

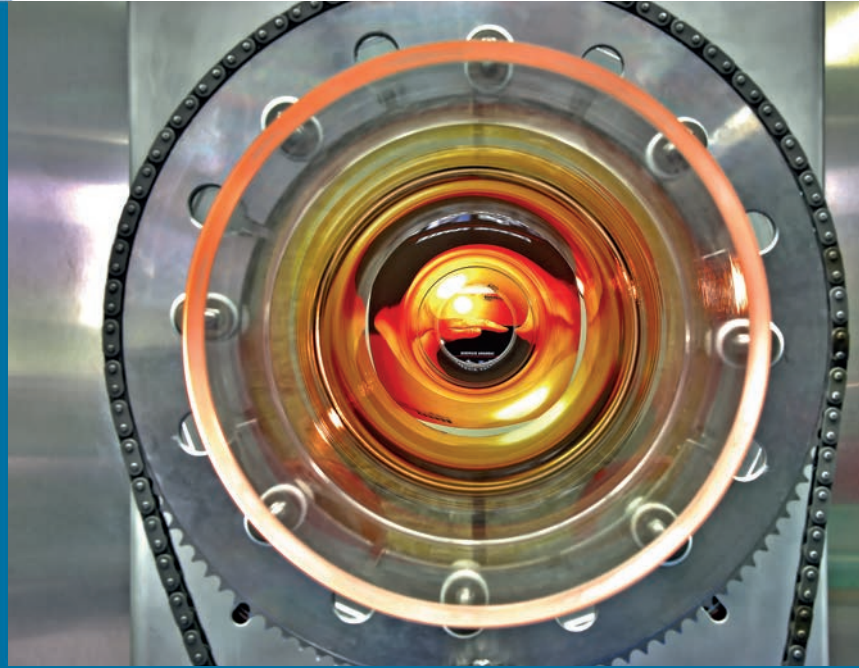
# linn



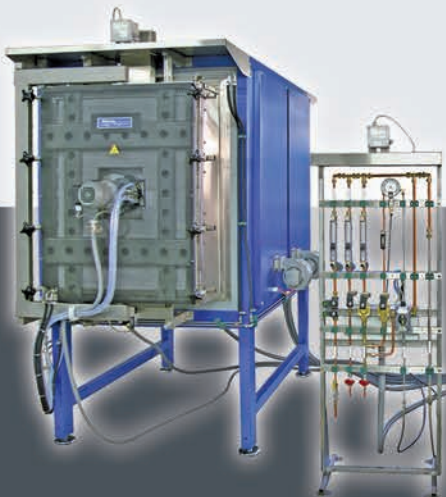
## High Therm

RESISTANCE,  
INDUCTION AND  
MICROWAVE-  
HEATING SYSTEMS

Innovative - Quality-oriented - Reliable



**50** Years  
Burning  
for  
you



## Linn High Therm GmbH

The family-owned company Linn High Therm GmbH has been founded in 1969 through Mr. Horst Linn sen. and the business has been continued since 2014 from his son Horst Linn in 2nd generation. The company is headquartered in Eschenfelden (Bavaria) and has a further location in Bad Frankenhausen (Thuringia).

Linn High Therm GmbH is specialised in production and service of electrically heated heat treatment units for its customers worldwide. The special strength hereby lies in the development, conception and production of customized special units. A variety of standard products completes the product range and is the basis for cost-effective design based on a modular construction system.

LINN HIGH THERM GmbH offers basically the following three heating technologies as well as combinations from it:

- Resistance heating
- Microwave heating
- Induction heating

Linn High Therm GmbH looks back on 50 years

experience. Continuous innovation, the keeping and increasing of knowledge and know how have been in the foreground ever since.



### **Our vision**

Quality determines our acting for a better future. We will pursue our business goals with passion and engagement. Our goal is to create the highest customer satisfaction with responsible staff.

### **Our mission**

We are proud to execute in time qualitative and innovative units according to customer satisfaction with our sustainable action. We consider ourselves equally as service providers for customers, partners and colleagues. Motivated and solution oriented staff is eager to realize your requests and challenges! Always according to the motto: „Burning for you“.

### **Our values and principles**

I behave how I expect it from the others. Honesty and confidence are for us the basis for a respectful social interaction with each other. Through reliability and assuming of responsibility solution and cost oriented services are rendered. Open and appreciative communication ensures transparency over all business units.

## Content

### Resistance heated furnaces

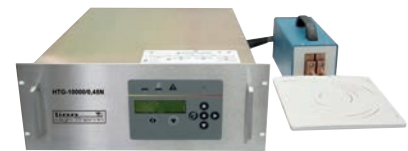
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# Chamber furnaces under air

## LHT-/ LHT-Vac-Series



Heating / drying unit,  
32 - 1060 l.

Tmax  
300 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
LHT 30	32	300	400 x 250 x 320	1,6
LHT 55	53	300	400 x 330 x 400	2,0
LHT 75	74	300	400 x 330 x 560	2,5
LHT 110	108	300	560 x 400 x 480	2,8
LHT 160	161	300	560 x 400 x 720	3,2
LHT 260	256	300	640 x 500 x 800	3,4
LHT 450	449	300	1040 x 600 x 720	5,8
LHT 750	749	300	1040 x 600 x 1200	7,0
LHT 1060	1060	300	1040 x 850 x 1200	7,0
LHT 200 Vac	29	200	385 x 250 x 305	0,8
LHT 400 Vac	49	200	385 x 330 x 385	2,0
LHT 500 Vac	101	200	545 x 400 x 465	2,4

Options:

- Control: Different temperature controller, data recording.
- Temperature and cycle time: Air circulation for good heat transfer and constant temperature.
- Gas/Safety: Protective gas purge with inert gases.
- Charge/Operation: Charge racks and accessories.
- Additional options for LHT-Vac: Separate heated insert sheets with temperature control, vacuum pumps.

## LM-Series



Laboratory furnace, ASW-insulation,  
1,5 - 18,4 l.

Tmax  
1340 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
LM-112	1,5	1100	100 x 150 x 100	0,6
LM-312	5,0	1200	175 x 300 x 95	2,8
LM-412	8,4	1200	175 x 320 x 150	3,2
LM-512	18,4	1200	200 x 400 x 230	6,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple, reinforced thermocouple.
- Temperature and cycle time: Increased power.
- Gas/Safety: Protective gas purge with inert gases.
- Charge/Operation: Charge racks and accessories, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit, thermal post combustion.

## VMK-Series



Laboratory chamber furnace,  
ASW-insulation, 1 - 25 l.

Tmax  
1200 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
VMK-10	1,0	1200	100 x 100 x 100	0,6
VMK-22	2,2	1200	130 x 170 x 100	0,9
VMK-39	3,9	1200	180 x 200 x 110	1,3
VMK-80	7,7	1200	210 x 230 x 160	2,1
VMK-135	13,5	1200	250 x 300 x 180	2,6
VMK-250	25,0	1200	250 x 400 x 250	3,7

Options:

- Control: Different temperature controller, data recording, trailing thermocouple, PT/Rh-thermocouple type S.
- Temperature and cycle time: Increased power.
- Gas/Safety: Protective gas purge with inert gases.
- Charge/Operation: Charge racks and accessories, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit, thermal post combustion.

# Chamber furnaces under air

## KK-H-Series



Options:

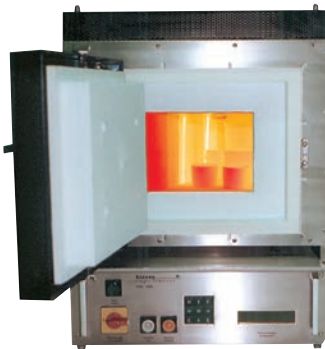
- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: Multiple zone heating for uniform temperature distribution, ASW-insulation for extreme fast recooling cycles.
- Charge/Operation: Charge racks and accessories, second boogie hearth, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit/ Exhaust flaps, thermal post combustion.

Boogie hearth furnace,  
stone and ASW-insulation, 1050 - 2830 l.

