Heraeus

VACUUM HEATING AND DRYING OVENS

Gentle and safe


Quality Products – Lifetime Care

∴Kendro

VACUTHERM® 6000 –
USER FRIENDLY AS NEVER BEFORE

The intelligent, modular system: three sizes and two types of heating

Series 6000 vacutherm ovens uncompromisingly meet all demands relating to heat treatment in vacuum, whether simple routines or complicated processes up to 400 °C are involved. Starting with high quality standard models, application specific configurations can be realised through selection from a wide range of equipment options.
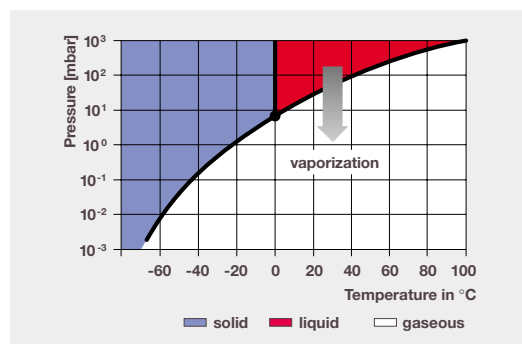
Water: Lower pressure means lower boiling point

Vacuum applications offer many benefits:

- Gentle drying of heat sensitive materials
- Significantly reduced drying times
- Residue free drying of intricately designed parts
- Elimination of oxidation associated with heat treatment
- Safe drying of flammable solvents
- Targeted recovery of degassed products

High tech equipment

Safety tested
Kendro has set new safety standards with Heraeus® vacutherm 6000 Vacuum Drying Ovens. With the double-pane door made of safety glass, for instance, implosion protection is guaranteed throughout the equipment's working life. The glass cannot become brittle or dull as with plastic. Special versions are available for drying applications that involve flammable solvents.

Process safety
With heating systems that have been tried and tested for decades, uniform and reproducible drying and heat treatment is ensured.

DIN EN ISO 9000

Time saving
Jacket- or shelf-heating results in reduced heating-up times. Process times are up to six times faster than in conventional Vacuum Drying Ovens.

User comfort
With the inert gas connection incorporating a precision valve, process gas is dispensed accurately. Drying times are therefore reduced and condensation is prevented. Furthermore, the precision valve can safely prevent blowing of powders when the vacuum chamber is ventilated.

Cleaning
The vacuum chamber has electro-polished surfaces and rounded corners, and is therefore easy-to-clean.

Corrosion resistance
The vacuum chamber is made of high quality stainless steel (1.4571) with outstanding corrosion resistance.

Economic viability
With their high quality standard features, extreme reliability and state of the art safety concepts, vacutherm ovens offer the best price/performance ratio.
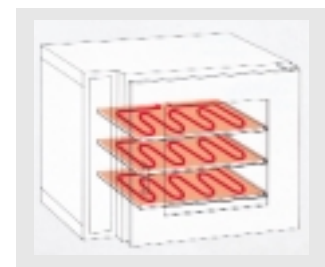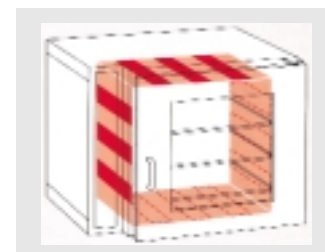
GENTLE, FAST AND EXTREMELY VERSATILE

A well thought-out concept – Heraeus vacutherm VT 6060 and VT 6130

MODEL M, JACKET HEATING
- Rated temperature of 200 °C
- The large direct contact heating elements are reinforced at the front and therefore compensate natural loss

Features

- **Modular design**
- **Two types of heating**
- **Temperatures to 200, 300 and 400 °C**
- **Total volumes of 53 and 128 l**

Standard features

- User friendly Kelvitron® t micro-processor controller for jacket heated ovens and Digicon® multi-channel Controller for shelf heated ovens
- Upper limit cut-out for oven and product protection
- Certified safety (GS-mark)
- Vacuum chamber made of stainless steel (1.4571), electropolished, 100 % rounded corners, easy-to-clean and corrosion resistant
- Stainless vacuum fittings, tubing and ball valve
- Analogue pressure display
- Rapid ventilation valve for quick ventilation of the chamber
- Additional precision valve for gentle ventilation
- Inert gas connection for controlled atmosphere. A safety valve prevents overpressure inside the vacuum chamber
- DN 25 access port in the rear wall

Two types of heating

The vacutherm 6000 series is available with two different types of heating:

- **model M, jacket heating:**
  Heat transfer from the vacuum chamber via the shelves to the load
- **model P, shelf heating:**
  The shelves incorporate heating coils. Heat is transferred directly to the load.

