CATALOG

LAC®

Laboratory furnaces and dryers

LAC® *Art of heating*

IN LABORATORY SEGMENT

LAC COMPANY PRODUCES

MORE THAN 300 FURNACES PER YEAR

Art of heating

The LAC company profile

The LAC Company Ltd. has been successful manufacturer and marketer of industrial furnaces, dryers and refractory castable shapes for more than two decades on domestic as well as foreign markets. Since establishment in 1992 the company manufactured more than 11 thousand furnaces.

The products find application in many technological processes of thermal production, namely:

- Low-temperature technologies
- Laboratory technologies
- Technology for the industrial production of glass and industrial ceramics
- Technology for thermal processing of ferrous metals in metallurgy
- Alloys' technology for non-ferrous metals and thermal processing of non-ferrous metals in metallurgy
- Technology for thermal and chemical-thermal metal processing
- Technology for heat processing in metals shaping
- Technology for heat processing in welding
- Technology for production of hobby glass and ceramics

The manufacturing program does not represent only serially manufactured furnaces and dryers, but even accommodates the needs for atypical furnaces according to specific requirements of the customer. Development and design office in tandem with a team of service technicians is a guarantee of quality service to customers and a promise in the next company growth. Significant part of business is the manufacture of refractory castable shapes, whose essential part is used in manufacture of industrial furnaces. Other users are metallurgy companies and manufacturers of boilers for burning wood, pellets, and biomass. In the area of refractory concrete shaped blocks, the company belongs among the largest manufacturers in Europe. The company offers also supplies of heating elements, refractory and insulation materials, regulating elements, and reconstruction of furnaces, heating systems and switchboards.

The aggressive growth of the company is illustrated by its present 200 employees, capital assets in the amount of 480,000 EUR, 25,000 m^2 for production, warehousing and company administration. In 2007 the company certified its quality management system according to ČSN EN 9001 and in 2010 passed recertification according to the new standard ČSN EN ISO 9001:2009. In 2008 the company opened a branch in China.

LONG LIFETIME – 24 MONTHS WARRANTY

PERFECT WORKSHOP PROCESSING

LOW POWER CONSUMPTION

SAFE OPERATION

DEVELOPED, DESIGNED
AND MANUFACTURED IN CZECH REPUBLIC

MAINTENANCE SERVICES

SUMMARY

LABORATORY FURNACES L

These furnaces are suitable for all laboratory tests in medical, dental, hygienic, industry, ceramic, glassmaking, and other workplaces. They are suitable for technological testing where a very precise temperature distribution and a dynamic progress of the temperature curve are required. For control of cooling, it is possible to separate heat elements in the internal space of the furnace. It is especially suitable for material heat treatments, all sorts of fritting tests, calcinations, softening or material sintering point setting, samples firing etc. The rust-resistant mantle ensures a long service life of the furnace. The heating elements are placed in the ceramic heating boards. The heating coils are thus partially protected against corrosion by aggressive materials which can be released during use.

Standard design of furnace:

- Ht40 AL or INDUSTRY controller
- Manually operated door opening downwards with an end switch
- Insulation from the mineral fibre insulation boards
- Heating panels from the refractory ceramics in the bottom and in the ceiling
- Airing chimney on the back part of the furnace
- Supply cable fitted with single-phase plug
- Thermocouple Type "S"
- Solid state relay

Accessories for an additional charge:

- Injector with an exhaust fan and draft diverter
- Plate for furnace bottom
- Protection atmosphere inlet
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
L 03/12	Ht40 AL	1200	3	380x440x400	180x100x140	1,2	21	230	16/1	4
L 05/12	Ht40 AL	1200	5	430x470x430	230x130x170	2,4	26	230	16/1	6
L 09/12	Ht40 AL	1200	9	430x505x500	230x170x240	3	32	230	16/1	6
L 15/12	Ht40 AL	1200	15	450x505x600	250x170x340	3,5	39	230	16/1	6
L 03/12	INDUSTRY	1200	3	380x440x400	180x100x140	1,2	21	230	16/1	4
L 05/12	INDUSTRY	1200	5	430x470x430	230x130x170	2,4	26	230	16/1	6
L 09/12	INDUSTRY	1200	9	430x505x500	230x170x240	3	32	230	16/1	6
L 15/12	INDUSTRY	1200	15	450x505x600	250x170x340	3,5	39	230	16/1	6

Technical changes reserved

Furnaces LE are suitable for testing technology where the exact distribution of temperature, the controlled increase and decrease of temperature, and controlled cooling are important, and where it is also desirable that the heating elements are not in the interior space with the samples. This especially applies to heating material for the heat treatment of metal, various tests of sintering, calcination, determination of the softening point or of material sintering, combusting samples, enamel firing etc. The rust-resistant coating ensures the long life of the furnace. The heating spirals are placed in tubes of silica glass. This partially protects the spirals from corrosion by aggressive materials which can be released during use. A programmable controller and the master switch are located on the front side of the furnace.

Standard design of furnace:

- Ht60B controller
- Manually operated door opening downwards with an end switch
- Heating elements in quartz glass tubes
- Airing chimney on the back part of the furnace
- Sliders for air inlet control
- Supply cable fitted with single-phase plug
- Thermocouple Type "K"
- Solid state relay

Accessories for an additional charge:

- Ht40 P controller
- Injector with an exhaust fan and draft diverter
- Protection atmosphere inlet
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
LE 05/11	Ht60B	1100	5	470x330x455	170x130x230	1,8	18	230	16/1	6
LE 09/11	Ht60B	1100	9,4	490x370x515	190x170x290	2,3	23	230	16/1	6
LE 15/11	Ht60B	1100	14,4	550x370x565	250x170x340	3	30	230	16/1	6

Technical changes reserved

These furnaces have a flexible use in laboratories. Suitable for the testing of different materials using heat processing, requiring higher operating temperatures above 1300°C where no harmful materials which can attack the coils or brick lining can be produced during use. It can be used for heat treatment of metals, glass or ceramics in smaller quantities. Rust-resistant construction, an attractive design, perfect display of the temperature, premier insulating materials, programmable temperature adjustment with high accuracy, a solid state relay (more fluent and quieter, the minimum disturbance of the surrounding mechanism), perfect workshop processing, the hardware and top operating safety. Working temperature is up to 1340°C.

Standard design of furnace:

- Ht40 AL controller
- Manually operated door opening upwards with an end switch
- Heating coils inserted in the lining grooves
- Airing chimney on the back part of the furnace
- Chamber composed of lightweight bricks
- Supply cable fitted with single-phase plug
- Thermocouple Type "S"
- Solid state relay

Accessories for an additional charge:

- INDUSTRY controller
- Injector with an exhaust fan and draft diverter
- Protection atmosphere inlet
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
LH 06/13	Ht40 AL	1340	6	600x590x715	200x150x230	1,5	72	230	16/1	10
LH 09/13	Ht40 AL	1340	9	600x590x715	230x170x230	2	73	230	16/1	10
LH 15/13	Ht40 AL	1340	15	620x670x715	250x250x250	2,4	82	230	16/1	15
LH30/13	Ht40 AL	1340	30	680x770x800	310x310x310	3,2	120	230	16/1	25

Technical changes reserved

Furnaces are used in laboratories for the heat-treatment testing of various samples, where aggressive fouling can occur. Rust-resistant construction, an attractive design, a draft prevents the evaporation of vapors at firing and markedly decreasing the temperature of the mantle, a perfect display of the temperature, top insulating materials (low power consumption, with the possibility of a fast start with the required temperature). Furnaces have programmable temperature adjustment with a high accuracy, a solid state relay for more fluent and quieter operation, with minimum disturbance of the surrounding mechanism. They also have a perfect workshop processing, the hardware, and top operating safety.