Tmax 1400 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
KK-H 1000 L	1050	1280	850 x 1450 x 840	70
KK-H 2000 L	1900	1280	920 x 1950 x 1060	120
KK-H 3000 L	2830	1280	920 x 2900 x 1060	160
KK-H 1000	1050	1340	850 x 1450 x 840	70
KK-H 2000	1900	1340	920 x 1950 x 1060	120
KK-H 3000	2830	1340	920 x 2900 x 1060	160

## VMK-HT-Series



Laboratory chamber furnace, high  
temperature, PCW-insulation, 3,9 - 11,9 l.

Tmax 1800 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
VMK-1400	6,8	1400	170 x 270 x 150	3,5
VMK-1600	6,8	1600	170 x 270 x 150	3,5
VMK-1600-G	11,9	1600	170x 350 x 200	5,0
VMK-1800	3,9	1800	150 x 240 x 110	4,0
VMK-1800-G	8,9	1800	150 x 330 x 180	5,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Gas/Safety: Protective gas purge with inert gases.
- Charge/Operation: Charge racks and accessories, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit, thermal post combustion.

## HT-Eco-Series



Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: Increased power.
- Gas/Safety: Protective gas purge with inert gases.
- Charge/Operation: Charge racks and accessories, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit, thermal post combustion.

Chamber furnace, high temperature,  
PCW-insulation, 40 - 390 l.

Tmax 1800 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
HT 1600 ECO 40	40	1600	320 x 400 x 320	10
HT 1600 ECO 60	60	1600	375 x400 x 400	14
HT 1600 ECO 120	120	1600	450 x 530 x 500	21
HT 1600 ECO 180	180	1600	500 x 600 x600	30
HT 1600 ECO 270	270	1600	600 x 750 x600	40
HT 1600 ECO 390	390	1600	600 x 800 x 810	45
HT 1800 ECO 40	40	1750	320 x 400 x 320	10
HT 1800 ECO 60	60	1750	375 x400 x 400	14
HT 1800 ECO 120	120	1750	450 x 530 x 500	21
HT 1800 ECO 180	180	1750	500 x 600 x600	30
HT 1800 ECO 270	270	1750	600 x 750 x600	40
HT 1800 ECO 390	390	1750	600 x 800 x 810	45
HT 1800 ECO Plus 40	40	1800	320 x 400 x 320	12
HT 1800 ECO Plus 60	60	1800	375 x400 x 400	16
HT 1800 ECO Plus 120	120	1800	450 x 530 x 500	25
HT 1800 ECO Plus 180	180	1800	500 x 600 x600	35
HT 1800 ECO Plus 270	270	1800	600 x 750 x600	45
HT 1800 ECO Plus 390	390	1800	600 x 800 x 810	50

# Chamber furnaces under air / Protective gas furnaces


## AK-/ HK-/ AHK-Series



Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Gas/Safety: Protective gas purge with inert gases and sheet housing around insulation.
- Charge/Operation: Charge racks and accessories, lifting door, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit/Exhaust flaps.

Chamber furnace for annealing and hardening, stone and ASW-insulation, 22 - 603 l.

T<sub>max</sub> 1300 °C 

Type	Liter	T <sub>max</sub> °C	Useful chamber mm (wxdxh)	kW
AK-30*	22	550	240 x 380 x 240	5,0
AK-40**	40	800	340 x 500 x 240	9,0
AK-70**	72	800	400 x 600 x 300	12,0
AK-160	160	800	500 x 800 x 400	18,0
AK-315	315	800	630 x 1000 x 500	36,0
AK-600	600	800	800 x 1300 x 580	42,0
HK-30*	31	1200	270 x 420 x 270	7,5
HK-40**	40	1200	340 x 500 x 240	13,5
HK-70**	72	1200	400 x 600 x 300	18,0
HK-160	160	1200	500 x 800 x 400	26,0
HK-315	315	1200	630 x 1000 x 500	41,0
HK-600	600	1200	800 x 1300 x 580	54,0
AHK-40**	40	1200 H / 800 A	340 x 500 x 240	13,5
AHK-70**	72	1200 H / 800 A	400 x 600 x 300	18,0
AHK-160	160	1200 H / 800 A	500 x 800 x 400	26,0
AHK-315	315	1200 H / 800 A	630 x 1000 x 500	41,0
AHK-600	600	1200 H / 800 A	800 x 1300 x 580	54,0

\*Table device, \*\*also possible as table device, H = hardening, A = annealing

## KK-DH-Series



Rotary hearth furnace, stone and ASW-insulation, 80 - 1060 l.

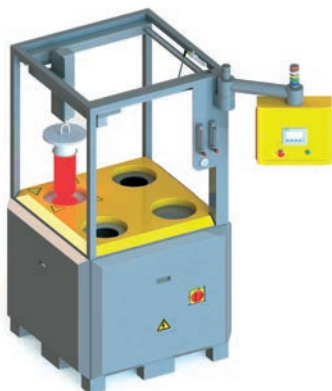
T<sub>max</sub> 1100 °C 

Type	Liter	T <sub>max</sub> °C	Trays	Height of trays mm	Useful chamber mm (wxdxh)	kW
KK-DH 80	80	1100	2	200	400 x 400 x 480	7,5
KK-DH 170	170	1100	2	250	460 x 610 x 590	15,0
KK-DH 260	260	1100	2	300	610 x 610 x 700	18,0
KK-DH 1000	1060	1100	3	300	1000 x 1000 x 1060	43,0

Options:

- Control: Different temperature controller, data recording.
- Charge/Operation: Charge racks and accessories, inspection glass for visualization of process control or additional pyrometer measurement.
- Exhaust treatment: Exhaust unit, thermal post combustion.

## 6-SL-Series



Shaft furnace with gas circulation and quenching unit, ASW-insulation, 34 l.

T<sub>max</sub> 650 °C 

For thermal treatment of small parts in loading baskets under protective gas.

Type	Liter	T <sub>max</sub> °C	Inner Ø mm	Heated length mm	kW
6-SL-25	34	650	270	450	7

# Protective gas-/ vacuum chamber furnaces

## KS-S-Series



Customer specific sizes up to 3 m<sup>3</sup>

Chamber furnace, stone and ASW-insulation, gas tight muffle, 69 - 462 l.

T<sub>max</sub> 1200 °C 

Type	Liter	T <sub>max</sub> °C	Useful chamber mm (wxdxh)	kW
KS-80-S	69	1050	340 x 600 x 340	18
KS-160-S	166	1050	440 x 700 x 540	26
KS-240-S	245	1050	490 x 800 x 640	44
KS-480-S	462	1050	580 x 950 x 840	56

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control for best temperature distribution, circulation for good heat transfer and constant temperature, reinforced air circulation for better temperature distribution and heat transfer, fast cooling for short cycles, gas recooling for fast cycles, ASW-complete insulation for extrem fast cooling cycles, reinforced heating power, inonel muffle for T<sub>max</sub> 1100 °C/1200 °C.
- Gas/Safety: Gas feeding device for vacuum, burn-off device, gas warning system, safety package, gas mixer/MFC, gas pre-heating.
- Charge/Operation: Charge racks and accessories, furnace underframe, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap, TPC (thermal post combustion), washer.

## KS-Vac-Series



Customer specific sizes up to 1 m<sup>3</sup>

Chamber furnace, stone and PCW-insulation, vacuum tight muffle, 57 - 462 l.