## The benefits of shelf heating

The direct energy transportation ensures rapid heating-up and process times. Drying process times can be reduced as much as 6 fold compared to standard drying methods.

MODEL P, SHELF HEATING
- Rated temperature of 300/400 °C
- Rapid heating-up times
- Direct heat transfer ensures short process times
- Separate temperature control and overtemperature protection for each shelf

vacutherm 6000 Order numbers

Type	Total volume	Order no.
VT 6060 M	53 litres, jacket heating	51014539
VT 6130 M	128 litres, jacket heating	51014541
VT 6060 P	53 litres, shelf heating	51014542
VT 6130 P	128 litres, shelf heating	51014543

EVERYTHING THAT'S NEEDED

Options and accessories for the unique vacutherm 6000
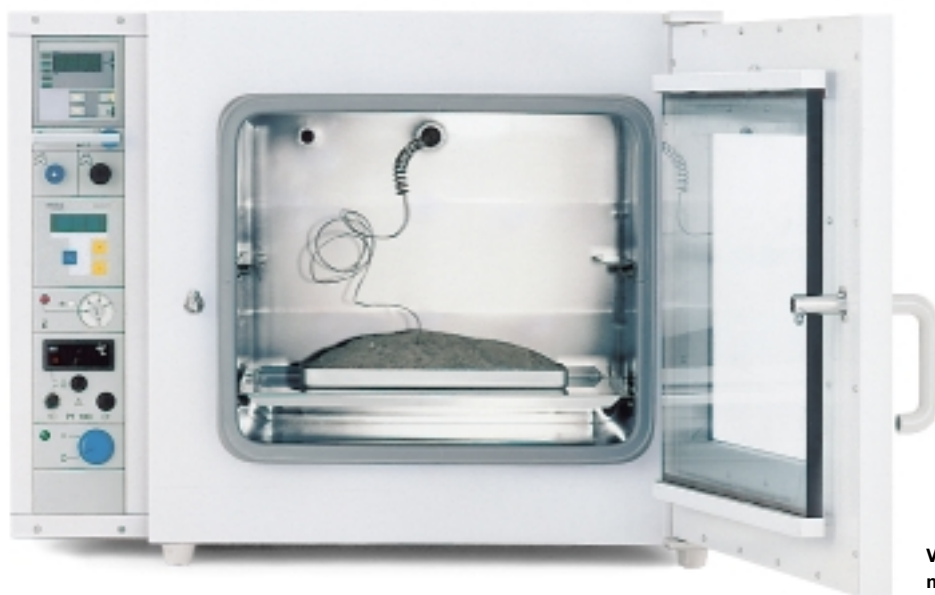
**VT 6130 with direct measure-
ment of sample temperature**

Option for rated temperature of 400 °C

As an option the ovens vacutherm 6060 P and 6130 P can operate at temperatures up to 400 °C. These vacuum ovens come standard with a door without an inspection window.

VITON door gasket

Compared to standard door gaskets VITON provides increased resistance to highly caustic substances.

Vacuum chamber with 100 % rounded corners

This model has rounded corners and at the sides also at the rear of the vacuum chamber, making the inner casing even easier-to-clean.

Accessories

For powders or granules, trays are available as accessories.

Options

Options for vacutherm 6000 M/P	Order no.
RS 232 computer interface for Kelvitron controller	51900284
Digital pressure display	51900069
Pressure controller with solenoid valve	51900193
VITON door gasket for 6060 M and 6060 P	51900071
VITON door gasket for 6130 M and 6130 P	51900072
Daily program timer, mechanical	51900205
24 hour timer (20 h at 60 Hz)	51900073
Weekly program timer, mechanical	51900008
Weekly program timer, digital	51900161
Digital sample temperature display with flexible Pt 100 temperature sensor and socket for external data recorder	51900074
Thermicon® P temperature program controller (for M-models only)	51900209
Eurotherm 2404/P4 temperature controller with RS 232 interface (for M-models only)	51900297
Eurotherm 2404/P4 temperature controller with RS 422/485 interface (for M-models only)	51900298
Digicon S temperature controller with analog interface 0-20 mA/0-10 V	
(200 ºC): VT 6060 M and VT 6130 M	51900194
(300 ºC): VT 6060 P and VT 6130 P	51900195
(400 ºC): VT 6060 P	51900196
VT 6130 P	51900197
Rated temperature of 400 °C, (door without inspection window)	
for VT 6060 P	51900079
for VT 6130 P	51900080
Central monitoring connection	51900081
Vacuum chamber with rounded corners at the rear;	
for VT 6060 M	51900075
for VT 6060 P	51900077
for VT 6130 M	51900076
for VT 6130 P	51900078
Temperature recorder with flexible Pt 100 temperature sensor (not in combination with the 400 °C model)	51900029