Standard design of furnace:

- Ht40 AL controller
- Manually operated door opening upwards with an end switch
- The door portal made of refractory shapes
- Inside of the peephole is protective clear glass
- Muffle insulated with the matting of the mineral grain and encased in the insulation desks
- Heating spiral on the muffle
- Airing chimney on the back part of the furnace
- Supply cable fitted with single-phase plug
- Thermocouple Type "S"

Accessories for an additional charge:

- INDUSTRY controller
- Injector with an exhaust fan and draft diverter
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
LMH 04/12	Ht40 AL	1200	4	490x540x720	170x90x275	3	43	230	16/1	10
LMH 07/12	Ht40 AL	1200	7	490x540x720	170x170x275	3	46	230	16/1	10
LMH 11/12	Ht40 AL	1200	11	570x540x720	255x165x255	3,5	53	230	16/1	15

Technical changes reserved

Vertical charging (samples for testing) into a ceramic muffle. This muffle prevents the access of possibly aggressive materials, formed during heat treatment, to the heating elements. Rust-resistant construction, an attractive design, a perfect distribution of the temperature, top insulating materials (low power consumption with the possibility of a fast start with the asked temperature). These furnaces have a programmable temperature adjustment with a high accuracy, solid state relays for more fluent and quieter operation with a minimum disturbance of the surrounding mechanism. They also have a perfect workshop processing, the hardware, and top operating safety.

Standard design of furnace:

- Ht40 AL controller
- The lid is fulfilled by the sedge of mineral fibre, manually opened lid
- Muffle insulated with the matting of the mineral grain
- Heating spiral on the muffle
- Supply cable fitted with single-phase plug
- Circuit breaker on the back side of the furnace
- All electro elements placed in the area below the muffle
- Thermocouple Type "S"

Accessories for an additional charge:

- INDUSTRY controller
- Protection atmosphere inlet
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
LMV 2/12	Ht40 AL	1200	2	300x470x300	110x160	1,8	30	230	16/1	5
LMV 5/12	Ht40 AL	1200	5	300x550x350	170x230	2,6	40	230	16/1	5

Technical changes reserved

LABORATORY TUBE FURNACES LT

For special laboratory and research uses at which is charge loaded in a ceramic tube. These furnaces have all stainless-steel design, premium insulation materials (low electricity consumption, the possibility of a quick rise to the required temperature). They have programmable temperature control, semi-conductor relay for more fluent and noiseless operation, minimum interference of surrounding devices. Furnaces also have a perfect workshop design, technical equipment and high operational safety.

Standard design of furnace:

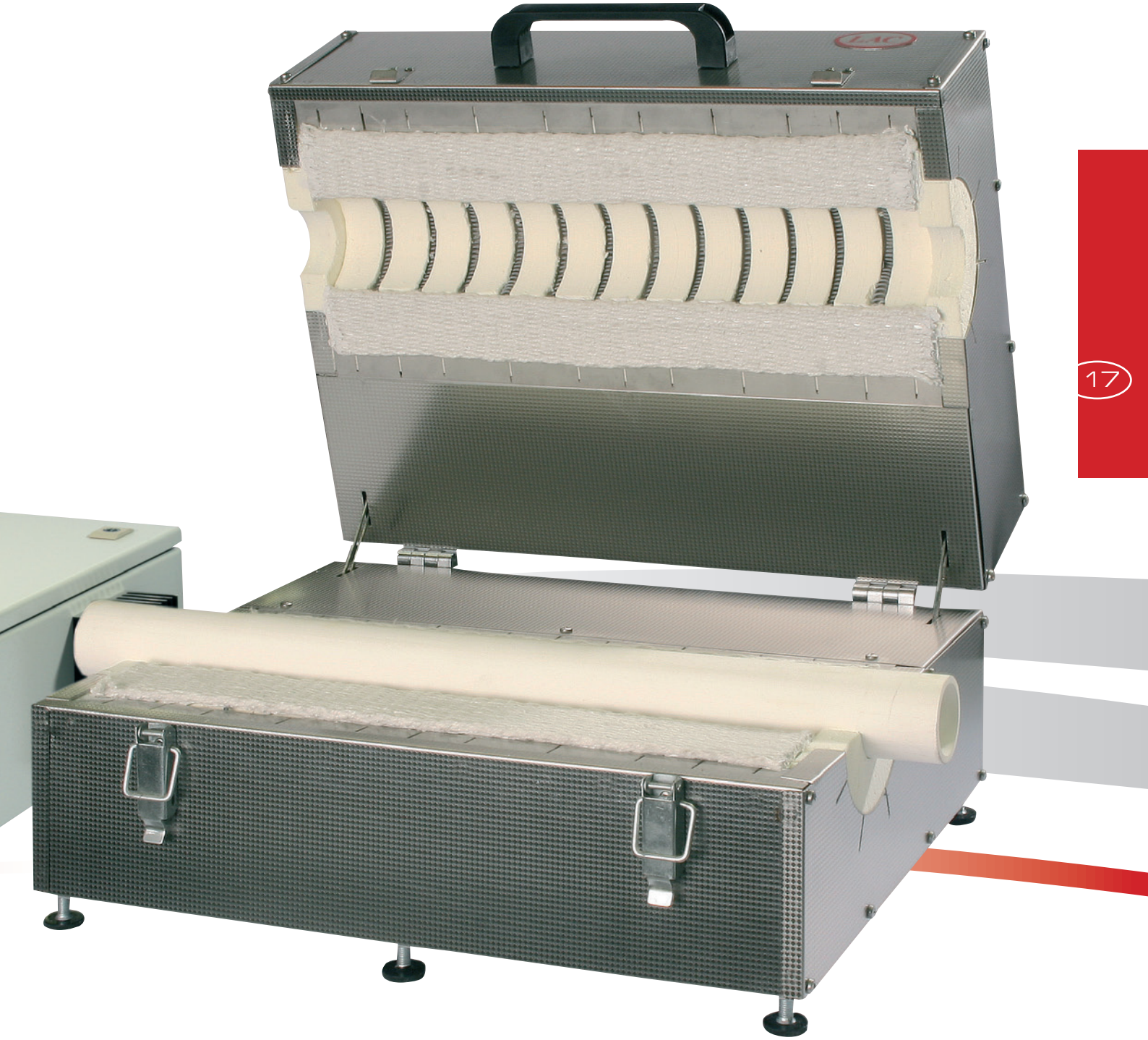
- Ht40 AL controller
- Frameless construction made of a stainless steel shell of bent sheet metal
- Desktop design
- Upper part of the furnace is manually tilted up by a handle
- Heating spirals are located in the insulation grooves
- Insulation from the mineral fibre insulation boards
- Electric wiring elements are placed in a separate switchboard
- Thermocouple Type "S"

Accessories for an additional charge:

- INDUSTRY controller
- Protection atmosphere inlet
- Stand for vertical positioning of the furnace
- Tube packer of mineral fibre
- 3 three-zone heating system for models with tube length 750 mm
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	External dimensions	Internal Ø of tube	Heating zone length	Tube lenght	Input	Weight	Voltage
		°C	(wxhxd) mm	Ø mm	mm	mm	kW	kg	V
LT 50/300/13	Ht40 AL	1300	570x310x510	50	300	660	3,2	75	230
LT 50/500/13	Ht40 AL	1300	810x310x510	50	500	900	5	85	400
LT 50/750/13	Ht40 AL	1300	1100x310x510	50	750	1220	8	95	400
LT 75/500/13	Ht40 AL	1300	810x400x600	75	500	660	6,5	85	400
LT 75/750/13	Ht40 AL	1300	1100x400x600	75	750	900	10	95	400
LT 100/500/13	Ht40 AL	1300	810x450x650	100	500	1220	7	85	400
LT 100/750/13	Ht40 AL	1300	1100x450x650	100	750	660	11,5	95	400

Technical changes reserved



These high temperature furnaces are used for research and laboratory tests. In addition to sintering dental ceramics such as tooth bridges made of zirconium oxides, for sintering of technical and quartz glass, material tests in metallurgy and other special-purpose applications. Desktop and freestanding models of compact high-temperature furnaces have many preferences. In particular this involves the first-class processing of stainless mantle, high-quality insulation and simple attendance. Depending on their sizes, all models are marked by their low weight. Therefore the desktop models can be easily placed on the most suitable place for charging. The charging edge of the freestanding models is designed for the easiest charging.

Standard design of furnace:

- INDUSTRY controller
- Frameless construction made of a stainless steel shell of bent sheet metal (furnaces VP02; VP04, table models)
- Frame construction with stainless front and door (furnaces VP10, VP20)
- Hand operated door to the side equipped with a safety end limit switch
- Insulation from the ceramic fibre insulation boards
- Additional fan for cooling of mantle
- Heating elements from the material MoSi2 hanged vertically on the side walls
- Solid state relay regulating primary circuit of the transformer
- Thermocouple Type "B", placed in the chamber ceiling

Accessories for an additional charge:

- Protection atmosphere inlet
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
VP 02/16	INDUSTRY	1600	2	660x680x740	130x150x135	3	90	230	16/1	1
VP 04/16	INDUSTRY	1600	4	660x680x740	130x160x180	3	100	230	16/1	4
VP 10/16	INDUSTRY	1600	10	850x1595x775	200x200x250	6	290	400	25/3	6
VP 20/16	INDUSTRY	1600	20	850x1595x775	250x250x310	8	315	400	32/3	10
VP 70/16	INDUSTRY	1600	70	1100x1750x1150	400x300x600	14	350	400	63/3	12
VP02/17	INDUSTRY	1700	2	660x680x740	130x150x135	3	90	230	16/1	1
VP 04/17	INDUSTRY	1700	4	660x680x740	130x160x180	3	100	230	16/1	4
VP10/17	INDUSTRY	1700	10	850x1595x775	200x200x250	6	290	400	25/3	6
VP 20/17	INDUSTRY	1700	20	850x1595x775	250x250x310	8	315	400	32/3	10
VP 70/17	INDUSTRY	1700	70	1100x1750x1150	400x300x600	14	350	400	63/3	12

Technical changes reserved

LABORATORY GRADIENT FURNACES SP

Excellent for firing tests of several samples together under various temperatures. Acceleration of the firing of the samples is helped by the construction of the furnace, top insulating materials (low power consumption, the possibility of a quick rise to the desired temperature), a programmable temperature adjustment, solid state relays (fluent and quieter running, with a minimum of disturbance from the surrounding mechanism), perfect workshop processing, hardware, and top operational safety.

Standard design of furnace:

- INDUSTRY controller
- Multilayered insulation
- Lid of the furnace is lagged by sedge of mineral grains
- Manually operated door opening
- Spiral heating wire is slide in grooves on sidewall of the furnace
- All electro elements placed in the area below the muffle
- Thermocouple type "S"

Accessories for an additional charge:

- Multichannel meter Ht100 (possibility to capture up to ten values)
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V	
SP 30/13	INDUSTRY	1300	30	1700x1200x500	1400x140	7	240	400	20/3

Technical changes reserved

HARDENING FURNACES PKE

These hardening furnaces are suitable for all industrial and glass technologies where a very precise temperature distribution and a dynamic progression of the temperature curve are required. Especially for hardening, annealing, artificial ageing, curing, heat treatment, preheating glass forms, and metal use before armoring under an oxidizing atmosphere.

Standard design of furnace:

- Ht40 P controller
- Manually operated door opening downwards
- Stand (operating height 900mm)
- Heating elements in the bottom and two side walls

Accessories for an additional charge:

- Protection atmosphere inlet
- Metal panel for the bottom
- Retort for quenching in protective atmosphere
- Optimization of the temperature field to fulfill DIN 17052-1 ΔT 20°C in the internal usable space (in the empty furnace at Tmax)
- Automatic ventilation flap
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Weight	Voltage	Furnace protection	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
PKE 12/12	Ht40 P	1280	12,2	700x1400x850	250x200x250	3	95	230	16/1	20
PKE 18/12	Ht40 P	1280	17,5	700x1400x950	250x200x350	3,5	115	230	16/1	30
PKE 18/12R	Ht40 P	1280	17,5	700x1400x950	250x200x350	5,5	115	400	16/3	30
PKE 25/12	Ht40 P	1280	25	700x1400x1100	250x200x500	7	140	400	16/3	50
PKE 45/12	Ht40 P	1280	44	800x1350x1100	350x250x500	13	165	400	25/3	100
PKE 65/12	Ht40 P	1280	65	800x1350x1350	350x250x750	16	195	400	32/3	130
PKE 90/12	Ht40 P	1280	87	800x1350x1600	350x250x1000	18	225	400	32/3	150

Technical changes reserved

TEMPERING FURNACES PP

Chamber furnaces with a forced circulation of the inner atmosphere are used for special applications such as preheating and annealing in industry or the preheating of moulds. Our standard range meets most requirements. A stainless steel muffle with a long life, high mechanical and corrosion resistance, horizontal circulation ensures the even distribution of air inside the furnace. And the first-rate insulating materials bear low operational expenses of the furnace.