T<sub>max</sub> 1200 °C 

KS vacuum furnaces with muffle made of heat resistant steel 1.4841				
Type	Liter	T max °C *	Useful chamber mm (wxdxh)	kW
KS-80-Vac	69	400 Vac / 1050 P	340 x 600 x 340	18
KS-160-Vac	166	400 Vac / 1050 P	440 x 700 x 540	26
KS-240-Vac	245	400 Vac / 1050 P	490 x 800 x 640	44
KS-480-Vac	462	400 Vac / 1050 P	580 x 950 x 840	56

KS vacuum furnaces with muffle made of Inconel				
Type	Liter	T max °C *	Useful chamber mm (wxdxh)	kW
KS-80-Vac	69	600 Vac / 1100 P	340 x 600 x 340	18
KS-160-Vac	166	600 Vac / 1100 P	440 x 700 x 540	26
KS-240-Vac	245	550 Vac / 1100 P	490 x 800 x 640	44
KS-480-Vac	462	550 Vac / 1100 P	580 x 950 x 840	56

KS vacuum furnaces with cylindric muffle made of Inconel				
Type	Liter	T max °C *	Useful chamber mm (Øxd)	kW
KS-80-Vac	57	900 Vac / 1100 P	350 x 550	18
KS-160-Vac	110	900 Vac / 1100 P	430 x 650	26
KS-240-Vac	157	800 Vac / 1100 P	490 x 750	44
KS-480-Vac	260	800 Vac / 1100 P	570 x 900	56

\* Vac = vacuum, P = protective gas

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control, multiple zones for best temperature distribution, circulation for good heat transfer and constant temperature, reinforced air circulation for better temperature distribution and heat transfer, fast cooling for short cycles, gas recooling for fast cycles, ASW-complete insulation for extrem fast cooling cycles, reinforced heating power, Inconel muffle for T<sub>max</sub> 1100/1200 °C.
- Gas/Safety: Gas feeding device for vacuum, burn-off device, gas warning system, safety package, gas mixer/MFC, gas pre-heating.
- Vacuum: Vacuum pump, partial pressure control 10-1100 mbar, vacuum pump for higher vacuum 10<sup>-2(3)</sup> mbar.
- Charge/Operation: Charge racks and accessories, furnace underframe, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap, TPC (thermal post combustion).

# Protective gas-/ vacuum chamber furnaces

## VMK-S-Series



Laboratory chamber furnace, ASW-insulation, gas tight, 2,5 - 15 l.  $T_{max}$  1100 °C

Type	Liter	$T_{max}$ °C	Useful chamber mm (wxdxh)	kW
VMK-39-S	2,5	1050	150 x 180 x 95	1,9
VMK-80-S	5,2	1050	180 x 210 x 140	2,3
VMK-135-S	9,2	1050	220 x 280 x 150	3,0
VMK-250-S	15,0	1050	200 x 360 x 210	5,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: Air circulation for good heat transfer and constant temperature (only for VMK-250-S), fast cooling for short cycles.
- Gas/Safety: Gas feeding device, burn-off device, gas warning system, safety package, gas mixer/MFC.
- Charge/ Operation: Charge racks and accessories, door guide rails, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap.

## VMK-Vac-Series



Laboratory chamber furnace, ASW-insulation, gas and vacuum tight, 1,9 - 12,2 l.  $T_{max}$  1150 °C

Type	Liter	$T_{max}$ °C	Useful chamber mm (wxdxh)	kW
VMK-39-Vac	1,9	1050	135 x 170 x 80	2,2
VMK-80-Vac	4,0	1050	160 x 190 x 130	2,6
VMK-135-Vac	7,2	1050	200 x 260 x 140	3,5
VMK-250-Vac	12,2	1050	180 x 340 x 200	5,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: air circulation for good heat transfer and constant temperature (only for VMK-250-Vac), fast cooling for short cycles.
- Gas/Safety: Gas feeding device for vacuum, burn-off device, safety package, gas warning system, gas mixer/MFC.
- Vacuum: Vacuum pump, partial pressure control 10-1100 mbar.
- Charge/Operation: Charge racks and accessories, door guide rails, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap.

## KKV-/ KKH-Series



Cold wall furnaces with metallic heater and radiation shield package as insulation, gas and vacuum tight.  $T_{max}$  2400 °C

Furnaces of this series are designed and manufactured depending on customer's process requirements.

Type	$T_{max}$ °C	Useful chamber Ø	Heated length	kW
KKV / KKH	2400	100 - 1000 mm	100 - 1000 mm	20 - 300

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control, molybdenum or tungsten heating elements, gas recooling for fast cycles.
- Gas/ Safety: Gas feeding device for vacuum, burn-off device, safety package, gas warning system, gas mixer/MFC.
- Vacuum: Vacuum pump, partial pressure control 10-1100 mbar, vacuum pump for higher vacuum  $10^{-6}$  mbar.
- Charge/Operation: Charge racks and accessories, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap, washer.



# Protective gas-/ vacuum chamber furnaces

## HT-Series



Chamber furnace, high temperature,  
ASW-insulation, gas tight, 3 - 52,5 l.

Tmax  
1820 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
HT-1400	4,0	1400	130 x 190 x 160	3,5
HT-1400-M	12,5	1400	250 x 200 x 250	6,0
HT-1400-G	26,0	1400	250 x 350 x 300	9,0
HT-1400-GT	52,5	1400	250 x 700 x 300	16,0
HT-1600	4,0	1600	130 x 190 x 160	4,0
HT-1600-M	12,5	1600	250 x 200 x 250	6,0
HT-1600-G	26,0	1600	250 x 350 x 300	9,0
HT-1600-GT	52,5	1600	250 x 700 x 300	16,0
HT-1800	4,0	1750	130 x 190 x 160	4,0
HT-1800-M	12,5	1750	250 x 200 x 250	6,0
HT-1800-G	26,0	1750	250 x 350 x 300	9,0
HT-1800-GT	52,5	1750	250 x 700 x 300	16,0
HT-1800-Plus	3,0	1820	110 x 170 x 160	5,0
HT-1800-M-Plus	9,5	1820	230 x 180 x 230	8,0
HT-1800-G-Plus	21,0	1820	230 x 330 x 280	12,0
HT-1800-GT-Plus	44,0	1820	230 x 680 x 280	21,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple. • Temperature and cycle time: 3-zone-control, molybdenum or tungsten heating elements for higher temperatures under protective gas, insulation for hydrogen operation, inner insulation made of fire resistant stones for hydrogen operation >1600 °C, gas recooling for fast cycles. • Gas/Safety: Gas feeding device, burn-off device, safety package, gas warning system, gas mixer/MFC. • Charge/Operation: Charge racks and accessories, furnace underframe, inspection glass for visual process control or additional pyrometer measurement, door guide rails, • Exhaust treatment: Condensate trap, washer.

## HT-Vac-Series



Chamber furnace, high temperature,  
ASW-insulation, gas and vacuum tight,  
3 - 52,5 l.

Tmax  
1820 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
HT-1400-Vac	4,0	1400	130 x 190 x 160	3,5
HT-1400-M-Vac	12,5	1400	250 x 200 x 250	6,0
HT-1400-G-Vac	26,0	1400	250 x 350 x 300	9,0
HT-1400-GT-Vac	52,5	1400	250 x 700 x 300	16,0
HT-1600-Vac	4,0	1600	130 x 190 x 160	4,0
HT-1600-M-Vac	12,5	1600	250 x 200 x 250	6,0
HT-1600-G-Vac	26,0	1600	250 x 350 x 300	9,0
HT-1600-GT-Vac	52,5	1600	250 x 700 x 300	16,0
HT-1800-Vac	4,0	1750	130 x 190 x 160	4,0
HT-1800-M-Vac	12,5	1750	250 x 200 x 250	6,0
HT-1800-G-Vac	26,0	1750	250 x 350 x 300	9,0
HT-1800-GT-Vac	52,5	1750	250 x 700 x 300	16,0
HT-1800-Plus-Vac	3,0	1750	110 x 170 x 160	5,0
HT-1800-M-Plus-Vac	9,5	1820	230 x 180 x 230	8,0
HT-1800-G-Plus-Vac	21,0	1820	230 x 330 x 280	12,0
HT-1800-GT-Plus-Vac	44,0	1820	230 x 680 x 280	21,0

Options:

- Control: Different temperature controller, data recording, trailing thermocouple. • Temperature and cycle time: 3-zone-control, molybdenum or tungsten heating elements for higher temperatures under protective gas, insulation for hydrogen operation, inner insulation made of fire resistant stones for hydrogen operation >1600 °C, gas recooling for fast cycles. • Gas/Safety: Gas feeding device for vacuum, burn-off device, safety package, gas warning system, gas mixer/MFC. • Vacuum: Vacuum pump, partial pressure control 10-1100 mbar, vacuum pump for higher vacuum 10<sup>-2(3)</sup> mbar. • Charge/Operation: Charge racks and accessories, furnace underframe, inspection glass for visual process control or additional pyrometer measurement, door guide rails. • Exhaust treatment: Condensate trap, washer.