Accessories

| Accessories for vacutherm	Order no.
Support stand, 780 mm height	
for VT 6060 M/P	50029890
for VT 6130 M/P	50029597
Additional shelf (incl. 2 shelf supports)	
for VT 6060 M	50043975
for VT 6130 M	50043976
Tray for VT 6060 M/P made of stainless steel	50048621
for VT 6060 M/P made of aluminium	50048620
for VT 6130 M/P made of stainless steel	50048619
for VT 6130 M/P made of aluminium	50048618
Stainless steel vacuum connection kit for tubing with a diameter of 10 mm	50046860

THOUGHT THROUGH IN THE FULLEST DETAIL

vacutherm 6000 regulation and control modules

Pressure controller with solenoid valve

- Digital pressure display from 1 to 1400 mbars
- Pressure range is controlled via two pre-selected set points with a stainless steel solenoid valve
- Pressure can be controlled from 5 to 1400 mbars
- Recorder connection 0...1V for pressure documentation
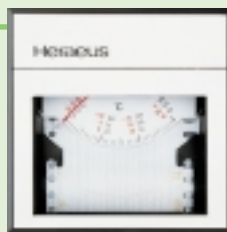
Temperature recorder

- Continuous temperature documentation on thermal paper
- No ribbon or ink required
- Paper roll sufficient for 14 days continuous use
- Recorder can be switched on and off as required
- For M-models only

24 hour timer

- For on/off intervals within 24 hours (not in combination with sample temperature display for VT 6060)

Microprocessor controlled temperature controller

Eurotherm 2404/P4 for models M with
- Temperature program with a maximum of 16 program steps
- RS 232 or RS 485 computer interface, connection via sub-D plug

Digital load temperature display

- Temperature measured directly at load
- With flexible Pt 100 temperature sensor
- External temperature recorder can be connected

Microprocessor controlled temperature controller

Thermicon P for models M with
- Temperature program with a maximum of 9 program steps
- Integrated timer for on/off switching up to 99 h 59 mins.
- Defective temperature sensor indicator

Central monitoring

- Connection for max. 250 V/3 A

Digicon temperature controller with analog interface
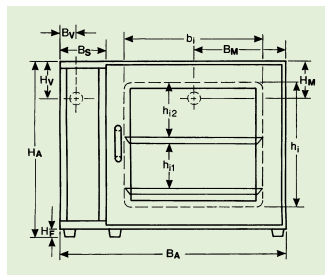
Digicon S for models P and M
- Digital display of set or actual temperature
- External setting of preset value 0...20 mA
- External temperature registration 0...10 V
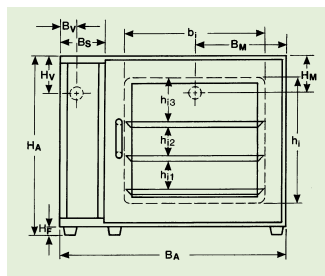- Connection via a plug in accordance with DIN 41524

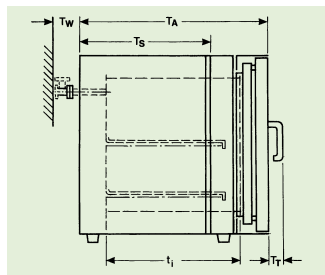## RS 232 interface for temperature registration