Standard design of furnace:

- Ht40 AL controller for a temperature of 450 °C
- INDUSTRY controller for temperatures of 650 °C and 850 °C
- Stainless circulation insert with long lifetime
- Ventilator is placed in the back part of the furnace, with horizontally oriented shaft axis
- Manually controlled ventilation flap
- One-hand opening (up to size PP 140 including)
- Shelves, stand (except furnace PP20), (operating height 900 mm)
- Supply cable fitted with plug
- Electrics in the back part of the furnace
- Solid state relay
- Thermocouple type "K"

Accessories for an additional charge:

- Protection atmosphere inlet
- Semi gas-tight construction of the furnace
- Automatic ventilation flap
- Other shelves
- One-hand opening (for PP20-PP140 inclusive is a part of standard)
- Overpressure cooling (cannot be combined with semi gas-tight construction)
- Exhaust fan (serves for compulsory exhaust of waste products)
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Selection of atypical accessories:

- Door opening to the left and upwards (hydraulically actuated, pneumatically actuated, possible pantographic hinges)
- Graphic temperature plotter (regulator and plotter are located in a small switchboard on the furnace side)
- Optimization of the temperature field to fulfill DIN 17052-1 ΔT 10°C in the internal usable space (in the empty furnace at Tmax)

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Number of shelves	Max shelve load	Weight	Voltage	Furnace protec-tion	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	ks	kg	kg	V		kg
PP 20/45	Ht40 AL	450	20	700x650x1050	300x200x350	3	-	-	115	230	16/1	30
PP 40/45	Ht40 AL	450	35	800x1450x1050	300x300x400	6	2	15	160	400	16/3	50
PP 70/45	Ht40 AL	450	70	850x1550x1150	350x400x500	8	2	20	190	400	20/3	80
PP 140/45	Ht40 AL	450	135	950x1650x1250	450x500x600	12	2	30	300	400	20/3	150
PP 270/45	Ht40 AL	450	270	1150x1750x1650	600x600x750	20	2	35	580	400	40/3	200
PP 540/45	Ht40 AL	450	540	1300x1950x1800	750x800x900	24	2	40	750	400	50/3	250
PP 20/65	INDUSTRY	650	20	850x650x1050	300x200x350	3	-	-	130	230	16/1	30
PP 40/65	INDUSTRY	650	35	850x1450x1050	300x300x400	6	2	15	200	400	16/3	50
PP 70/65	INDUSTRY	650	70	900x1550x1150	350x400x500	8	2	20	250	400	20/3	80
PP 140/65	INDUSTRY	650	135	1000x1650x1250	450x500x600	12	2	30	350	400	20/3	150
PP 270/65	INDUSTRY	650	270	1300x1750x1650	600x600x750	20	2	35	720	400	40/3	200
PP 540/65	INDUSTRY	650	540	1500x1950x1800	750x800x900	24	2	40	850	400	50/3	250
PP 20/85	INDUSTRY	850	20	850x650x1050	300x200x350	3	-	-	130	230	16/1	30
PP 40/85	INDUSTRY	850	35	850x1450x1050	300x300x400	7	2	15	200	400	20/3	50
PP 70/85	INDUSTRY	850	70	900x1550x1150	350x400x500	9	2	20	250	400	20/3	80
PP 140/85	INDUSTRY	850	135	1000x1650x1250	450x500x600	14	2	30	350	400	25/3	150
PP 270/85	INDUSTRY	850	270	1300x1750x1650	600x600x750	20	2	35	720	400	40/3	200
PP 540/85	INDUSTRY	850	540	1500x1950x1800	750x800x900	30	2	40	850	400	50/3	250

Technical changes reserved

The dryers are suitable for drying, vulcanization, preheating, curing and other modifications of various materials in plastics, rubber, automotive, electrotechnic industry etc. A stainless steel muffle with a long life, high mechanical resistance and corrosion resistance. Horizontal circulation ensures the even distribution of air inside the dryer, and the first-rate insulating material bears low operational expenses.

Standard design of furnace:

- Ht40 AL controller
- Limit unit
- The door openenable to the left equipped with handle, closing by two clamps, sealed with braided seal cord and silicon profile
- The frame and outer jacket are made of structural steel
- Stand (operating height 700mm)
- Muffle and lateral circulation inserts are made of stainless steel
- Adjustable shelves made of perforated sheet with square holes
- Manually controlled ventilation flap
- Suction bleeder is situated in the bottom
- Horizontal circulation of internal atmosphere
- Solid state relay
- Thermocouple type "K"

Accessories for an additional charge:

- INDUSTRY controller
- Automatic ventilation flap
- Exhaust fan (serves for compulsory exhaust of waste product)
- Additional shelves
- Door opening to the right
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

Selection of atypical accessories:

- Travel wheels
- Relative humidity measurement
- Gas analyzer METREX
- Door inspection window
- Door opening upwards (electrohydraulic)
- Overpressure ventilation
- Furnace bottom customized for boogie
- One-hand opening

Type LAC	Controller	Tmax	Volume	External dimensions	Internal dimensions	Input	Number of valves	Number of shelves	Max shelve load	Weight	Voltage	Furnace protec-tion	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	ks	ks	kg	kg	V		kg
S 60/02	Ht40 AL	200	60	1050x1350x950	450x300x450	2	1	1	15	60	230	16/1	40
S 100/02	Ht40 AL	200	100	1050x1550x1000	450x500x450	3	2	1	15	100	230	16/1	50
S 250/02	Ht40 AL	200	240	1400x1550x1200	800x500x600	4	1	1	25	250	400	16/3	70
S 400/02	Ht40 AL	200	380	1400x1750x1200	800x800x600	4	1	1	25	350	400	16/3	70
S 60/03	Ht40 AL	300	60	1050x1350x950	450x300x450	3	1	1	15	60	230	16/1	40
S 100/03	Ht40 AL	300	100	1050x1550x1000	450x500x450	3	2	1	15	100	230	16/1	50
S250/03	Ht40 AL	300	240	1400x1550x1200	800x500x600	4	1	1	25	250	400	16/3	70
S 400/03	Ht40 AL	300	380	1400x1750x1200	800x800x600	6	1	1	25	350	400	16/3	70

Technical changes reserved

HARDENING FURNACES WITH GASTIGHT RETORT PKR AND PKRC

The gastight chamber furnaces with retorts are used especially for the heat treatment of materials in a controlled atmosphere (argon, nitrogen, forming gas etc.) with low gas drain to a maximum temperature of 1100°C for annealing, tempering, soldering, metal powder sintering. Heating from three sides (heating elements on the bottom and in two sidewalls) ensures an even distribution of temperature inside the chamber, low shielding gas consumption; the space for placing TC inside the retort, a defined work area in the retort, thanks to the inner atmosphere circulation in PKRC.

Standard design of furnace:

- INDUSTRY controller
- Limit unit
- Frame is made of construction steel
- Gastight refractory retort with water cooled flange on door side
- Stand (operating height 900mm)
- Doors are sealed by silicon sealing
- Heating coils mounted on ceramic tubes
- A fan placed in the furnace door (PKRC models)
- Circulation of inner atmosphere (PKRC furnaces)
- Hand operated inlet of protective atmosphere for one protective gas
- Solid state relay
- Thermocouple type "S"

Accessories for an additional charge:

- Charge thermocouple
- Manovacuometer (for overpressure checking)
- Vacuum pump (for atmosphere suction after manipulation with batch)
- Fully automatic supply of protective atmosphere for one or more gases
- Automatic ventilation flap
- Pressure cooling
- Optimization of the temperature field to fulfill DIN 17052-1 ΔT 20°C in the internal usable space (in the empty furnace at Tmax)
- Calibration of the controller measuring entry
- Interface RS232 or RS485
- Set HtMonit (includes interface + software)

