Leybold

Vacuum Pump Systems

RUTA
Forevacuum Pump Systems

Central Vacuum Supply Systems
with SOGEVAC Pumps

TMP / TURBOLAB
High Vacuum Pump Systems

UNIVEX
High Vacuum Experimentation Systems

CS
Calibration Systems

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General to Vacuum Pump Systems

Overview

A continually increasing number of applications in industry and research are relying on vacuum technology. Thus widely differing requirements result regarding the vacuum generating systems.

The comprehensive range of vacuum pumps from Leybold offers, in combination with the matching accessories, all options of selecting the optimum pump system for your application in each case.

Based on the longstanding experience in the design and manufacture of vacuum pump systems, Leybold offers standardized pump systems which will match most applications – the RUTA pump systems.

RUTA pump systems excel by being compact, reliable and service-friendly.

The pump systems are equipped as standard with 400 V, 50 Hz three-phase motors.

Motors for special supply voltages, special mains frequencies or explosion protected pumps are available.

Standards

Leybold pump systems are rated according to CE, ISO, DIN and VDE regulations. Compliance with other standards is possible upon request.

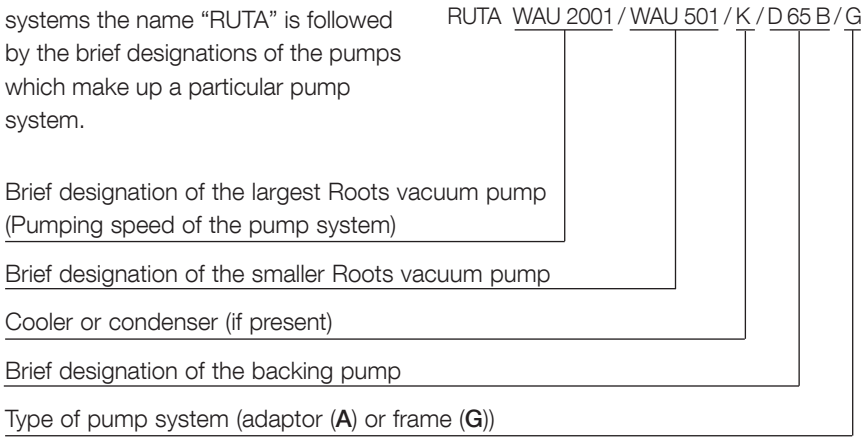
The technical data of the vacuum pump systems given in this catalog part are based on the PNEUROP Acceptance Specifications for Vacuum Pumps, Part 1, and comply with DIN 28 426. The characteristic curves in our pumping speed diagrams are plotted in accordance with DIN 28 426. The curves represent the mean of several measurements. Our warranty refers to the values indicated in the technical data table.

Designation of Roots Vacuum Pump Systems

Leybold pump combinations of Roots vacuum pumps with backing pumps are called “RUTA”.

In order to identify the standard pump systems the name “RUTA” is followed by the brief designations of the pumps which make up a particular pump system.

The pump system designation is arranged as follows:



Part Numbers

The part numbers listed refer in each case to the standard version of the respective systems. Minor deviations are indicated by way of variants. The variant V001 designates in each case the described version of the system.
The pump system RUTA WAU 2001/ SP630 F/G has Part No. 502 511 V001. When using the air-cooled screw pump SCREWLINE SP 630 then the variant will have the Part No. 502 511 V002. Minor deviations are special operating voltage, fitted accessories and custom painting for frame or pumps, for example.
The use of a different type of Roots vacuum pump, use of the WS 2001 instead of the WAU 2001, for example, is also treated as a variant. All variants with the same basic number have the same frame dimensions, the same distance between intake flange of the Roots pump and the exhaust flange of the backing pump.

Types of Pump Systems

Typical areas of application for RUTA pump systems are industry, research and chemistry. Here the focus is on processes for metal production and processing, drying and degassing, thermal treatment, coating in the area of solar components and semiconductor manufacture as well as surface refinement. RUTA pump systems are also used as backing pump sets for high vacuum systems in combination with diffusion pumps, turbomolecular pumps and cryo pumps.

RUTA WH7000/4xSV750BF/G

The RUTA pump systems described here have been designed for rough and medium vacuum operation, i.e. for the pressure range from atmospheric pressure down to 10^{-4} mbar (0.75×10^{-4} Torr). RUTA pump systems consist of a combination of individual pumps whereby Roots vacuum pumps are employed on the intake side. Further compression to atmospheric pressure may be performed either by oil sealed or dry compressing vacuum pumps, liquid ring pumps or Roots vacuum pumps with pre-inlet cooling. All combinations may be equipped at suitable places with condensers.

The selection criteria for a RUTA pump system are as follows:

- Pumping speed
- Operating pressure
- Process conditions
- Characteristics of the media
- Standards and regulations which depend on the area of application and the produced products.

Standard RUTA Pump Systems

Our Roots vacuum pumps WA, WH, WS and RA or WAU and WSU with integrated bypass line are combined with oil sealed backing pumps for conventional generation of the vacuum. Single-stage arrangements are capable of delivering pumping speeds of 250 to 16000 m^3/h (147.3 to 9424 cfm). Higher pumping speeds can be attained by paralleling several pumps. The attainable operating pressures depend on the number of pumping stages.

For higher pumping speeds or lower ultimate pressures, also three-stage or multi-stage pump systems are available.

RUTA Pump Systems with Condensers

If vacuum systems must pump larger quantities of vapor or vapor gas mixtures, it is economical to insert condensers which are cooled with water or a different coolant at a suitable place within the pump system. Cooled condensers are themselves effective partial pumps which condense most of the vapors from the pumped media. The downstream mechanical pumps will then only need to pump those gases which have not already condensed.