# Protective gas-/ vacuum chamber furnaces

## HT-Graphit-Series



Chamber furnace, high temperature, graphite felt and ASW-insulation, gas and / or vacuum tight, 2 - 39,8 l.

Tmax 2200 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
HT-1900	2,0	1950	100 x 160 x 130	11
HT-1900-M	8,0	1950	220 x 170 x 220	14
HT-1900-G	16,6	1950	220 x 280 x 270	21
HT-1900-GT	39,8	1950	220 x 670 x 270	28
HT-1900-Vac	2,0	1950	100 x 160 x 130	11
HT-1900-M-Vac	8,0	1950	220 x 170 x 220	14
HT-1900-G-Vac	16,6	1950	220 x 280 x 270	21
HT-1900-GT-Vac	39,8	1950	220 x 670 x 270	28

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control, gas recooling for fast cycles.
- Gas/Safety: Gas feeding device, burn-off device, safety package, gas warning system, gas mixer/MFC.
- Vacuum (only HT-Graphit Vac): Gas feeding device for vacuum, vacuum pump, partial pressure control 10-1100 mbar, vacuum pump for higher vacuum 10<sup>-3(4)</sup> mbar.
- Charge/Operation: Charge racks and accessories, furnace underframe, inspection glass for visual process control or additional pyrometer measurement, door guide rails.
- Exhaust treatment: Condensate trap, washer.

## FBV-/ GBV-Series



Chamber furnace, bottom loader, PCW- and/or graphite felt-insulation, high temperature, gas tight, 2 - 1000 l.

Tmax 2400 °C 

Furnaces of this series are designed and manufactured depending on process according to customer's requirements.

Type	Liter	Tmax °C	kW
FBV	2 - 1000	1800	4 - 100
GBV	2 - 1000	2400	8 - 160

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control, graphite-, molybdenum or tungsten heating elements, gas recooling for fast cycles.
- Gas/Safety: Gas feeding device for vacuum, burn-off device, safety package, gas warning system, gas mixer/MFC.
- Charge/Operation: Charge racks, fork lift, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Condensate trap, TPC (thermal post combustion), washer.

# Protective gas-/ vacuum chamber furnaces / tube furnaces

## FKH-/ GKH-Series



Options:

- Control: Different temperature controller, data recording, trailing thermocouple. • Temperature and cycle time: 3-zone-control, Graphit-, molybdenum or tungsten heating elements, gas recooling for fast cycles. • Gas/Safety: Gas feeding device for over pressure/vacuum, burn-off device, safety package, gas warning system, gas mixer/MFC. • Vacuum: Vacuum pump, pressure regulation. • Charge/Operation: Charge racks and accessories, inspection glass for visual process control or additional pyrometer measurement. • Exhaust treatment: Condensate trap, washer.

Chamber furnace, high pressure, water cooled pressure vessel, PCW- and/or graphite felt-insulation, gas and vacuum tight, Pmax 200 bar, 2 - 5,4 l. Tmax 2200 °C

Type	Liter	T max °C	Pmax bar	Atmosphere	Useful chamber (wxdxh) (Øxd) mm	kW
FKH-100x160/120/1000 (Rubistar 100/1000)	2,0	1000	100	Luft, Ar, N <sub>2</sub>	100 x 120 x 160	8
FKH-100x160/120/1800 (Rubistar 50/1800)	2,0	1800	50	Ar, N <sub>2</sub>	100 x 120 x 160	8
GKH-100/120/2200	1,0	2200	200	Ar	100 x 120	10
FKH-170x160/200/1000 (Rubistar 100/1000)	5,4	1000	100	Luft, Ar, N <sub>2</sub>	170 x 200 x 160	10
FKH-170x160/200/1800 (Rubistar 50/1800)	5,4	1800	50	Ar, N <sub>2</sub>	170 x 200 x 160	10
GKH-130/150/2200	2,0	2200	200	Ar	130 x 150	15

## FRH-/ FRV-Series



Options:

- Control: Different temperature controller, data recording, trailing thermocouple. • Temperature and cycle time: 3-zone-control, multiple zones heating for temperature profiles. • Gas/Safety: Gas feeding device, burn-off device, safety package, gas warning system, bursting disc, gas mixer/MFC. • Charge/Operation: Insert tubes (metal, ceramic, sapphire), protective gas tight end caps, tiltable for easy tube change, UPS, inspection glass for visual process control or additional pyrometer measurement. • Exhaust treatment: Thermal post combustion, condensate trap.

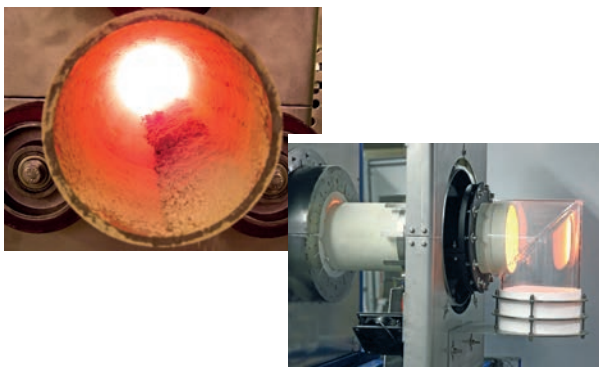
Tube furnace, high temperature, ASW-insulation gas and / or vacuum tight, Ø 25 - 150 mm, heated length 150 - 1000 mm. Tmax 1800 °C

Type	Tmax °C	Zones	Inner-Ø mm	Heated length mm	kW
FRH-25/150/1100	1150	1	25	150	0,25
FRH-40/250/1100	1150	1	40	250	0,60
FRH-40/500/1100	1150	1	40	500	1,20
FRH-70/250/1100	1150	1	70	250	0,90
FRH-70/500/1100	1150	1	70	500	1,80
FRH-100/500/1100	1150	1	100	500	2,60
FRH-40/220/1250	1300	1	40	220	0,86
FRH-40/520/1250	1300	1	40	520	1,35
FRH-70/520/1250	1300	1	70	520	2,22
FRH-100/520/1250	1300	1	100	520	2,88
FRH-3-40/750/1100	1150	3	40	750	1,80
FRH-3-70/750/1100	1150	3	70	750	2,70
FRH-3-100/1000/1100	1150	3	100	1000	5,20
FRH-3-150/1000/1100	1150	3	150	1000	7,60
FRH-3-40/750/1250	1300	3	40	750	2,77
FRH-3-70/1000/1250	1300	3	70	1000	5,02
FRH-3-100/1000/1250	1300	3	100	1000	7,08
FRH-3-150/1000/1250	1300	3	150	1000	9,50
FRH-40/250/1550	1600	1	40	250	1,60
FRH-40/500/1550	1600	1	40	500	3,00
FRH-67/250/1550	1600	1	67	250	2,40
FRH-67/500/1550	1600	1	67	500	4,80

Also available as split type version FRHT / also available as vertical version FRV/FRVT.

# Rotary-/ and retort furnaces

## FDHK-Series



Rotary tube furnace, rotary drum furnace, ASW-insulation, gas tight, 0,3 - 30000 l. Tmax 2600 °C

Furnaces of this series are designed and manufactured depending on process according to customer's requirements. Units can be designed resistance as well as microwave or inductively heated. Combination of different heating methods is possible.

Type	Tmax °C	Useful chamber Ø	Heated length	kW
FDHK	1900	20 - 1800 mm	100 - 12000 mm	1 - 2000

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: 3-zone-control, multiple zones heating for temperature profiles, water-cooled discharge tube.
- Gas/ Safety: Gas feeding device, burn-off device, safety package, gas warning system, bursting disc, gas mixer/MFC.
- Charge/Operation: Insert tubes (metal, quartz, ceramic), In/Outlet head, conveyor (screw, vibration or belt conveyors, rotary airlock feeder, double sluice), installations in the rotary tube to improve throughput properties, protective gas tight end caps, end caps made of stainless steel, aluminium or quartz glass for high-purity processes, tiltable for easy tube change, emergency motor, UPS, inspection glass for visual process control or additional pyrometer measurement.
- Exhaust treatment: Thermal post combustion, dust trap (cyclone, dust filter), condensate trap.