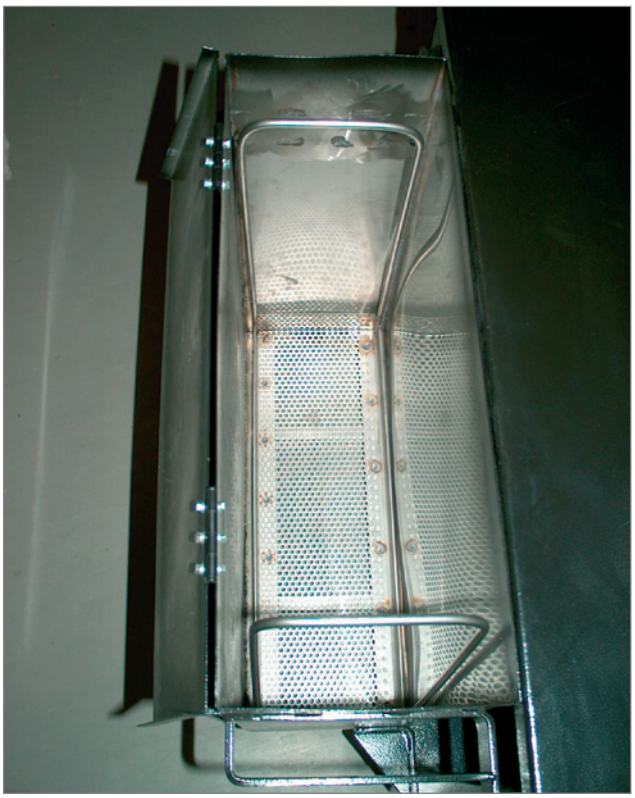
Type LAC	Controller	Tmax	Volume	External dimensions	Internal chambre dimensions	Internal muffle dimensions	Input	Weight	Voltage	Furnace protec-tion	Max floor load capacity
		°C	l	(wxhxd) mm	(wxhxd) mm	(wxhxd) mm	kW	kg	V		kg
PKR 35/11	INDUSTRY	1100	24	1400x1450x1300	290x315x600	220x260x450	11	400	400	20/3	
PKR 55/11	INDUSTRY	1100	30	1450x1450x1300	400x250x600	320x200x450	13	570	400	25/3	150
PKR 130/11	INDUSTRY	1100	75	1450x1450x1550	500x250x900	450x200x700	21	950	400	40/3	200
PKR 180/11	INDUSTRY	1100	110	1650x1650x1550	550x400x850	500x340x700	29	1050	400	50/3	200
PKR 350/11	INDUSTRY	1100	230	1800x1750x1850	750x450x1150	700x340x1050	50	1350	400	80/3	300
PKRC 55/09	INDUSTRY	900	30	1450x1450x1450	400x250x600	320x200x370	13	600	400	25/3	150
PKRC 130/09	INDUSTRY	900	75	1450x1450x1950	500x250x900	450x200x620	21	980	400	40/3	200
PKRC 180/09	INDUSTRY	900	110	1650x1650x2050	550x400x850	500x340x620	29	1100	400	50/3	200
PKRC 350/09	INDUSTRY	900	230	1800x1750x2350	750x450x1150	700x340x970	50	1380	400	80/3	300

Technical changes reserved

More information about heat treatment you can find in the catalog "Industrial furnaces and dryers". On request in printed form or electronically for download on our website www.lac.cz

HARDENING LABORATORY TABLE SKM

The hardening laboratory table can be used for preheating, quenching and tempering in oil or water bath.



Workplace contains:

- Small hardening laboratory table
- PKE 12/12 and PKE 18/12 hardening furnace
- Combination of any of the LH furnaces and PP 20/45, 65 or L 03 – L 15 tempering furnace

Standard design of hardening laboratory table:

- Frame welded from section bars
- One table leg equipped with a height-adjustable shoe, a cooling fan, and a grid for hardening in air flow
- 50 liter vessel for water made of stainless steel
- 50 liter vessel for oil made of construction steel
- Vessels are equipped with lids and handrails, made of perforated plate for small components of use

Accessories for an additional charge:

- Refractory shaped pieces around hardening grid
- Thermostat controlled heating of hardening medium

Type LAC	Ventilator output	External dimensions	Container dimensions	Grate dimensions	Input	Weight	Voltage
	W	(wxhxd) mm	mm	mm	kW	kg	V
SKM	120	1855x850x750	200x550x550	350x350	3	200	230

Technical changes reserved

FURNACE FOR MECHANICAL TESTING MATERIALS AT INCREASED TEMPERATURE LT 90/30/11

This laboratory tube furnace is designed for testing materials up to 1100°C and is mounted in the frame of blasting stool. Tested sample enclosed in dies is positioned in the electrically heated furnace workspace (splitted into 2 parts) in which the controller maintains temperature according to a running program or regulates it to a constant value.

Description of construction:

- Ht40 AL controller
- Frameless construction made of a stainless steel shell of bent sheet metal
- Double door design
- Insulation from the mineral fibre insulation boards
- Heating spirals are located in the insulation grooves
- Temperature in the working chamber is measured by thermocouples Type "S"
- Electric wiring elements are placed in a separate switchboard
- Thermocouples Type "S"

Type LAC	Controller	Tmax	External dimensions	Refractory tube length	Internal Ø of tube	Heating zone length	Input	Weight	Voltage
		°C	(wxhxd) mm	mm	Ø mm	mm	kW	kg	V
LT 90/300/11	Ht40 AL	1100	600x700x470	410	60	300	4,6	41	400

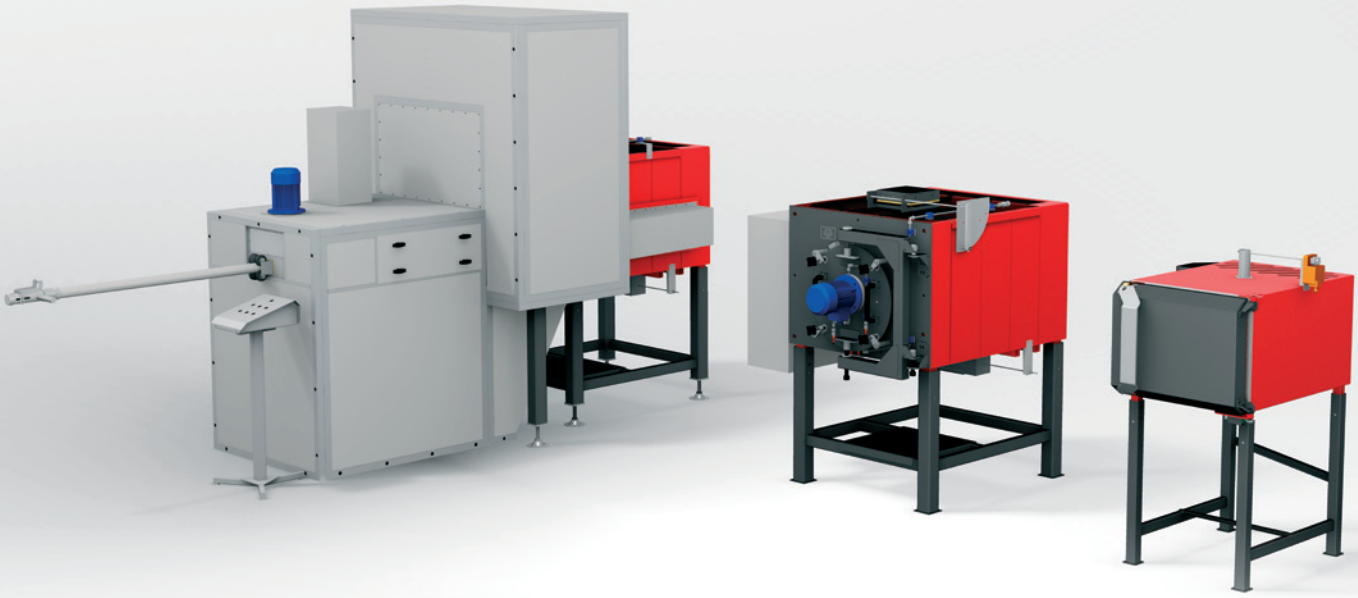
Technical changes reserved

SMALL WORKPLACE CHTZ

The workplace serves for the heat and chemical-heat treatment of metal parts. It is suitable for the treatment of those parts in which the quality of surface is important. The charge is under a protective atmosphere during treatment and transportation into the hardening bath which prevents the creation of clinkers on the charge surface.