The quantity of vapor present in each case determines the size of the condenser and the temperature at which it is operated. The size of the downstream pump is determined by the quantity of non-condensable gases, the required pressure and the required pump-down time for the system.

All pump systems of the WA/WAU, WS/WSU, WH and RA series may be equipped with one or several condensers. These are often used in the chemical industry. Here RUTA vacuum pump systems with condensers are not only used to generate a vacuum, but they are also often employed in the recovery of solvents. When installing one or several Roots pumps upstream of a condenser, low operating pressures and high condensation pressures can be attained. Thus the condenser may in many cases be operated with cooling water instead of brine. The vapor components pumped together with inert gases may be separated once more in an emission condenser on the exhaust side so that the quality of the exhaust gas can be maintained within close tolerance regarding its cleanness.

Dry Compressing RUTA Vacuum Pump Systems

Increasing environmental awareness, pumping of condensable vapors or high requirements regarding cleanness when pumping high quality media which must not be contaminated by other media for recycling, often requires the use of universal pumps where the pump chamber is free of operating agents (dry pumps).

Here Leybold offers two solutions:
1. Pump systems with dry compressing vacuum pumps combined with one or several Roots vacuum pumps.
2. Single-stage RUTA RAV vacuum pump systems, consisting of Roots vacuum pumps with pre-admission cooling.

The operating pressure ranges of the pump systems depend on the number of Roots vacuum pumps, but will extend in any case without interruptions to atmospheric pressure.

Already in connection with one Roots pump, pump systems with a screw pump are capable of attaining base pressures of < 1 x 10^{-3} mbar (7.5 x 10^{-4} Torr).

Single-stage RAV combinations attain an ultimate pressure of 150 mbar (112.5 Torr).

Multi-stage combinations with Roots vacuum pumps of all systems are capable of attaining pressures below 10^{-4} mbar (7.5 x 10^{-5} Torr).

RUTA Custom Pump Systems

Most users will be able to select the right pump system for their application from our range of standard pump systems. In special cases a custom design may be required for special processes and high pumping speeds.

We are prepared to design and manufacture custom pump systems according to customers specifications. If required we will use - besides oil-sealed and dry compressing backing pumps - liquid ring and ejector pumps.

RUTA Pump Systems for the Metal Producing and Processing Industry

In common vacuum furnace processes such as hardening, annealing, brazing, melting and casting, preferably oil sealed or dry compressing standard vacuum pump systems are usually used.
The oil sealed systems consist of a combination of Roots vacuum pumps with a single or two-stage rotary vane or rotary piston pump.

In the dry compressing systems our screw vacuum pump SCREWLINE is used as the backing pump.

The vacuum pumps are mounted in a rugged frame. The design of the pump systems is service-friendly, modular and can be easily upgraded with additional equipment.

On smaller furnaces RUVAC WAU Roots vacuum pumps are the most suitable because these may be cut-in at a higher operating pressure, while on larger furnaces and particularly where short pump-down cycles are required, the use of RUVAC WH Roots vacuum pumps with suitably sized backing pumps is advisable. For special processes, e.g. fusion or degassing of molten masses, due to the high dust contents, the additional use of a dust separator is required as well as equipping the backing pumps with oil filtering units.
These additional units ensure utmost operational reliability of the pump systems even under the toughest operating conditions.

Pump system for the field of steel degassing

RUTA Pump Systems for the Photovoltaic and Coating Industry

In photovoltaic coating processes reactive, toxic and corrosive substances are generally used.

Frequently large quantities of dust for the pump system need to be expected. For such applications, Leybold has developed process pump combinations consisting of pumps from the DRYVAC line and Roots pumps from the RUVAC WS/WH line with optionally integrated controller.

The integrated electronics and sensor systems permit easy integration of the pump systems within the plant control system.

(For information on possible applications, see Catalog Part “Dry Compressing Screw Vacuum Pumps DRYVAC”).

RUTA Pump Systems for the Chemical Industry

In chemical processes it is often necessary to remove corrosive, condensable and reactive gases and vapors. Leybold designs and manufactures custom-built pump systems for specific process applications. Depending on the type of application, either a rotary vane pump, or a dry compressing screw vacuum pump (SCREWLINE, for example), a liquid ring pump or a combination of gas jet pump and liquid ring pump may be used as the backing pump.

To ensure dependable monitoring of the system, the following monitoring devices, among others, may be installed:

- Temperature sensors to monitor the gas temperatures between the pump stages and the pump body temperature,
- Water flow monitors for the cooling water supply to pumps and condensers,
- Differential pressure indicator with control setpoint to monitor the exhaust filters of the rotary vane vacuum pump.

Pump Systems for Drying, Evaporation and Distillation Applications (TVD)

More and more vacuum applications are finding their way into the areas of environmental protection, recycling and waste disposal. “Waste disposal of used oil and aromatic compounds” and “Cleaning processes in metal-processing factories” demonstrate that the combination of vacuum know-how, innovative engineering and applications know-how is in-dispensable for the successful application of vacuum technology in most widely differing applications.

TVD pump system, mobile with control cabinet

The product is no longer in the foreground, solutions to problems are demanded instead.

Leybold has developed some continuously operating vacuum pump systems for these applications. These systems basically
consist of a rotary vane pump with a condenser unit. Upon request the condenser arrangement may also be equipped with a cold water set. This version will then be independent of any cooling water connections and - being a mobile system - it is well-suited for operation at varying locations.