### Tubes for rotary tube furnaces

Material	Tmax °C	gas tight	Dimensions mm (Øi x l max.)
Heat resistant steel	1100	x	1800 x 15000
Nickel-base alloys	1250	x	1800 x 15000
Iron-Chrome-Aluminum alloys	1300	x	180 x 5000
Quartz glass	1050 (1300)	x	500 x 5000
Sintered ceramic	1750	x	120 x 2000
Plasma-sprayed ceramics	1700	x*	400 x 6000
Sapphire	1900	x	60 x 1000
Graphite	3000	-	600 x 3000

\* up to appr. 1400 °C

# Belt furnaces

## FAU-Series



Conveyor belt convection furnace,  
stone and ASW-insulation.

Tmax  
1150 °C 

Furnaces of this series are designed and manufactured depending on process according to customer's requirements.

Type	Tmax °C	Useful chamber length	belt width	kW
FAU	1150	1000 - 25000 mm	100 - 2000 mm	up to 252

Options:

- Control: Different temperature controller, data recording.
- Temperature and cycle time: Multiple zones for best temperature distribution, circulation for good heat transfer and constant temperature, ASW-insulation for extrem fast recooling cycles.
- Gas/Safety: Gas tight muffle up to 1050/1150 °C, gas feeding device, burn-off device, gas warning system, safety package, gas mixer/MFC, gas pre-heating.
- Charge/Operation: Belts up to 1150 °C, handling systems.
- Exhaust treatment: Condensate trap, TPC (thermal post combustion), washer.

## T-Series



Belt furnace with protective gas tight muffle and quenching unit,  
ASW-insulation.

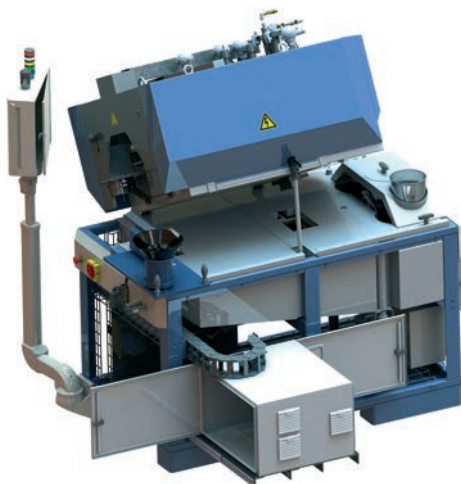
Tmax  
930 °C 

Type	Zones	Tmax °C	Belt width mm	Channel height mm	Heated length mm	kW
T-9	3	930	55	15	600	8
T-15	3	930	100	40	1200	20

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: Hot oil quench tank (up to 160 °C).
- Charge/Operation: Feeding system (for belt and shaker hearth), various discharge systems (carousel bath and oil circulation).

## Vi-Series



Shaker hearth furnace.

In continuous process with protective gas tight muffle and quenching unit,  
ASW-insulation.

Tmax  
950°C 

Type	Zones	Tmax °C	Shaking hearth width mm	Channel height mm	Heated length mm	kW
Vi-9	3	930	55	15	900	6
Vi-30	3	930	240	40	900	15

Options:

- Control: Different temperature controller, data recording, trailing thermocouple.
- Temperature and cycle time: Hot oil quench tank (up to 160 °C).
- Charge/Operation: Feeding system (for belt and shaker hearth), various discharge systems (carousel bath and oil circulation).

## KBV-200/350/1250-Vac



Cold wall furnace, bottom loader,  
vacuum  $10^{-2}$  mbar.  
Glove box connection, 1 - 25 l.

T<sub>max</sub>  
1150 °C 

For sintering of NdFe magnets. Combination of cold wall furnace and nozzle quenching chamber for extremely fast heating and cooling cycles.

Type	Liter	T <sub>max</sub> °C	Useful chamber mm (Øxh)	kW
KBV	1 - 25	1150	200 - 600 x 350 - 800	8 - 60

## KH-64-S



Curing furnace, cleanroom class  
ISO 2, gas tight, 64 - 125 l

T<sub>max</sub>  
300 °C 

Hardening furnace for coatings on electronic components under protective gas with integrated fast cooling, residual oxygen monitoring and excellent temperature uniformity.

Type	Liter	T <sub>max</sub> °C	Useful chamber mm (wxdxh)	kW
KH-64-S	64	300	400 x 400 x 400	5
KH-125-S	125	300	500 x 500 x 500	8

## FRV-5-25/350/1850



Vertically movable tube furnace, multi-  
zone, gas tight with fast quenching in  
liquid metal, graphite felt insulation.

T<sub>max</sub>  
1850 °C 

As Bridgman crystal growing furnace and for directional solidification of metals such as Ti and Ni-based alloys.

Type	Zonen	T <sub>max</sub> °C	Inner-Ø mm	Heated length mm	kW
FRV-3-25/300/1850	3	1850	25	300	8
FRV-5-25/350/1850	5	1850	25	350	10

## FKH-200/200/200/1250



Chamber furnace, high temperature, PCW- and graphite insulation, gas tight, 20 l.

Tmax 1300 °C 

For heating of steel samples in a holding- and pressing device made of molybdenum or for heating of other material samples for pressing or tensile tests.

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
FKH	8	1300	200 x 200 x 200	20

## Furnace line for carbon fiber production



Drawing furnaces.

Tmax 2100 °C 

For heat treatment of carbon fiber with oxidation furnace (not shown) as well as carbonizing and graphitization furnace for PAN or lignin precursor material. Designed for 1 - 10 strands with 4K filaments.

Type	Heating zones	Tmax °C	Nutzraum mm (ØxL)	kW
KFU	4	300	200 x 2000	40
FRHT	14	1100	100 x 2000	40
GRH	4	1800	100 x 2000	80

## FWU-3-2200/1500/5500/700



Boogie hearth furnace, air circulation, ASW-insulation, 638 - 30000 l.

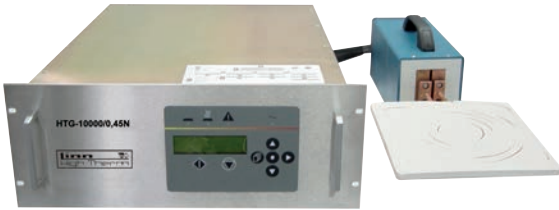
Tmax 700 °C 

For annealing and preheating of web shafts and welded constructions up to a max. load of 15000 kg.

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
FWU	18150	700	2200 x 5500 x 1500	282

# Induction generators

## HTG-N-Series



High frequency generator,  
1,2 - 10 kW, 150 - 450 kHz.

Options:

- Control: Different temperature controller, data recording, pyrometer, controlling over thermocouple, inductor design/construction.
- Gas/Safety: Protective gas purge with inert gases, vacuum/protective gas chambers.
- Charge/Operation: Workpiece holders, hardening showers, circulation coolers.

Type	HTG-1200/0,45N	HTG-2400/0,45N	HTG-6000/0,45N	HTG-10000/0,45N
HF output power kW	1,2	2,4	6,0	10,0
Inductivity range $\mu\text{H}$	0,2 – 1,7*	0,2 – 1,7*	0,3 – 2,2*	0,3 – 2,2*
Working frequency, optimal range kHz	150-450	150-450	150-450	150-450
Mains connection kVA	(230 V) 1,6	(230 V) 3,3	(3x 400V) 7,4	(3x 400V) 12,4
Cooling water consumption l/min	1,5	3	6	8
Dimensions HF-Teil (wxdxh) mm	432 x 140 x 400	432 x 140 x 400	432 x 178 x 610	432 x 178 x 610
Weight kg	12,7	12,7	16,3	16,3
HF part incl. cable (wxdxh) mm	102 x 204 x 102	102 x 204 x 102	114 x 292 x 146	114 x 292 x 146
Weight of HF parts without coil and cable kg	3,6	4,5	9,1	9,1

\* optionally other ranges are possible

## MFG-Series



Medium frequency inverter,  
10 kW - 1 MW, 5 - 100 kHz.

Options:

- Control: Different temperature controller, data recording, pyrometer, controlling over thermocouple, inductor design/construction.
- Gas/Safety: Protective gas purge with inert gases, vacuum/protective gas-chambers.
- Charge/Operation: switching / additional output adapter for different inductances, hardening shower, circulating cooler, workpiece holders.