The line can be used for the following types of chemical thermal treatment:

- Hardening
- Carburizing
- Carbonitriding
- Nitriding
- Tempering



The workplace is made up of these devices:

CARBONIZING FURNACE
Inner dimensions (wxhxd): 300x150x400 mm
Max. work temperature: 950°C
Input: 13kW
Max. charge weight: 20kg

HARDENING BATH:
Volume of hardening medium: approx. 200l
Input: 3kW
Equipped with heating, cooling and circulation of hardening medium
Pneumatically controlled grid for charge

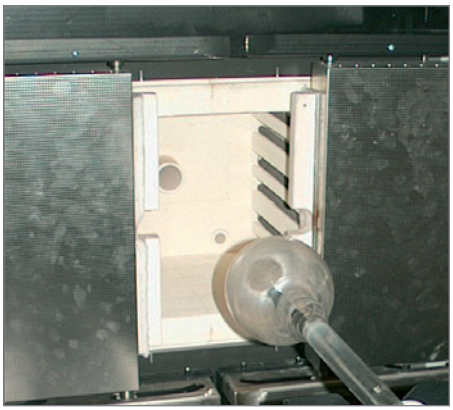
NITRIDING FURNACE
Inner dimensions (wxhxd): 300x150x400 mm
Max work temperature: 650°C
Input: 13kW
Max. charge weight: 20kg

TEMPERING FURNACE:
Inner dimensions (wxhxd): 300x300x400 mm
Max. work temperature: 850°C
Input: 7kW
Max charge weight: 50kg

PROCESS MEDIA DISTRIBUTOR:
Serves for process media supply into the case hardening, nitriding and tempering furnace.
Process media: methanol, propane, carburizing, nitrogen, air.

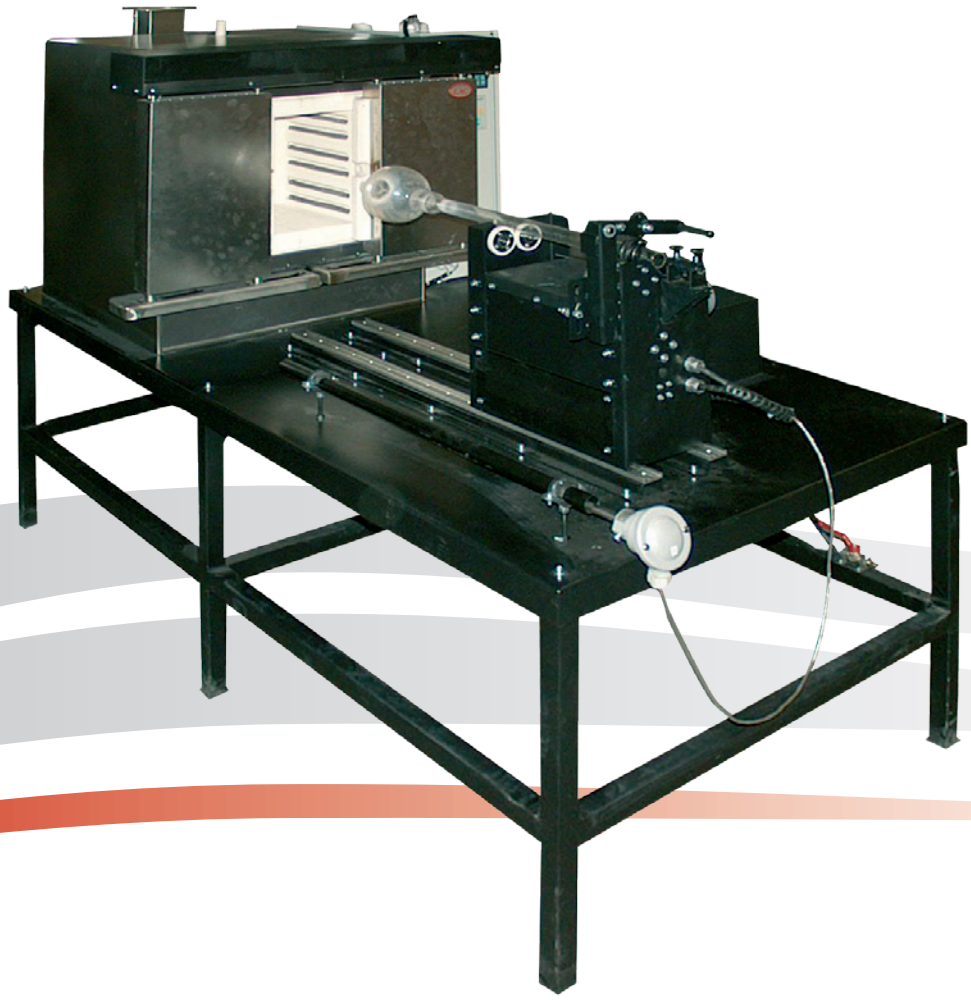
LABORATORY CALCINING FURNACE LH 30/12

This atypical furnace is designed for laboratory calcination of titanium dioxide (TiO_2). The charge is inserted into the quartz glass retort. The retort is filled into the furnace space by stacker. The temperature is controlled by temperature controller. The furnace consists of laboratory furnace, automatic retort stacker and carrier table. All these part are connected with a bolt and thus form a compact unit.



Description of construction:

- Frameless construction made of a stainless steel shell of bent sheet metal
- Into a shell is inserted module with insulation and furnace mask
- Double door controller by pneumatic cylinders
- The chamber is made up of lightened bricks
- Space between shell and module is cooled/ventilated by exhaust fan located on the back wall of furnace
- Furnace is equipped with injector exhaust fumes from retort
- Retort loading in into the chamber provides automatic stacker
- Retort rotation ensures transmission with adjustable speed
- Heating system consists of heating spirals which are located in the grooves on the sides of chamber
- Temperature in the working chamber is measured by thermocouples Type S
- Control system is in a separate switchboard and where is located PLC control panel with controllers
- Furnace is equipped with communication line RS485 a EIA232



Type LAC	Control system	Tmax	Volume	External dimensions	Internal chambre dimensions	Input	Weight	Voltage
		°C	l	(wxhxd) mm	(wxhxd) mm	kW	kg	V
LH 30/12	PLC	1200	30	1090x1540x2070	310x310x310	5,5	253	400

Technical changes reserved

LABORATORY DISPERSING UNIT LD 05

Laboratory dispersing unit LD 05 is designed for direct manufacturing of slurry containing metal nanoparticles from the dry powder. The equipment provides manufacturing capacity of 500 grams of slurry in 20 minutes. Laboratory dispersing unit LD 05 is equipped with vacuum pump and inert gas inlet with automatic regulation enabling to process a metal nano--powder and slurry under protective atmosphere. Protective inert atmosphere prevent product degradation by air oxygen.