Products

Oil Sealed RUTA Pump Systems Three-Stage, with Two-Stage TRIVAC Backing Pumps, Adaptor Version

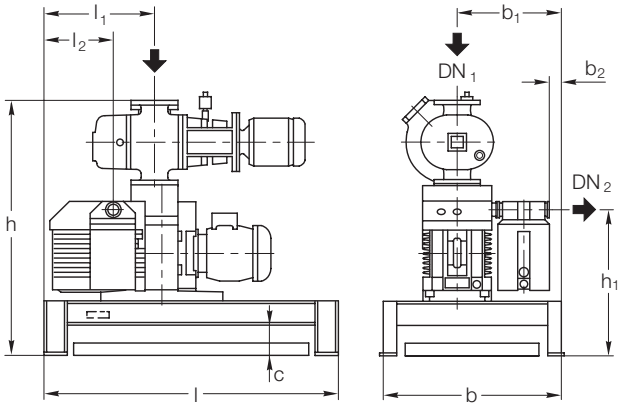
RUTA WAU501/D65B/A

Standard Equipment

- Exhaust filter
- Oil collecting pan
- Manually operated gas ballast
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Oil filter
- 24 V DC gas ballast valve
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Exhaust filter with oil return line
- Special motors
- Electric control systems



Type	RUTA	251/D40B/A	251/D65B/A	501/D65B/A
RUVAC WA/WAU/WS/WSU	P2	251	251	501
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B
	DN_1	63 ISO-K	63 ISO-K	63 ISO-K
	DN_2	40 ISO-KF	40 ISO-ISO-KF	40 ISO-KF
	l	1000 (39.37)	1000 (39.37)	1000 (39.37)
	l_1	375 (14.76)	375 (14.76)	375 (14.76)
	l_2	234 (9.21)	234 (9.21)	234 (9.21)
	b	600 (23.62)	600 (23.62)	600 (23.62)
	b_1	350 (13.78)	350 (13.78)	350 (13.78)
	b_2	40 (1.57)	40 (1.57)	40 (1.57)
	h	854 (33.62)	854 (33.62)	894 (35.20)
	h_1	488 (19.21)	488 (19.21)	488 (19.21)
	c	100 (3.94)	100 (3.94)	100 (3.94)

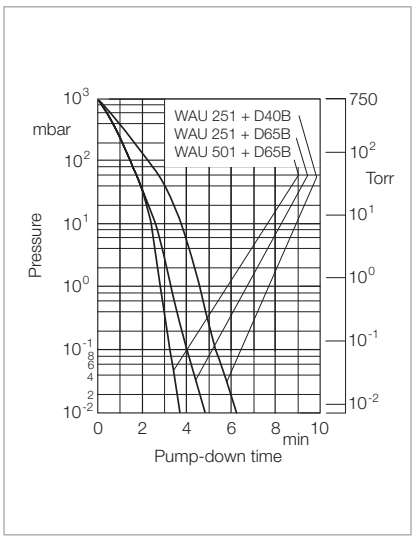
Dimensional drawing for the pump systems with TRIVAC D40/65 B backing pumps on pallet; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

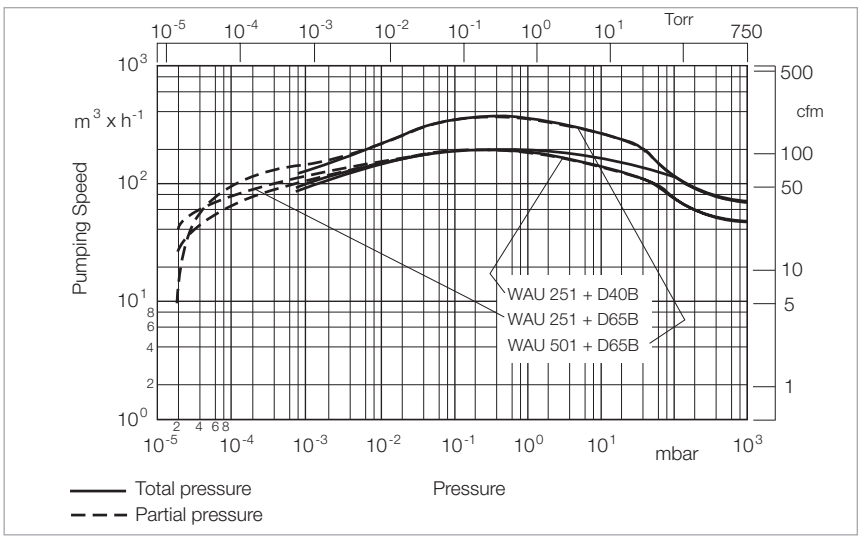
		RUTA WAU 251/D40B/A	RUTA WAU 251/D65B/A	RUTA WAU 501/D65B/A
RUVAC (WA/WAU/WS/WSU possible)	P2	251	251	501
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	200.0 (117.8)	210.0 (123.7)	380.0 (223.8)
Ultimate partial pressure	mbar (Torr)	< 2×10^{-5} (< 1.5×10^{-5})	< 2×10^{-5} (< 1.5×10^{-5})	< 2×10^{-5} (< 1.5×10^{-5})
Ultimate total pressure with gas ballast	mbar (Torr)	< 8×10^{-4} (< 6×10^{-4})	< 8×10^{-4} (< 6×10^{-4})	< 8×10^{-4} (< 6×10^{-4})
Installed motor power 400 V, 50 Hz	kW (hp)	2.6 (3.5)	3.3 (4.5)	4.4 (6.0)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	2.0 (2.7)	2.5 (3.4)	2.7 (3.7)
Noise level				
max.	dB(A)	64	65	67
without gas ballast at 1 mbar (0.75 Torr)	dB(A)	62	63	63
Oil filling, total, approx.	l (qt)	3.3 (3.49)	4.0 (4.23)	4.3 (4.55)
Weight, total, approx.	kg (lbs)	245.0 (540.2)	260.0 (573.3)	305.0 (627.5)
Connecting flange				
Inlet port	DN_1	63 ISO-K	63 ISO-K	63 ISO-K
Outlet port	DN_2	40 ISO-KF	40 ISO-KF	40 ISO-KF