VACUTHERM 6000 TECHNICAL DATA

Dimensions

**Front view
of model VT 6060**

**Front view
of model VT 6130**

**Side view
of models VT 6060 and VT 6130**

[1] The values stated apply to the
empty oven and vacuum operation
in acc. with DIN 12880, part 2)
[2] Control range M:
electronic controller from T_A + 15 °C;
control range P:
electronic controller from T_A + 10 °C;
T_A = Ambient temperature
[3] Measured on the shelves
[4] Distributed load
[5] Other voltages on request
[6] In line with heat transfer to the
environment

vacutherm 6000			jacket heating		shelf heating	
			VT 6060 M	**VT 6130 M**	**VT 6060 P**	**VT 6130 P**
Total volume	l		53	128	53	128
Internal dimensions	mm	b_i	415	495	415	495
		h_i	345	489	–	–
		t_i	371	529	371	529
		h_{i1}	124	124	119	119
		h_{i2}	155	124	140	119
		h_{i3}	–	158	–	146
Vacuum suction sockets	mm	B_V	53	53	53	53
		H_V	132	132	132	132
Vacuum measuring sockets	mm	H_M	132	132	132	132
		B_M	298	373	298	373
External dimensions	mm	B_A	744	895	744	895
		H_A	576	720	576	720
		T_A	570	750	570	750
Feet height		H_F	24	24	24	24
Door handle depth		T_T	60	60	60	60
Control box width		B_S	149	149	149	149
Control box depth		T_S	400	580	400	580
Distance for options		T_W	80	80	80	80
T_W with inert gas connection		$T_{W\,Inert}$	160	160	160	160
T_W with models for flammable solvents		$T_{W\,bL}$	160	160	160	160
Temperature[1]						
Rated temperature[1]	°C		200	200	300/400	300/400
Spatial temperature deviation[3]						
at 200 °C	± °C		± 4	± 6	± 3	± 4
at 300 °C	± °C		–	–	± 6	± 6
at 400 °C	± °C		–	–	± 7	± 7
Temperature deviation in time with electronic controllers	°C		≦ 0.5	≦ 0.5	≦ 0.5	≦ 0.5
Heating-up time to 98 % of [1] [3]						
200 °C	min		75	140	25	25
300 °C	min		–	–	35	40
400 °C	min		–	–	50	60
Electrical protection						
Protection class			I	I	I	I
Protection type			IP 20	IP 20	IP 20	IP 20
Vacuum						
Vacuum connection with tube shaft Ø 20 mm	DN		25	25	25	25
Measuring connection	DN		25	25	25	25
Max. final vacuum	mbar (hPa)		1×10^{-2}	1×10^{-2}	1×10^{-2}	1×10^{-2}
Leak rate	$\frac{mbar \times l}{s}$		$< 1 \times 10^{-2}$	$< 1 \times 10^{-2}$	$< 1 \times 10^{-2}$	$< 1 \times 10^{-2}$
Shelves	no. (max.)		2 (4)	3 (5)	2 (2)	3 (3)
Usable area	mm	W/D	400/312	480/470	400/297	465/417
Weight (empty)	kg		82	153	90	164
Permissible total load	kg		40	60	40	60
Max. load of shelf[4]	kg		20	20	20	20
Electrical input power						
Voltage (V~) 50/60 Hz[5]			230 ±10%	230 ±10%	230 ±10%	230 ±10%
Power	kW		1.7	2.2	1.6	3.0
Heat transfer to environment						
at 200 °C	Wh/h[6]		550	870	–	–
at 300 °C	Wh/h[6]		–	–	450	880

READY TO CONNECT

Vacuum pumps for Vacuum Drying Ovens: high quality, power and a long life

HMD 8 three-step diaphragm pump

Standard pump for drying processes involving water and non-caustic vapours.
Features: condensate trap and drain cock. 100 % oil free, requires little maintenance. Short pump-down times. Suitable for all vacutherm 6000 ovens.

HMD 4C three-step diaphragm pump

Chemical pump for drying processes involving caustic/corrosive

vapours. Fully lined with PTFE and other fluorinated hydrocarbons.
Functional design: integrated glass condensate trap and an emission condenser with cooling, supplied as standard. We recommend this pump for all vacutherm 6000 models in particular the BL versions for flammable solvents (see page 8).

HMZ 2C two-step diaphragm pump

Features like HMD 4C but excluding emission condenser. Due to its low pump volume, we recommend it for model VT 6025.