Description of construction:

- Body completely made from stainless steel
- Control unit regulating dispersing speed and securing protective atmosphere
- Batching plant dedicated for transfusion of nano-material from a transportation keg into the reservoir
- Reservoir made from stainless steel of inner volume of 0,2l dedicated for dry nano-powder application into the reaction vessel
- Reactor vessel made from borosilicate glass with jacket for temperature control of the process (heating/cooling)
- Vacuum pump connected to the control unit

Accessories for an additional charge:

- Transportation keg
- Measuring probes for pressure sensor, temperature measurement, pH electrode etc.

TEMPERATURE CONTROLLERS

Electric resistance furnaces manufactured by LAC Ltd. are fitted with the following types of high-quality PID controllers: Ht60B, Ht40 P, Ht40 AL or INDUSTRY. These types of controllers are microprocessor-controlled devices meeting all the requirements for temperature control and the security of electro-thermal devices.

HT60B TEMPERATURE CONTROLLER

- The device allows the user to control the temperature to a constant value
- Measurement accuracy of ± 0,25% from the measuring scope, regulation accuracy of ±1 °C
- One auxiliary outlet – can be set as an alarm (monitoring the limit temperature) or as a signal (signaling the achieving of a specific set temperature)
- The controller can have an RS232 or EIA485 series communication line
- The device can be connected to a PC using the series communication line, and the course of the measured and desired temperatures can be displayed on a PC using the HtMonit software (the temperature course can be stored in the memory of a PC)
- Automatic setup of PID parameters of control loop
- User menu: only parameters relevant for a specific application are available to the user
- This makes controlling the device easier

HT40 P TEMPERATURE CONTROLLER

- The device allows the controlling of the temperature to a constant value or by the program (10 programs)
- Measurement accuracy of ± 0,1% from the measuring scope, regulation accuracy of ±1 °C
- One auxiliary output for controlling an additional function (control of air flap, fan, recorder)
- Configurable alarm output (monitoring the temperature limit)
- The controller can have a RS232 or EIA485 serial communication line
- Device can be connected to computer through communication line and by using HtMonit software can display measured and desired temperatures (temperatures can be saved in PC memory)
- The controller is equipped with a function for recording the measured values (so-called datalogger) and memory capacity is 500
- Real time clock
- Automatic setup of the PID parameters of the control loop
- User menu: for users are available only parameters which are relevant to the specific application

HT40 AL TEMPERATURE CONTROLLER

- The device allows the controlling of the temperature to a constant value or by the program (1 program)
- The regulation to a constant value can be disabled
- The program can be launched with a defined time delay
- Measurement accuracy of ± 0,1% from the measuring scope (min. 540 °C), regulation accuracy of ±1 °C
- One auxiliary output for controlling an additional function – end of program signal, program operation signal, end of program signal
- Configurable alarm output (limit temperature monitoring)
- The controller can be equipped with a RS232 or EIA485 serial communication line
- The device can be connected to a PC using the series communication line, and the course of the measured and desired temperatures can be displayed on a PC using the HtMonit software (the temperature course can be stored in the memory of a PC)
- Automatic setup of the PID parameters of the control loop

INDUSTRY TEMPERATURE CONTROLLER

- Program controller designed for controlling of complex technological devices-can be equipped with one input, two control outputs, four slave outputs and one alarm output
- Device allows temperature control to constant value or according to the program (up to 30 programs); programs can be connected by using the JuMP step
- Easy operation
- Real time clock (program starts at the programmed time)
- Regulation accuracy of ±1 °C
- Optional connection to PC using the RS 232 or EIA485 interface
- Optional fitting with two communication lines (connect to PC and control of subordinate controllers simultaneously, so-called MASTER – SLAVE)
- Optional modification of parameter settings during the program
- Recording of measured values (datalogger), up to 4000 records

MONITORING SOFTWARE HTMONIT

This program is designed for monitoring 1 up to 4 devices of HT series. The program allows:

- Monitoring connected devices
- Insert data into the database
- Display measured data in the graph
- Search in the graph and print graphs and tables
- Program INDUSTRY controller profiles
- Start or end programs

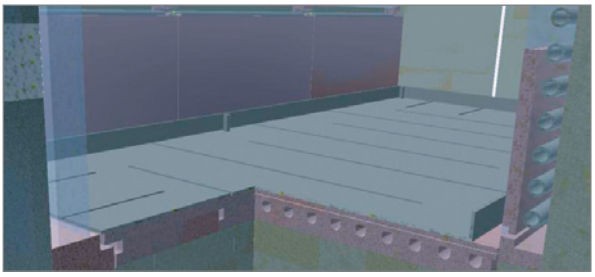
CALIBRATION OF THE CONTROLLER MEASURING ENTRY
Issue of a calibration certificate which defines the deviation between the temperature values displayed by the controller.

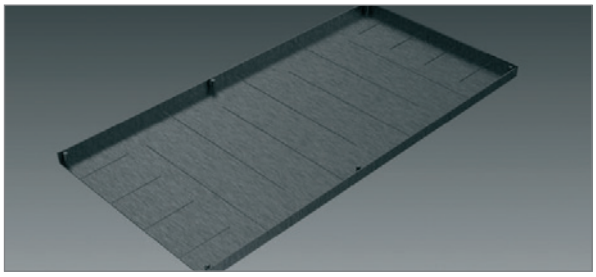
CALIBRATION OF THE MEASURING SYSTEM
Issue of a calibration certificate which defines the deviation and the theoretical values entering to the controller from thermocouple reflecting the deviation of all elements used in measuring system.

SOLID STATE RELAY - SSR
To control the furnace power are used the switching elements which contain no moving parts which can be wear out by frequent switching and also make noise.

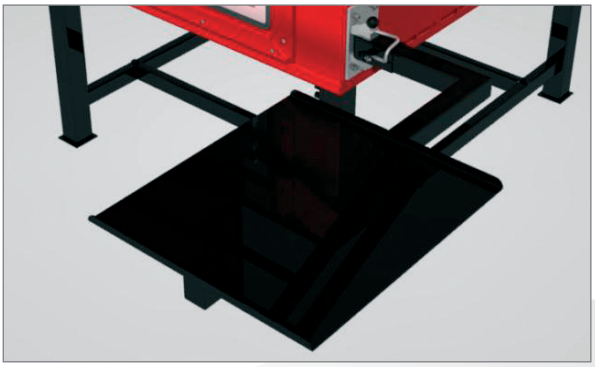
PLATE FOR FURNACE BOTTOM – FOR LABORATORY FURNACES
Furnace bottom plate covering and protecting the heating elements or bottom insulation against damage and prevents its contact with the charge.