Ordering Information

		RUTA WAU 251/D40B/A	RUTA WAU 251/D65B/A	RUTA WAU 501/D65B/A
		Part No.	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WAU 251	WAU 251	WAU 501
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU		**023 06**	**023 07**	**023 08**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/251 **500 001 381**	RT 5/251 **500 001 381**	RT 5/501 **500 001 382**

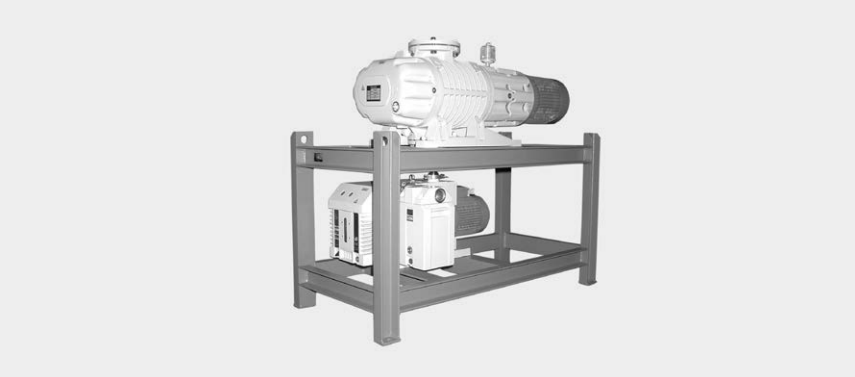


Pump-down time diagram
for a 1000 l tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems Three-Stage, with Two-Stage TRIVAC Backing Pumps, Frame Version



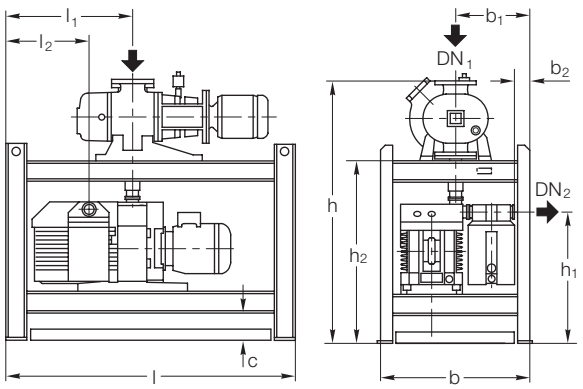
RUTA WAU501/D65B/G

Standard Equipment

- Exhaust filter
- Oil collecting pan
- Manually operated gas ballast
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Oil filter
- 24 V DC gas ballast valve
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Exhaust filter with oil return line
- Special motors
- Electric control systems



Type	RUTA	251/D40B/G	251/D65B/G	501/D65B/G	1001/D65B/G
RUVAC WA/WAU/WS/WSU	P2	251	251	501	1001
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B	D 65 B
	DN_1	63 ISO-K	63 ISO-K	63 ISO-K	100 ISO-K
	DN_2	40 ISO-KF	40 ISO-KF	40 ISO-KF	40 ISO-KF
	l	1000 (39.37)	1100 (43.31)	1150 (45.28)	1300 (51.18)
	l_1	400 (15.75)	480 (18.90)	480 (18.90)	480 (18.90)
	l_2	234 (9.21)	314 (12.36)	314 (12.36)	314 (12.36)
	b	560 (22.05)	560 (22.05)	560 (22.05)	600 (23.62)
	b_1	280 (11.02)	280 (11.02)	280 (11.02)	280 (11.02)
	b_2	59 (2.32)	59 (2.32)	59 (2.32)	59 (2.32)
	h	977 (38.46)	977 (38.46)	1017 (40.04)	1067 (42.01)
	h_1	488 (19.21)	488 (19.21)	488 (19.21)	488 (19.21)
	h_2	677 (26.65)	677 (26.65)	677 (26.65)	671 (26.42)
	c	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)

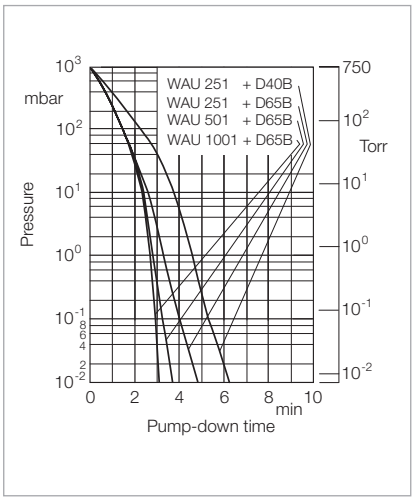
Dimensional drawing for the pump systems with TRIVAC D40/65 B backing pumps in a frame; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