HRE 8 one-step rotary vane pump

Precision vacuum pump designed for low pressure applications (<1 mbar).
Features: condensate trap and drain cock on the suction end, trap with integrated oil filter on the pressure end and permanent gas ballast. Suitable for all vacutherm 6000 ovens in particular for heat treatment without liquids.
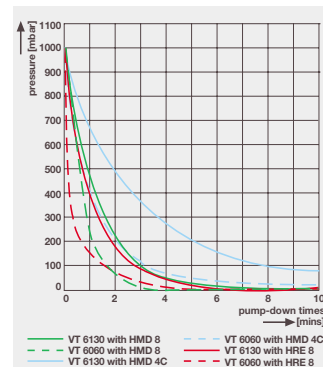
Pump-down times

Vacuum pumps – Technical data and Order numbers

Pumps		Diaphragm pumps			Rotary vane pumps
		HMD 8	HMD 4C	HMZ 2C	HRE 8
Rated pumping capacity (Pneurop)	m³/h	6.5	3.0	1.7	8.6
Total final pressure without gas ballast	mbar	2	2	10	0.1
Total final pressure with gas ballast	mbar	<10	<10	<20	6×10^{-1}
Water vapour compatibility	mbar	–	–	–	40
Capacity of trap	ml	725	500	500	500
Weight	kg	26	18	14	24
Dimensions with trap (w/h/d)	mm	240 x 300 x 610	241 x 500 x 338	241 x 326 x 336	260 x 232 x 460
Order number		50040078	50028362	50028364	50028361

All Heraeus pumps are equipped with the necessary components for connection to Heraeus Vacuum Ovens.

ALL IN ONE

vacucenter® vacuum pump cabinet – the complete solution

vacutherm and vacucenter – one system for any type of application

This fully equipped vacuum pump cabinet is designed for vacutherm 6060 and 6130 Vacuum Drying Ovens. Three types of vacuum pumps are available.

- Central power supply and single main switch for both vacuum oven and pump
- Hours counter for tracking oil changes for rotary vane pumps

vacucenter is not designed for use in BL-versions (for flammable solvents).

vacucenter vacuum pump cabinet – Technical data and order numbers

vacucenter with pump model		HMD 8	HMD 4C	HRE 8
Voltage	V3N~, 50/60 Hz	400	400	400
Max. rated power	kW	3.37	3.20	3.37
External dimensions (w/h/d)	mm	895/650/900	895/650/900	895/650/900
Total weight	kg	88	80	86
Protection class		I	I	I
Protection type		IP 20	IP 20	IP 20
Order number[1]		50044332	50044333	50044334

[1] in combination with VT 6060 or VT 6130

A SAFE BET

Vacuum Drying Ovens for flammable solvents

Heraeus vacutherm 6000 BL Vacuum Drying Ovens for safe drying of samples that contain flammable solvents offer a unique safety concept that, even in the case of unsupervised operation, provides optimum protection.

Features:

- **Rated temperature of 200 °C/300 °C**
- **TÜV and GS tested**
- **Total volume of 53 and 128 l (25 l on request)**

VT 6060 BL with shelf heating

Additional features

In addition to the standard version described before all ovens also feature a forced release of inertgas system which, in the event of a leakage, prevents the formation of explosive mixtures inside the vacuum chamber. Furthermore the heating elements are only activated once the pressure inside the vacuum chamber is below 80 mbar.

Safety concept

- Meets the requirements of Explosion Protection Guidelines
- Pressure related activation of the heating elements
- Precision control valve allows inert gas operation
- Forced release of inertgas in case of an accidental increase in pressure

Safe, user friendly operation

The VT 6000 BL's safety concept has no limitations to working temperatures. Elaborate calculations of working temperature – due to the composition of solvents are therefore not required.
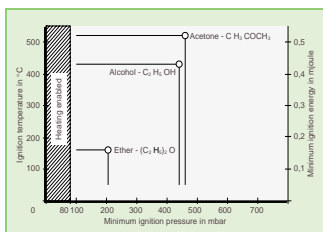
Technical data

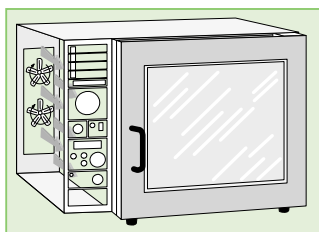The vacutherm 6000 BL technical data are identical to those of the vacutherm 6000 series, table on page 6.

supplyLAB
www.supplylab.pt

TECHNICAL FEATURES
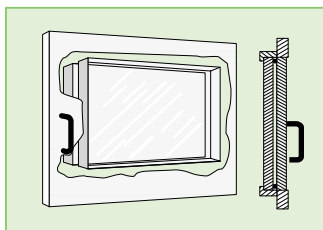
vacutherm 6000 BL: safety first

Pressure related activation of heating at < 80 mbar. Forced release of inert gas of the vacuum chamber in the case of accidental increase of pressure above 130 mbar.