Type	MFG-10	MFG-20	MFG-30	MFG-50	MFG-80	MFG-100
MF output power kW	10,0	20,0	30,0	50,0	80,0	100,0
Working frequency, optimal range kHz	10-100	8-100	8-100	8-100	5-70	3-70
Reactive power at inductor kVA	50-300	100-600	150-900	125-1500	400-2400	500-3000
Mains connection kVA	(3x400 V) 12,5	(3x400 V) 26,0	(3x400 V) 39,0	(3x400 V) 69,0	(3x400 V) 96,0	(3x400 V) 120,0
Cooling water consumption l/min	10	15	20	30	50	60
Dimensions MF output (wxdxh) mm	280x400x230	400x600x400	400x600x500	400x500x400	320x650x280	400x650x800
Dimensions control part(wxdxh) mm	600x600x1600	600x600x1600	600x600x1900	800x600x1900	800x600x1900	800x600x1900
Weight control part/ MF output kg	70/5-20	120/30-80	140/10-50	250/20-70	260/25-70	300/30-80



# Unit for sample preparation

## Lifumat-M-Series



Remelting unit for sample preparation for spectroscopy (AES, AAS, ICP, XES) and scrap recycling, optional vacuum and gas tight, 3,3 - 30 kW.

Lifumat-M-6.6T, -7.7T, -Super-Vac useful for the preparation of calibration samples up to 2000 g.

Ferro alloys such as FeV, FeMn, FeCr, FeMo, FeSi and many more can be remelted with mixing ratios of 1:2 to 1:10 in graphite or ceramic crucibles without any problems.

Options:

- Control: Different temperature controller, data recording, pyrometer, pyrometer with video module.
- Temperature and cycle time: Increased performance.
- Gases: Improved vacuum, casting arm for over pressure up to 2,5 bar / 3 bar (Lifumat-M-Vac).
- Charge/Operation: circulation cooling unit.

Type	Outer dimensions (wxdxh)	HFmax kW	Fe	Al	max. sample size
Lifumat-M-3.3T	680 x 680 x 1640 mm	3,3	80 g	50 g	Ø 40 / 60 mm
Lifumat-M-6.6T	920 x 920 x 1640 mm	6,6	750 g	300 g	Ø 80 mm
Lifumat-M-7.7T	920 x 920 x 1640 mm	7,7	1200 g	500 g	Ø 80 mm
Lifumat-M-3.3T-Vac	680 x 680 x 1640 mm	3,3	80 g	50 g	Ø 40 / 60 mm
Lifumat-M-6.6T-Vac	920 x 920 x 1640 mm	6,6	750 g	300 g	Ø 80 mm
Lifumat-M-7.7T-Vac	920 x 920 x 1640 mm	7,7	1200 g	500 g	Ø 80 mm
Lifumat-Super	1800 x 1350 x 2100 mm	20 (30,0)	2000 g	900 g	Ø 200 - l 300 mm
Lifumat-Super-Vac	1800 x 1350 x 2100 mm	20 (30,0)	2000 g	900 g	Ø 200 - l 300 mm

## Lifumat-O-Series



Fusion system for sample preparation for spectroscopy (XRF, AAS, ICP), 2 - 4 kW.

Options:

- Control: Different temperature controller, data recording, pyrometer.
- Gases: Protective gas purge with inert gases (Lifumat-O-2.0T).
- Charge/Operation: Circulation cooling unit.

Type	Outer dimensions (wxdxh)	HFmax kW	max. sample weight	max. sample size
O-2.0T	680 x 680 x 1530	2	15 g	Ø 40 mm
O-2.0T-CRS	680 x 680 x 1530	2	20 g	Ø 40 mm
O-Semi-4.0T-35*	920 x 900 x 1770	4	20 g	Ø 40 mm

\* Semi-automatic: Up to 35 reproducible fusions of oxidic materials in one step.

**Lifumat C-Series** Remelting and fusion system for sample preparation for spectroscopy (XRF, AAS, ICP, XES) and scrap recycling, vacuum and gas tight, 3,3 kW.

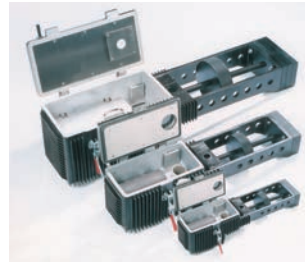
## Platicast-/ Titancast-/ Supercast-Series



Precision fine casting unit,  
optional vacuum and gas tight, 5 - 30 kW.

Options:

- Control: Different temperature controller, data recording, pyrometer, pyrometer with video module.
- Charge/Operation: Circulation cooling unit, lost wax furnaces, muffle pre-heating furnaces.



Type / technical data	Platicast-600T	Platicast-600T-Vac	Titancast-300T-Vac	Titancast-700T-Vac	Supercast	Supercast-Vac	Supercast-Titan/TiAl
MF output power kW	6,6	6,6	3,3	7,0	20,0	20,0	30,0
Nominal frequency	1,2 MHz	1,0 MHz	1,2 MHz	0,8 - 1 MHz	20 kHz	20 kHz	20 kHz
Mains connection kVa	(3x400 V) 14	(3x400 V) 14	(3x400 V) 6,6	(3x400 V) 19	(3x400 V) 28	(3x400 V) 28	(3x400 V) 38
Vacuum system mbar	-	1	$5 \times 10^{-3}$	$5 \times 10^{-3}$	-	$5 \times 10^{-1}$	$5 \times 10^{-3}$
Protective gas purging	x	x	x	x	x	x	x
Rotation speed of the casting arm (max. U/min <sup>-1</sup> )	500	500	600	400	300	300	300
Muffle siz (max. Ø x lg)	130 x 195	130 x 195	100 x 100	140 x 200	200 x 350	200 x 350	200 x 350
Dimensions MF part (wxdxh) mm	-	-	-	-	500x600x1900	500x600x1900	500x600x1900
Dimensions control part (wxdxh) mm	-	-	-	-	1000x600x2400	1000x600x2400	1000x600x2400
Dimensions casting unit (wxdxh) mm	920x900 x1640	920x900 x1640	680x680 x1640	920x900 x1640	1800x1500 x2700	1800x1500 x2700	1800x1500 x2700
<b>Casting weights</b>							
Platinum g	600	600	100	600	1400	1400	2000
Titanium g	-	-	40	350	-	-	2000
Steel g	800	800	80	1200	2500	2500	3500

## IT-KTS-90/250/1750 + FSS-280/325/1750



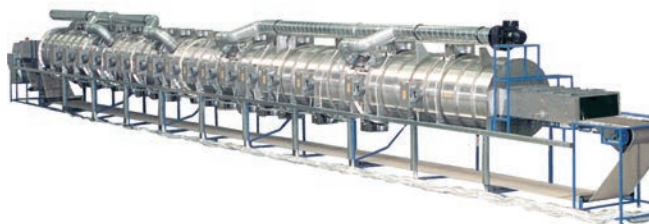
Inductive heated tiltable melting unit with  
resistance heated casting chamber.

T<sub>max</sub>  
1750 °C 

Research and development unit for the production of  
titanium and other metal foams.

Type	T <sub>max</sub> °C	Working-frequency	Useful chamber melting (Øxh)	Useful chamber casting mould (Øxh)	Melting capacity	Vacuum	Process gases	kW induct.	kW resist.
IT-KTS-90/250/1750 FSS-280/325/1750	1750	10 - 20 kHz	90 x 250 mm	280 x 325 mm	1,5 kg Ti	$5 \times 10^{-3}$ mbar	Ar, N <sub>2</sub>	30	10

## MDBT-Series



Continuous microwave belt dryer,  
2,4 GHz.

Tmax  
230 °C 

Furnaces of this series are designed and manufactured depending on process according to customer's requirements.

Type	Tmax °C	Useful chamber length	Belt width	kW
MDBT	230	990 - 12870 mm	200 - 1200 mm	2,7 - 108

Options:

- Control: Different temperature controller, data recording, residual moisture measurement exhaust air, pyrometer.
- Temperature and cycle time: Hybride heating with hot air.
- Gas/Safety: Extinguishing system, smoke detection system, various microwave measuring devices (mobile/local).
- Exhaust treatment: Exhaust unit.