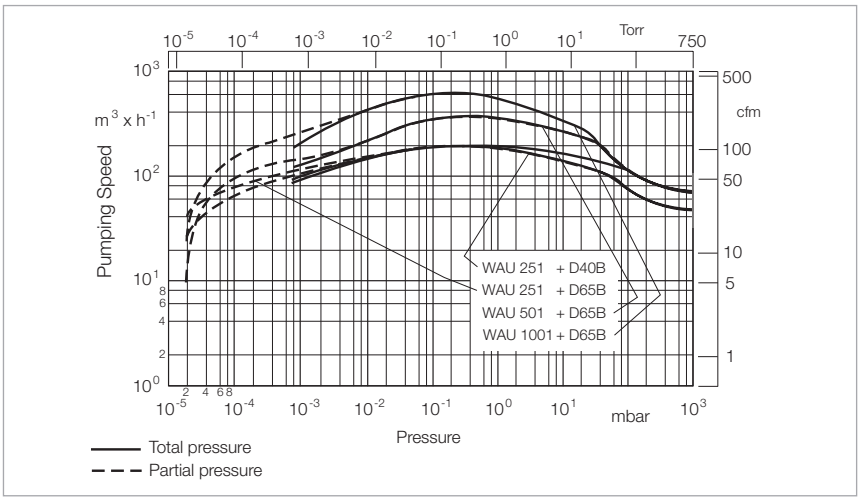
		RUTA WAU			
		251/D40B/G	251/D65B/G	501/D65B/G	1001/D65B/G
RUVAC (WA/WAU/WS/WSU possible)	P2	251	251	501	1001
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B	D 65 B
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	185.0 (109.0)	205.0 (120.7)	340.0 (200.3)	620.0 (365.2)
Ultimate partial pressure	mbar (Torr)	$< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$)	$< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$)	$< 2 \times 10^{-5}$ ($< 1.5 \times 10^{-5}$)	$< 2 \times 10^{-5}$) ($< 1.5 \times 10^{-5}$)
Ultimate total pressure with gas ballast	mbar (Torr)	$< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$)	$< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$)	$< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$)	$< 8 \times 10^{-4}$ ($< 6 \times 10^{-4}$)
Installed motor power 400 V, 50 Hz	kW (hp)	2.6 (3.5)	3.3 (4.5)	4.4 (6.0)	6.2 (8.4)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	2.0 (2.7)	2.5 (3.4)	2.7 (3.7)	3.0 (4.1)
Noise level					
max.	dB(A)	64	65	67	77
without gas ballast at 1 mbar (0.75 Torr)	dB(A)	62	63	63	70
Oil filling, total, approx.	l (qt)	3.3 (4.5)	4.0 (4.23)	4.3 (4.55)	5.3 (5.60)
Weight, total, approx.	kg (lbs)	280.0 (617.4)	310.0 (683.6)	350.0 (771.8)	460.0 (1014.3)
Connecting flange					
Inlet port	DN_1	63 ISO-K	63 ISO-K	63 ISO-K	100 ISO-K
Outlet port	DN_2	40 ISO-KF	40 ISO-KF	40 ISO-KF	40 ISO-KF

Ordering Information

		RUTA WAU			
		251/D40B/G	251/D65B/G	501/D65B/G	1001/D65B/G
		Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WAU 251	WAU 251	WAU 501	WAU 1001
Backing pump TRIVAC	P1	D 40 B	D 65 B	D 65 B	D 65 B
Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WAU		**023 16**	**023 17**	**023 18**	**023 19**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/251 **500 001 381**	RT 5/251 **500 001 381**	RT 5/501 **500 001 382**	RT 5/1001 **500 001 383**

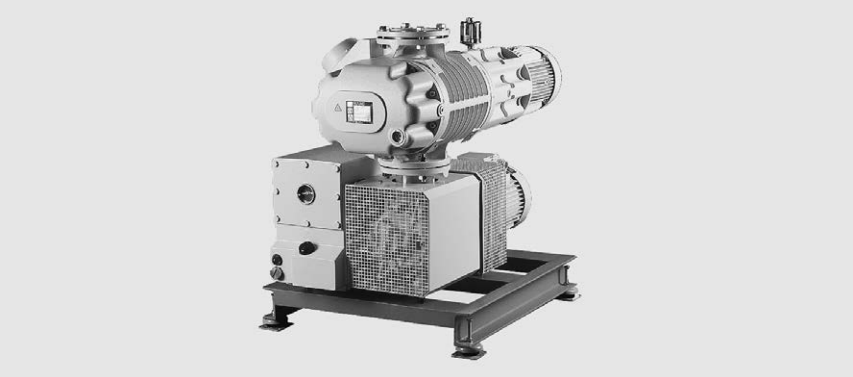


Pump-down time diagram for a 1000 l tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Adaptor Version