Permanent ventilation of the control panel area through two independently operating fans, to prevent solvent leakage.There is no need of permanent feed with gas.
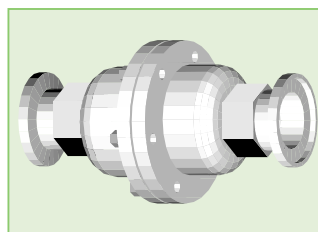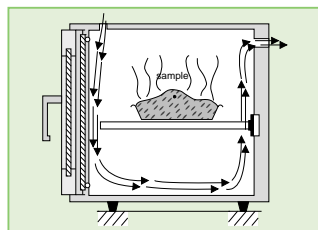

The optional flame filter prevents the spread of flames to protect the vacuum oven from sources of ignition. The flame filter is recommended for applications with solvents with ignition temperatures of < 21 °C.

Double pane door made of safety glass.
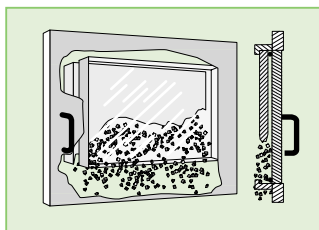
Tested implosion protection of the double pane sliding door, in accordance with GS approval.

Inert gas connection for gentle ventilation and for operation with process gases.

vacutherm 6000 BL Order Numbers

Units		Order no.
VT 6060 M-BL	230 V ~, 50/60 Hz, jacket heating, 200 °C, 53 l	51014546
VT 6130 M-BL	230 V ~, 50/60 Hz, jacket heating, 200 °C, 128 l	51014547
VT 6060 P-BL	230 V ~, 50/60 Hz, shelf heating, 300 °C, 53 l	51014548
VT 6130 P-BL	230 V ~, 50/60 Hz, shelf heating, 300 °C, 128 l	51014549

Options		Order no.
Calibration Certificate	Certificate of calibration for 150 °C at centre of the vacuum chamber	50044187
	Calibration at an additional measuring point (max. 2)	50044188

Accessories		Order no.
Flame filter		50042626
Support frame, 780 mm height	for VT 6060 M/P-BL	50029890
	for VT 6130 M/P-BL	50029597
Additional shelves	including shelf supports	
	for VT 6060 M-BL	50043975
	for VT 6130 M-BL	50043976
Tray	for VT 6060 M-BL made of stainless steel	50048621
	for VT 6060 M-BL made of aluminium	50048620
	for VT 6130 M-BL made of stainless steel	50048619
	for VT 6130 M-BL made of aluminium	50048618
Stainless steel vacuum connection kit for tubing with a diameter of 10 mm		50046860
HMD 4C diaphragm pump		50028362

GOOD THINGS COME IN SMALL PACKAGES

VT 6025 – the compact Vacuum Drying Oven

The stainless steel vacuum chamber – which is welded from the outside – is electropolished and therefore exceptionally resistant to corrosion. All parts that come into contact with media are made of stainless steel.

Features

■ **Total volume of 25 l**
■ **Temperatures to 200 °C**
■ **Compact design**

Standard model features

■ Jacket heating
■ Kelvitron® microprocessor temperature controller with digital temperature display
■ Analogue pressure display
■ Upper limit cut-out (class 2)
■ Stainless steel (1.4571) vacuum chamber
■ Ventilation valve

Comfort oven

The comfort model is designed for applications in chemical-pharmaceutical laboratories.

■ The vacuum chamber is seamlessly welded from the inside
■ Inert gas connection for precise release of non-flammable, non-toxic gases (VDI 2046) with precision valve and overpressure safety valve
■ DN 25 access port in the rear wall comes standard with comfort ovens

Further equipment options

Additional options for pressure and temperature documentation are available to meet requirements for ISO 9000, GLP/GMP, etc.

Standard VT 6025

VT 6025 Order Numbers

Units			Order no.
VT 6025	Standard model	230 V, 50/60 Hz[1]	51014550
VT 6025	Comfort oven with inert gas connection	230 V, 50/60 Hz[1]	51014552
VT 6025	Comfort oven with inert gas connection and digital pressure display with recorder output	230 V, 50/60 Hz[1]	51014553
VT 6025	Comfort oven with inert gas connection and digital pressure display with recorder output and Digicon S temperature controller with interface 0 – 20 mA/0 – 10 V	230 V, 50/60 Hz[1]	51014554

[1] Other voltages on request.