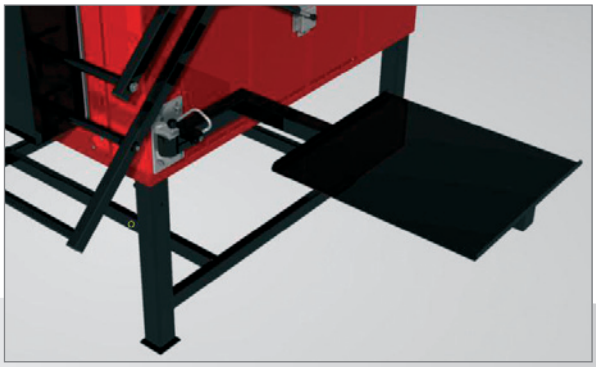
STEEL PLATE FOR FURNACE BOTTOM
Metal plate with a protective frame protecting the bottom of the furnace against damage while manipulating with heavy charge in the furnace chamber.





ROTARY TABLE
Rotary table with position securing at the side of the furnace is used as a storage area for manipulation with charge in front of the furnace. The table is removable, its height is the same as the height of the furnace charge edges.





GRAPHIC TEMPERATURE RECORDER
Device located in the control panel of the furnace which records the temperature in the furnace according to the time on a paper strip.

STAND FOR MOUNTING FURNACE IN VERTICAL POSITION
Only for LT furnaces. The stand allows installation of the furnace into the position where tube is oriented vertically.

TUBE SEAL FROM MINERAL FIBRE INSULATION
Only for LT furnaces. Shaped seal designed for enclosure of the ends of tube.

OPTIMIZATION OF THE TEMPERATURE FIELD TO FULFILL DIN 17052-01
Adjustment of the internal airflow, or adjustment of the furnace heating system according to the information detected by furnace measuring. These adjustments lead to optimization of temperature distribution in furnace; alternatively the furnace can be tune for specific charge.

COOLING

VENTILATION CHIMNEY
Ventilation of the inner furnace space, airflow cannot be controlled. On request can be supplied seal made of insulating materials.

SLIDERS FOR AIR SUPPLY CONTROL
Supply of the air to the inner space of the furnace is located at the bottom part of the door or on the bottom of the furnace. The amount of air suction can be regulated by inlet covering using a simple mechanism – the slider.

MANUALLY CONTROLLED VENTILATION FLAP
Ventilation, opening or closing the flap is controlled manually.

AUTOMATIC VENTILATION FLAP
Ventilation the furnace innerspace, opening or closing the flap is controlled by controller. It can be combined only with INDUSTRY controller.

INJECTOR WITH AN EXHAUST FAN AND DRAFT DIVERTER
Stainless steel exhaust chimney with a fan that improves the exhaust from the furnace and together with installed draft diverter reduces their temperature and forms preparation for aggressive gases exhaust.

EXHAUST FAN – SERVES FOR COMPULSORY EXHAUST OF WASTE PRODUCTS
Exhaust fan is connected to automatic ventilation flap. Approx. up to 500°C can be exhausted directly from the furnace, for higher temperatures is necessary to reduce the temperature of exhaust air by mixing with cold air. It can be combined only with INDUSTRY controller.

PRESSURE COOLING
Active cooling of the charge. To the bottom of the furnace through the flap is blown cool air that goes through an automatic ventilation flap from the furnace space. Starting the fan and opening the flaps controls the controller according to the furnace cooling speed adjustment. It can be combined only with the INDUSTRY controller.

MULTI-ZONE HEATING SYSTEM

For some furnaces it is technically possible to divide heating system into several sections, and then is each section managed separately according to its own thermocouple. This solution is designed for furnaces that require very precise temperature distribution.

THREE-ZONE HEATING SYSTEM
The heating system divided into three parallel branches. It is intended only for LT type furnaces with a minimum pipe length of 750 mm.

STANDARDS RS232 OR EIA485

Standards RS232 and EIA485 serve as a communication link between a PC and an external electronic device. RS232 serves to connect one PC with one device, EIA485 can connect up to 30 devices, by using repeaters this number can be further increased.

SET HTMONIT – INCLUDES INTERFACE AND SOFTWARE

Set includes a connector for one of these interfaces situated on accessible place on the furnace, the furnace cable and PC software and equipment – HtMonit software.

INTERFACE RS232 OR EIA485

Includes a connector situated on an accessible place on the furnace.

GAS ANALYZER METREX

Serves to monitor the dangerous concentration of vapors during drying, its output is connected to an automatic ventilation flap or other elements to ensure the safeness (exhaust fan, siren, etc.).

PROTECTION ATMOSPHERE

PROTECTION ATMOSPHERE INLET

Preparation of the furnace for a supply of the protective atmosphere into the furnace workspace ended by hosepipe input on the side of the furnace. In smaller furnaces, about 550 liters volume, bottle reducing valve with a flow meter is part of the supply. Inlet can be supplemented by automatically controlled solenoid valve – can be combined only with the INDUSTRY controller.

SEMI-GASTIGHT DESIGN OF THE FURNACE

Adjust of the furnace design to ensure the best possible gas- tightness of the furnace workplace. This version does not replace the gas-tight design, the furnace is not suitable for heat treatment under a defined protective atmosphere (e.g. bright annealing). This design is useful for heat treatment with the requirement to suppress oxidation.

RETORT FOR HEAT TREATMENT IN CONTROLLED ATMOSPHERE

The retort can be used for preventing oxidation or decarburization of steel parts during the heat treatment.

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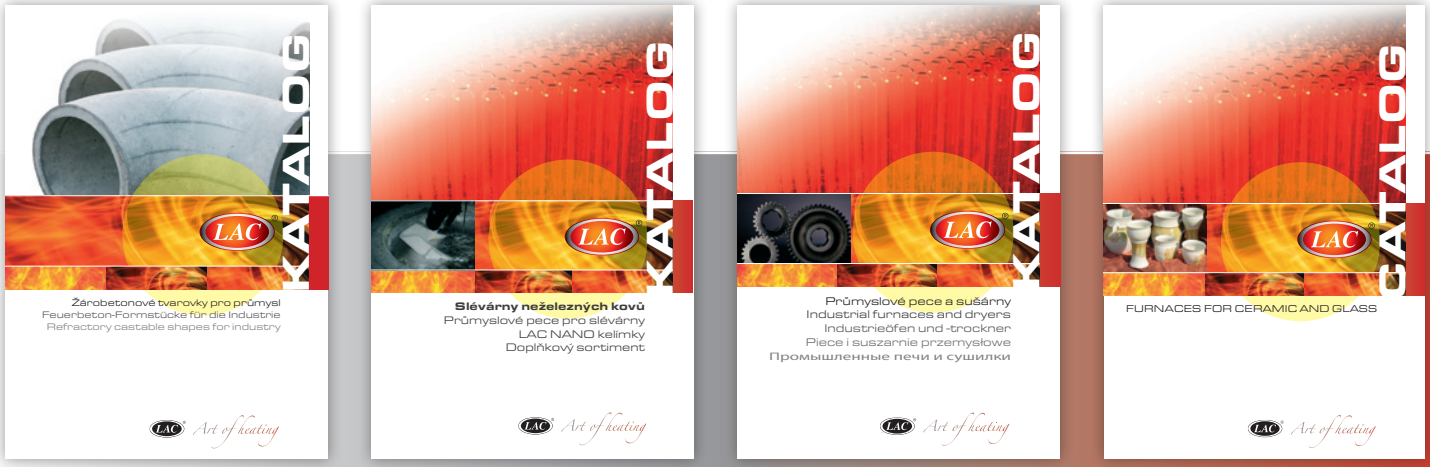

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