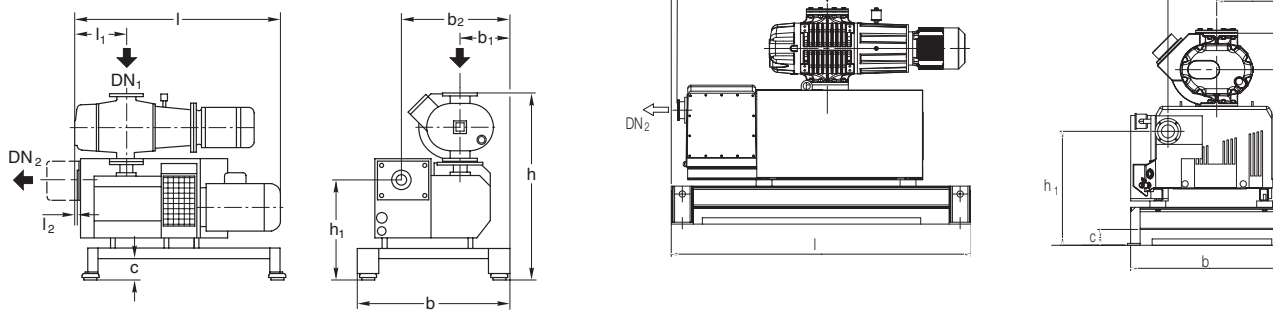
RUTA WAU1001/SV200/A

Standard Equipment

- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve:
  SV 200/300 B manually operated
  SV 630 BF 24 V DC
- SV 200/300 B with air cooling
- SV 630 BF with water cooling
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Type	RUTA	501/SV200/A	1001/SV200/A	1001/SV300B/A	2001/SV630BF/A
RUVAC WA/WAU/WS/WSU	P2	501	1001	1001	2001
Backing pump SOGEVAC	P1	SV 200	SV 200	SV 300 B	SV 630 BF
	DN_1	63 ISO-K	100 ISO-K	100 ISO-K	160 ISO-K
	DN_2	2"	2"	2"	100 ISO-K
	l	962 (37.87)	1050 (41.34)	1030 (40.55)	1896 (74.65)
	l_1	242 (9.53)	303 (11.93)	298 (11.73)	987 (38.86)
	l_2	70 (2.76)	77 (3.03)	88 (3.47)	40 (1.56)
	b	700 (27.56)	700 (27.56)	700 (27.56)	1000 (39.37)
	b_1	230 (9.06)	230 (9.06)	230 (9.06)	456 (17.95)
	b_2	499 (19.65)	499 (19.65)	520 (20.47)	764 (30.08)
	h	873 (34.37)	923 (36.34)	929 (36.58)	1340 (52.76)
	h_1	468 (18.43)	468 (18.43)	480 (18.90)	720 (28.35)
	c	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)

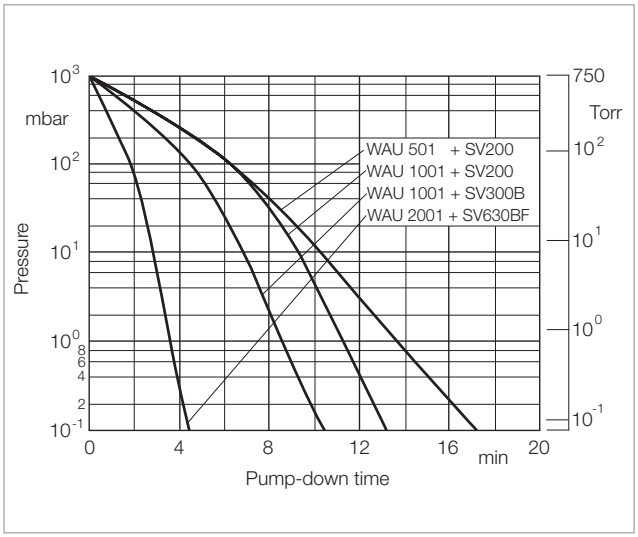
Dimensional drawing for the pump systems with SOGEVAC SV 200 and 300 B backing pumps [left], SOGEVAC SV 630 BF [right]; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

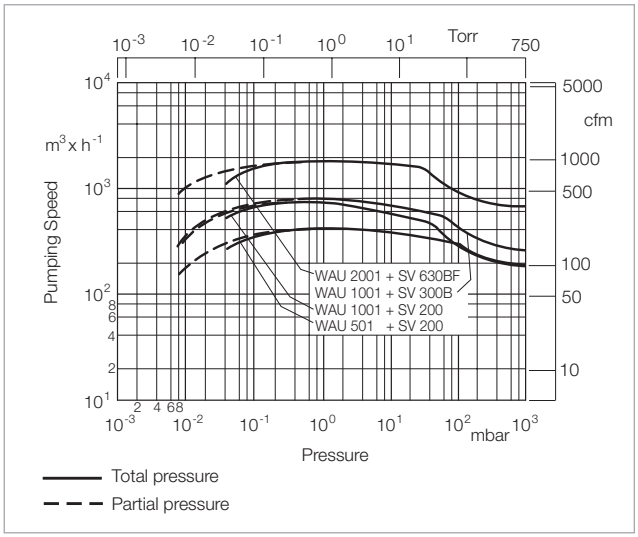
	RUTA WAU			
	501/SV200/A	1001/SV200/A	1001/SV300B/A	2001/SV630BF/A
RUVAC (WA/WAU/WS/WSU possible) P2	501	1001	1001	2001
Backing pump SOGEVAC P1	SV 200	SV 200	SV 300 B	SV 630 BF
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	365.0 (215.0)	715.0 (421.0)	730.0 (430.0)	1690.0 (995.4)
Ultimate partial pressure mbar (Torr)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)
Ultimate total pressure with gas ballast mbar (Torr)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)
Installed motor power 400 V, 50 Hz kW (hp)	6.2 (8.4)	8.0 (10.9)	9.5 (12.9)	22.5 (30.6)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	3.0 (4.1)	3.5 (4.8)	4.0 (5.4)	16.5 (22.4)
Noise level without gas ballast at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	70	75	76	80
Oil filling, total, approx. l (qt)	6.0 (6.34)	7.0 (7.4)	11.0 (11.63)	26.0 (27.47)
Weight, total, approx. kg (lbs)	335.0 (738.7)	430.0 (948.2)	480.0 (1058.4)	1140.0 (2513.7)
Connecting flange Inlet port DN_1 Outlet port DN_2	63 ISO-K 2"	100 ISO-K 2"	100 ISO-K 2"	160 ISO-K 100 ISO-K