Options/Accessories for VT 6025 Vacuum Drying Oven		
Precision control valve	(only for order no. 51014550)	51900326
Additional shelf	(incl. shelf supports)	50028403
RS 232 computer interface		51900284

Vacuum chamber with two additional shelves

VT 6025 TECHNICAL DATA

VT 6025		
Total volume	l	25
Internal dimensions	mm (w/h/d)	300/275/307
Internal height above shelf	mm	120
External dimensions	mm (w/h/d)	480/600/450
Shelves	number (max.)	2 (4)
Usable area	mm (w/d)	270/250
Weight (empty)	kg	58
Total permissible load	kg	40
Max. load/shelf[1]	kg	20
Electrical power		
Rated voltage (V~) 50/60 Hz[2]	V~	230 ± 10%
Rated power	kW	1.3
Power consumption (empty) at 200 °C[3]	Wh/h	340
Temperature		
Rated temperature[4]	°C	200
Spatial temperature deviation at 200 °C[5]	± °C	± 4
Temperature deviation in time at 200 °C	± °C	<0.5
Heating-up time to 98 % of 200 °C[5) 6]	min	<100
Electrical protection		
Protection class		I
Protection type		IP 20
Vacuum		
Max. final vacuum	mbar (hPa)	1×10^{-2}
Leak rate	$\frac{mbar \times l}{s}$	$< 1 \times 10^{-2}$

VT 6025 front view

VT 6025 side view

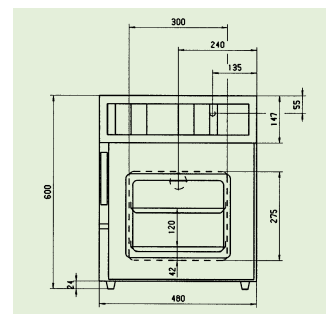[1] Distributed load
[2] Other voltages on request
[3] In line with heat transfer to the location
[4] Control range with electronic controller
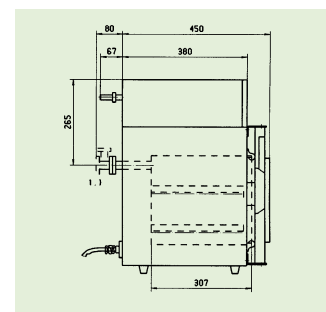   from T_A+ 15 °C; T_A = ambient temperature
[5] Measured on the shelves
[6] The values stated apply to the empty oven and vacuum operation (measured in
   acc. with DIN 12880, part 2)

EACH TO HIS OWN

Challenge our Customer Projects Department!

In addition to the extensive features provided by our standard equipment, we offer project related solutions.

An example:

Vacuum soldering and vacuum tempering equipment

Fully and partly automatic vacuum soldering and tempering equipment with directly heated and cooled sample shelves, suitable for soldering in an inert gas atmosphere using a non flammable form gas N_2/H_2 95/5 % or for heat treatment under vacuum.

- Customer specific equipment modifications
- Precise soldering with exact reproducibility
- Excellent operation and process safety
- Low oxygen partial pressure
- Negligible protective gas-consumption
- Small footprint

MORE THAN YOU EXPECT –
OUR SERVICE
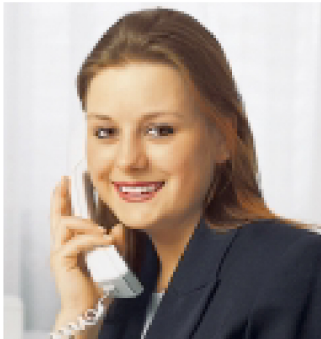
Our service:
A reassuring feeling

Individual

Many people talk about service – Kendro Laboratory Products brings this to life. You will notice this in the quality of our advice, which is individually geared towards your needs.
Our solutions are exactly tailored to your specific needs.

We will be there for you before, during and after your purchase.

You will find us as a partner who quickly and competently assists in all matters, to include:

■ calibration
■ reference measurement
■ application advice
■ repairs
■ exchange of spare parts

Other services are available on request.

For more detailed information please contact your local partner. The Kendro Service Team: a good feeling to know that this partner is at your side.

Your Sales Contact

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