE RSV 120/500 P480 1300C 480V	RI321P3AN3-480	75994-374
FURNACE TUBE RSV 120/750 B400 1300C 480V	RI421B3AN-480	75994-376
FURNACE TUBE RSV 120/750 P480 1300C 480V	RI421P3AN3-480	75994-704
FURNACE TUBE RSV 120/750P480 1100C 480V	RI421P2AN3-480	75994-684
FURNACE RSV 120/750/11 1100C 480V 120MM	RI421B2AN-480	75994-296
FURNACE TUBE RSV 120/1000P480 1100C 480V	RI521P2AN3-480	75994-688
FURNACE TUB RSV 120/1000 B400 1100C 480V	RI521B2AN-480	75994-686
FURNACE TUB RSV 120/1000 B400 1300C 480V	RI521B3AN-480	75994-706
FURNACE TUB RSV 120/1000 P480 1300C 480V	RI521P3AN3-480	75994-708
FURNACE TUBE RSV 170/750 B400 1300C 480V	RI471B3AN-480	75994-710
FURNACE TUBE RSV 170/750 P480 1300C 480V	RI471P3AN3-480	75994-712
FURNACE TUBE RSV 170/750B400 1100C 480V	RI471B2AN-480	75994-690
FURNACE TUBE RSV 170/750P480 1100C 480V	RI471P2AN3-480	75994-692
FURNACE TUB RSV 170/1000 B400 1300C 480V	RI571B3AN-480	75994-714
FURNACE TUB RSV 170/1000 P480 1300C 480V	RI571P3AN3-480	75994-716
FURNACE TUBE RSV 170/1000B400 1100C 480V	RI571B2AN-480	75994-694
FURNACE TUBE RSV 170/1000P480 1100C 480V	RI571P2AN3-480	75994-696
FURNACE RSV 500/11 1100C 480V B400 120MM	RI321B2AN-480	75994-292
FURNACE RSV 500/11 1100C 480V P480 120MM	RI321P2AN3-480	75994-294

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FURNACE MELTING K 1/10 R7 1000C 240 V	001420127-240	75994-322
FURNACE MELTING K 1/13 R7 1300C 208 V	001420427-208	75994-036
FURNACE MELTING K 1/13 R7 1300C 240 V	001420427-240	75994-038
FURNACE MELTING K 2/10 R7 1000C 208 V	001420227-208	75994-040
FURNACE MELTING K 2/10 R7 1000C 240 V	001420227-240	75994-042
FURNACE MELTING K 2/13 R7 1300C 208 V	001420527-208	75994-044
FURNACE MELTING K 2/13 R7 1300C 240 V	001420527-240	75994-046

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FURNACE MELTING K 4/10 R7 1000C 208 V	001420327-208	75994-048
FURNACE MELTING K 4/10 R7 1000C 240 V	001420327-240	75994-050
FURNACE MELTING K 4/13 R7 1300C 480 V	001420627-480	75994-052
FURNACE MELTING KC1/15 3508 1500C 480 V	001420730-480	75994-054
FURNACE MELTING KC2/15 3508 1500C 480 V	001420780-480	75994-056

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FURNACE FST-FIRING LS25/13 P470 480V 25L	101475220-480	75994-628

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