## MKT-Series



Microwave chamber heating unit,  
100 - 100000 l.

Tmax  
200 °C 

Furnaces of this series are designed and manufactured depending on process according to customer's requirements.

Type	Tmax °C	Useful chamber m <sup>3</sup>	kW
MKT	200	0,1 - 100	2,7 - 108

Options:

- Control: Different temperature controller, data recording, residual moisture measurement, exhaust, pyrometer.
- Temperature and cycle time: Hybride heating with hot air
- Gas/Safety: Protective gas purge with inert gases, extinguishing system, smoke detection system, various microwave measuring devices (mobile/local).
- Exhaust treatment: Exhaust unit.

## MKH-Eco-/ MKH-S-/ MKH-Vac-Series



Microwave chamber furnace,  
high temperature,  
2,4 GHz, 2,4 - 27 l.

Tmax  
1800 °C 

Type	Liter	Tmax °C	Useful chamber mm (wxdxh)	kW
MKH-2,7	2,4	1800	135 x 135 x 135	2,7
MKH-5,4	2,4	1800	135 x 135 x 135	5,4
MKH-7,2	27	1800	300 x 300 x 300	7,2

Options:

- Control: Different temperature controller, data recording, residual moisture measurement, exhaust, pyrometer.
- Temperature and cycle time: Hybride-system with resistance heating, susceptor materials up to 1800 °C.
- Gas/Safety: Gas feeding device, burn-off device, gas warning system, safety package, gas mixer/MFC, different microwave measure devices (mobile/local).
- Exhaust treatment: Exhaust unit.

## IT-GRV-330/350/2300



Inductive heated crystal growth reactor, gas and vacuum tight, graphite felt-insulation.

T<sub>max</sub> 2300 °C 

For growth of 4" SiC single crystals (optionally also 6") using the PVD process. The furnace is designed with water-cooled double jacket and graphite felt-insulation

Type	T <sub>max</sub> °C	Inner-Ø mm	Heated length mm	kW
IT-GRV-330/350/2300	2300	330	350	30

## IT-KTS-100/150/1750



Inductive heated medium frequency cold wall and levitation melting unit, gas and vacuum tight, P<sub>max</sub> 10 bar.

T<sub>max</sub> 1750 °C 

For examination and development of highly reactive alloys. Prepared for the production of metallic glasses (meltspin).



Type	T <sub>max</sub> °C	Working-frequency	Useful chamber crucible (ØxH)	Dimensions pressure vessel (ØxT)	Pressure	Vacuum	Process gases	kW
IT-KTS-100/150/1750	1750	8 - 28 kHz	100 x 150 mm	800 x 800 mm	10 bar	max. 2x10 <sup>-5</sup> mbar	Ar, N <sub>2</sub>	30

## KS-3-480-S



Chamber furnace ASW-insulation, gas tight muffle, cleanroom.

T<sub>max</sub> 1200 °C 

For reduction and sintering of precious metals under hydrogen, cleanroom installation with fast cooling and gas recirculation for short furnace cycles. Second door with gas circulation for optimal

Type	Liter	T <sub>max</sub> °C	Useful chamber mm (wxdxh)	kW
KS-3-480-S	462	1200	580 x 950 x 840	60

# Special units

## HTG-6000 + HTG-1200



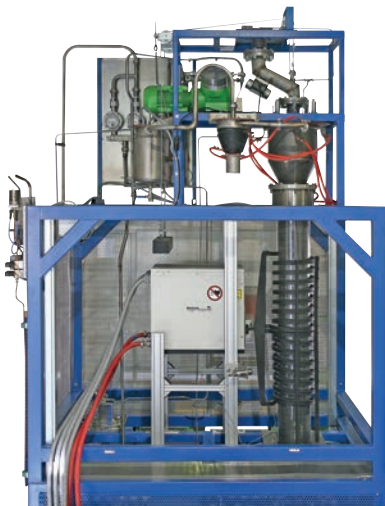
Inductive heated melting unit.

Tmax 1800 °C 

For melting and automatic casting of glass. For development and research of special glass and for glass fiber pulling units. Melting by inductive heating of a Pt-crucible. Casting by inductive heating of the bottom outlet.

Type	Tmax °C	Working-frequency	Crucible volume	Process gas	kW melting crucible / bottom outlet
HTG-6000 + HTG-1200	1800	150 - 400 kHz	250 ml	N <sub>2</sub>	max. 6 / max. 1,2

## IT-FRV-150/1000/1400-S



Inductive heated fluidized bed and fixed bed reactor, gas tight, graphite felt insulation.

Tmax 1450 °C 

Production of high purity ceramic powders by gas phase reaction.

Type	Tmax °C	Working frequency	Useful chamber mm (ØxH)	kW
IT-FRV-150/1000/1400-S	1450	30 kHz	150 x 1000	40

## GHV-150/300/1800-Vac



Graphite furnace, gas and vacuum tight, with four measuring systems.

Tmax 1800 °C 

For the examination of slags from the metal production with 4 measuring sensors which can be changed under vacuum.

Type	Liter	Tmax °C	Useful chamber mm (ØxH)	kW
GHV	5,5	1800	150 x 300	20

## Safety

### Gas installation

Two gas lines with blocking valves and needle dosing valves as well as a flow meter with needle valve are provided. In the exhaust line is also located a throttle valve in order to keep the furnace inner pressure at max. 4-7 mbar in case of small gas output. A manometer is responsible for furnace pressure measuring.

### Safety package

Supervision of purging time, purging gas flow, protective gas flow, residual oxygen content, purging gas stock. Locking of the door during the heat treatment process.

### Burn off device with flame supervision

The ignition is realized over press button or controller. When the ignition flame goes out the solenoid valve in the protective gas line will be automatically closed and the one in the nitrogen supply line will be opened.

## Dew point / Condensate

### Condensate trap

Protects the throttle valve against contamination. It is made of stainless steel, double walled and water cooled. The accumulated condensate can be drained over the ball valve that is installed in the bottom. The cover of the condensate trap can be taken off for cleaning.

### Heated bubbler and tube

The bubbler consists of stainless steel and is gas tight. An inspection glass will be mounted at the bubbler in order to control the filling level. Water refill is provided. The water drain is effected over a ball valve which is installed at the bottom. The heating of the bubbler can be controlled from room temperature to 90 °C. The gas outlet line will be heated from bubbler up to the insert retort till 120 °C.

## Fast cycles

### Fast cooling

In order to reach a faster cooling of the muffle, air will be blown via fans in the area between muffle insert and furnace chamber. The hot air escapes over an outlet chimney in the furnace ceiling.

### Gas recooling

The gas will be drawn from the chamber over a gastight side channel blower and blown back in the chamber over a gas water heat exchanger.

## Temperature accuracy

### Gas recirculation

In order to reach a better temperature distribution in the muffle a recirculating fan will be installed in the door. The recirculating fan is designed water cooled and protective gas tight.

### 3-zone-control

For optimization of the temperature uniformity in the useful chamber the heating will be divided in three heating zones which are each controlled separately. A further safety controller is also included.

## Vacuum pumps and systems

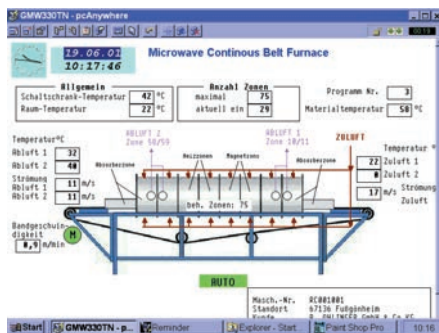
Pressure	Vacuum	Pump	Suction capacity	Application	Furnace
1000 - 0,1 mbar	Rough vacuum	Rotary vane pump	0,5 - 250 m³/h	Pre-evacuation	VMK-Vac, HT-Vac, KKV-Vac, Tube furnaces
0,1 mbar - 5x10 <sup>-3</sup> mbar	Fine vacuum	Rotary vane pump (+ Roots pump)	2 -1000 m³/h	Coating, brazing, heat treatment Cu, steel	VMK-Vac, HT-Vac, KKV-Vac, Tube furnaces
5x10 <sup>-3</sup> mbar - 5x10 <sup>-6</sup> mbar	High vacuum	Rotary vane pump (+ roots pump) + turbo molecular pump (diffusion pump)	60 - 1000 l/s (10000 l/s)	Heat treatment Titanium stainless steel	VMK-Vac, HT-Vac 10 <sup>-3</sup> , HT-Graphit-Vac 10 <sup>-5</sup> , KKV-Vac, Tube furnaces
50 mbar - 0,05 mbar	Oil-free vacuum	Membrane pump, Scroll pump	0,5 - 250 m³/h	Replacement for rotary vane pump in electronic	VMK-Vac, HT-Vac, KKV-Vac, Tube furnaces
700 mbar - 5 mbar	Regulated partial pressure	Rotary vane pump		CVD, electro ceramic	VMK-Vac, HT-Vac, KKV-Vac, Tube furnaces

ASW = Aluminium silicate wool. PCW = Polycrystalline ceramic wool.