Ordering Information

	RUTA WAU			
	501/SV200/A	1001/SV200/A	1001/SV300B/A	2001/SV630BF/A
	Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible) P2	WAU 501	WAU 1001	WAU 1001	WAU 2001
Backing pump SOGEVAC P1	SV 200	SV 200	SV 300 B	SV 630 BF
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU	**022 06**	**022 08**	**502 462 V001**	**502 463 V001**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")	RT 5/501 **500 001 382**	RT 5/1001 **500 001 383**	RT 5/1001 **500 001 383**	RT 5/2001 **500 001 384**

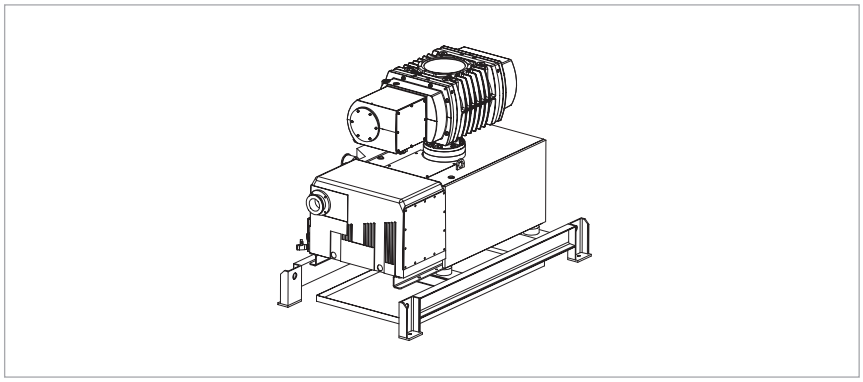


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems
Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Adaptor Version



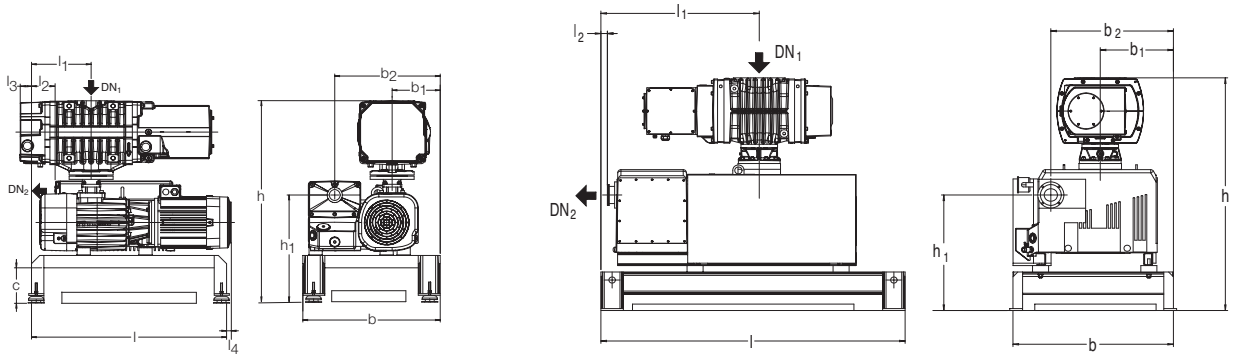
RUTA WH4400/SV630BF/A

Standard Equipment

- RUVAC WH with water cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve:
  SV 100 to 300 manually operated
  SV 630 BF 24 V DC
- SV 100 to 300 with air cooling
- SV 630 BF with water cooling
- Floor mounting
- The oil is supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Type	RUTA	700/SV100B/A	700/SV200/A	700/SV300B/A	4400/SV630BF/A
RUVAC WH	P2	700	700	700	4400
Backing pump SOGEVAC	P1	SV 100 B	SV 200	SV 300 B	SV 630 BF
	DN_1	100 ISO-K	100 ISO-K	100 ISO-K	250 ISO-K
	DN_2	G 1 1/4"	G 2"	G 2"	100 ISO-K
	l	710 (27.95)	950 (37.40)	950 (37.40)	1896 (74.65)
	l_1	217 (8.54)	262 (10.32)	335 (13.19)	947 (37.28)
	l_2	85 (3.35)	84 (3.31)	125 (4.92)	40.5 (1.59)
	l_3	41 (1.61)	–	45 (1.77)	–
	l_4	17 (0.67)	–	95 (3.74)	–
	b	500 (19.69)	700 (27.56)	700 (27.56)	1000 (39.37)
	b_1	175 (6.89)	230 (9.06)	230 (9.06)	456 (17.95)
	b_2	384 (15.12)	499 (19.65)	520 (20.47)	764 (30.08)
	c	100 (3.94)	100 (3.94)	100 (3.94)	100 (3.94)
	h	708 (27.87)	829 (32.64)	827 (32.56)	1450 (57.09)
	h_1	365 (14.37)	468 (18.43)	480 (18.90)	720 (28.35)

Dimensional drawing for the pump systems with SOGEVAC SV 100 B, 200 and 300 B backing pumps [left], SOGEVAC SV 630 BF [right]; dimensions in brackets ( ) are in inch