## Temperature controller

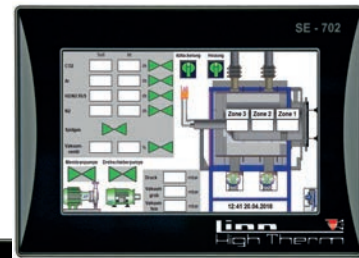


G 400, G 800



SE-50 Touch

Visualization system  
Optional for PLC-Simatic S7.  
Remote supervision via internet.



SE 702

Type	Screen		Input / operation	Function	Program function		Unit visualization possible	Interfaces*
	Size (wxh) mm	Display			Recipes	Segments		
G400	45 x 45	Seven-segment display	Foil keyboard	Temperature controller	0	0	-	
G800	45 x 45	Seven-segment display	Foil keyboard	Temperature-/ program controller	0 / 2 (4)	0 / 8 (4)	-	RS422/RS485, RS232
SE-50-Touch	97 x 97	3,5 " TFT-Display	TFT touch display (foliated)	Control / program controller	10	50	+	USB Host, USB Device, Modbus, Modbus RS485
SE-701	96 x 96	3,5 " TFT-Display	Capacitive glass touch display	Control / program controller	25	50	+	Ethernet, 1x USB
SE-702	210 x 144	7 " TFT-Display	Capacitive glass touch display	Control / program controller	99 [250*]	50	+	Ethernet, 2 x USB, CAN-Master, Profibus DP-Slave, RS485/422 Modbus-Master
SE-707 SE-709	370 x 260 1280 x 1080	12,1 " TFT-Display 19 " TFT-Display	Capacitive glass touch display	Control / program controller	99 [250*]	50	+	Ethernet, 2 x USB, CAN-Master, Profibus DP-Slave, RS485/422 Modbus-Master
Siemens S7	Variable, 19" typical	Industry-PC (variable)	Variable/ equipment dependent	Control / program controller	Variable	Variable	+	Profibus, Profibus via Ethernet, Profinet

\* Optional, available on request.

Other temperature / program controller / PLC, batch element, recorder, multi-zone controlling, differential control on customer's request.

## FRVT-3-400/1100/1200



3-zone split type reactor heater,  
ASW-insulation, gas and vacuum tight.

Tmax  
1200 °C 

For separation of pyrolytic carbon. Reactor made of high strength nickel material for partial pressure operation up to 1200 °C.

Type	Heating zones	Tmax °C	Useful chamber mm (ØxL)	kW
FRVT-3-400/1100/1200	3	1200	350 x 1100	35

## FRH-3-450/650/1050-Vac



3 zone moveable high vacuum tube  
furnace, ASW-insulation, gas and  
vacuum tight.

Tmax  
1050 °C 

For high temperature soldering of reactor components. The fastest cycle times are made possible by moving the furnace part. Vacuum pumping unit up to 10<sup>-6</sup> mbar. Tube made of high-strength nickel material for vacuum operation up to 1000 °C.

Type	Heating zones	Tmax °C	Useful chamber mm (ØxL)	kW
FRH-3-450/650/1050-Vac	3	1050	350 x 600	12

## FAH-3-350/30/10250/850



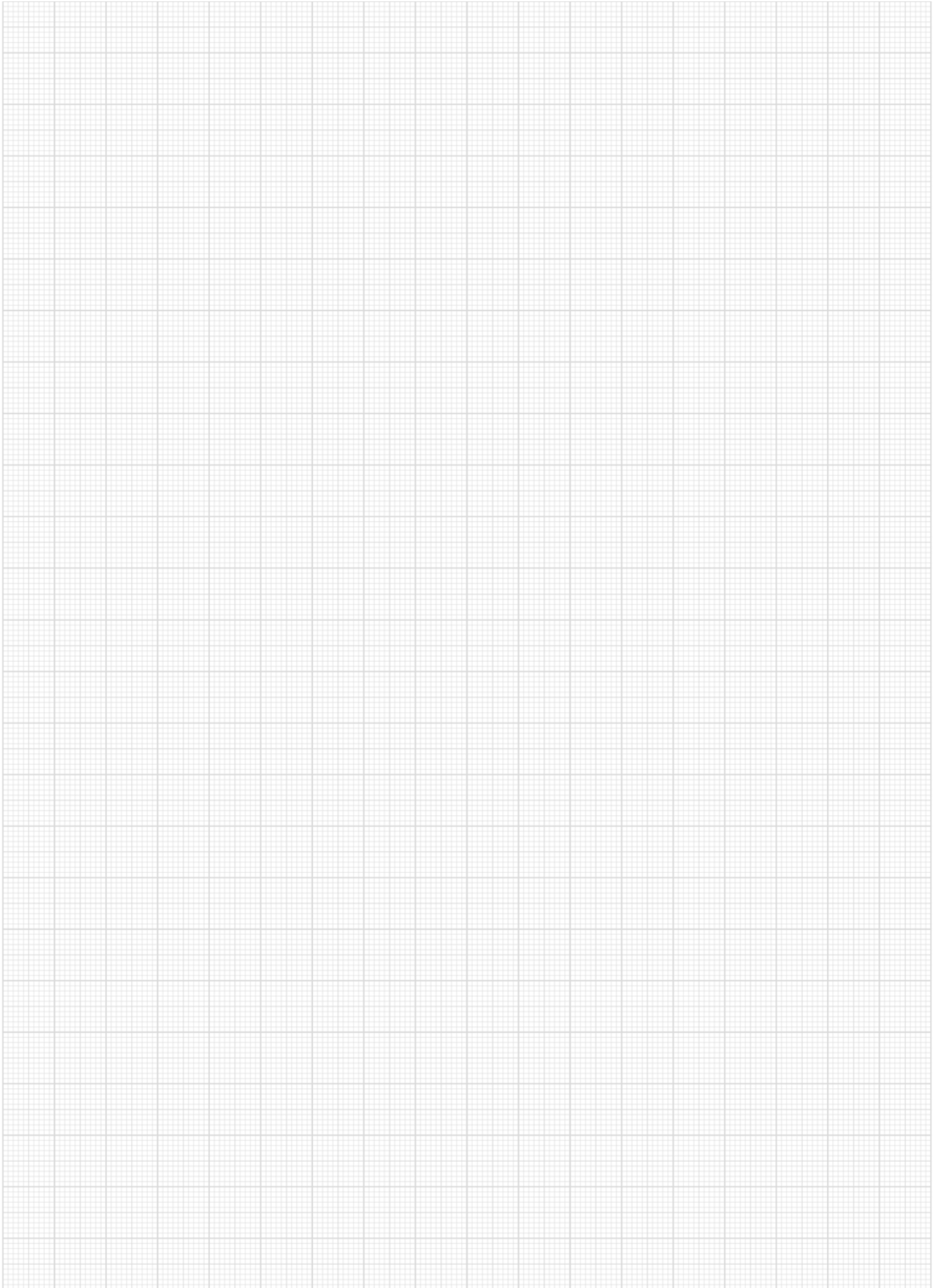
3 zone continuous belt furnace,  
PCW-insulation.

Tmax  
850 °C 

For extruding binders in soft ferrite mouldings. With protective gas retort, cooling zone and thermal post combustion system.

Type	Tmax °C	Retorte length	Belt width	kW
FAH	850	8000 mm	350 mm	60







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