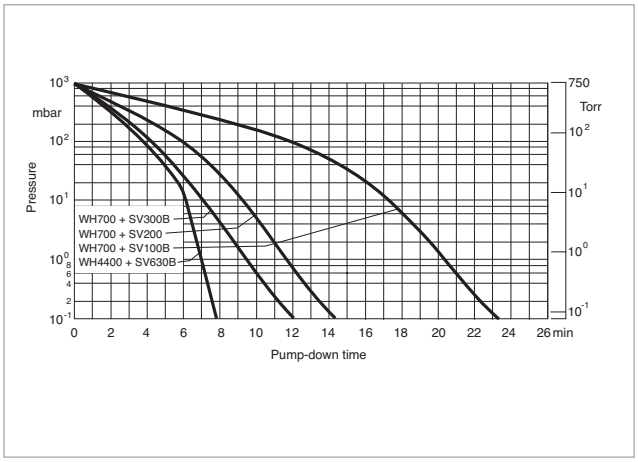
Technical Data, 50 Hz

		RUTA WH			
		700/SV100B/A	700/SV200/A	700/SV300B/A	4400/SV630BF/A
RUVAC WH	P2	700	700	700	4400
Backing pump SOGEVAC	P1	SV 100 B	SV 200	SV 300 B	SV 630 BF
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	520 (306)	570 (335)	600 (353)	3332 (1961)
Ultimate pressure without gas ballast	mbar	$< 5 \times 10^{-3}$	$< 2 \times 10^{-3}$	$< 3 \times 10^{-3}$	$< 3 \times 10^{-3}$
	(Torr)	($< 3.75 \times 10^{-3}$)	($< 1.5 \times 10^{-3}$)	($< 2.25 \times 10^{-3}$)	($< 2.25 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz	kW (hp)	4.4 (5.9)	6.2 (8.3)	7.7 (10.3)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	1.6 (2.2)	2.9 (3.9)	6.0 (8.0)	9,68 (12.98)
Noise level at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	62	69	70	73
Oil filling, total, approx.	l (qt)	2.9 (2.6.)	9.9 (8.7)	12.4 (10.9)	27.0 (23.8)
Weight, approx.	kg (lbs)	350 (722)	415 (915)	465 (1025)	1 330 (2932)
Connecting flange					
Inlet port	DN_1	100 ISO-K	100 ISO-K	100 ISO-K	250 ISO-K
Outlet port	DN_2	G 1 1/4"	G 2"	G 2"	100 ISO-K

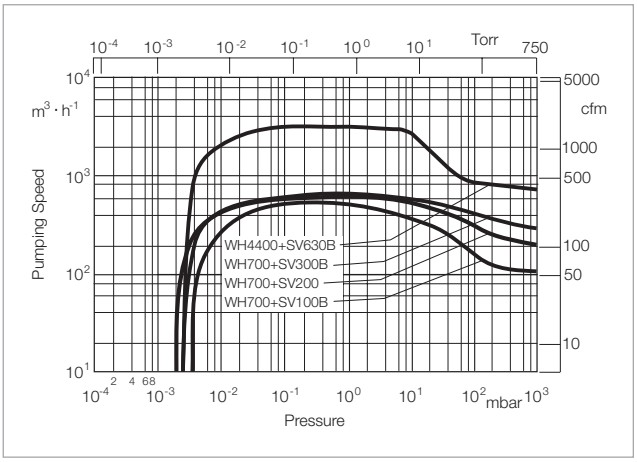
Ordering Information

		RUTA WH			
		700/SV100B/A	700/SV200/A	700/SV300B/A	4400/SV630BF/A
		Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC WH	P2	700	700	700	4400
Backing pump SOGEVAC					
air-cooled	P1	SV 100 B	SV 200	SV 300 B	–
water-cooled	P1	–	–	–	SV 630 BF
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH		**503155V001** [1]	**503156V001** [1]	**503157V001** [1]	**503164V001** [1]

[1] Including external frequency converter

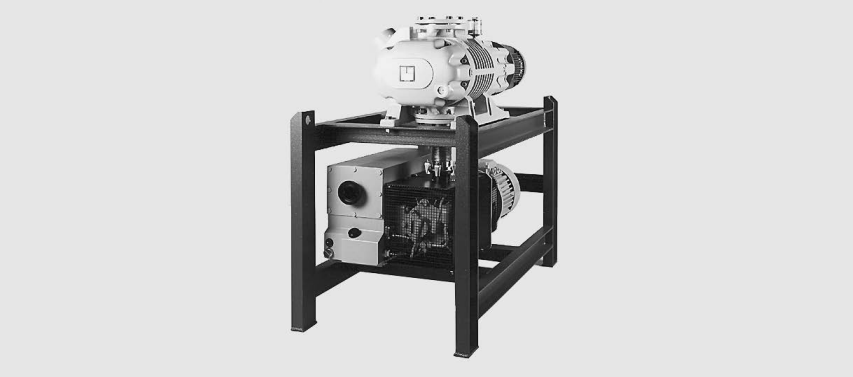


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Frame Version



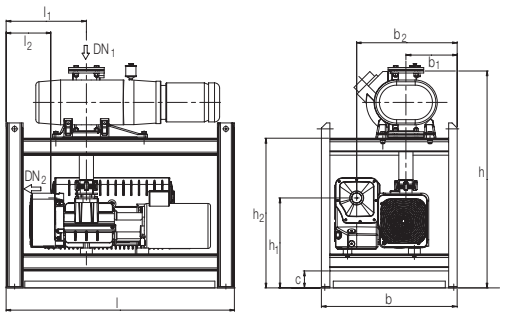
RUTA WAU2001/SV300B/G

Standard Equipment

- RUVAC WAU with air cooling
- SOGEVAC SV 300 B with air cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve: SV 300 B manually operated
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Type	RUTA	1001/SV300B/G	2001/SV300B/G
RUVAC WA/WAU/WS/WSU	P2	1001	2001
Backing pump SOGEVAC	P1	SV 300 B	SV 300 B
	DN_1	100 ISO-K	160 ISO-K
	DN_2	2"	2"
	l	1340 (52.76)	1340 (52.76)
	l_1	470 (18.50)	470 (18.50)
	l_2	260 (10.24)	260 (10.24)
	b	750 (29.53)	800 (31.50)
	b_1	252 (9.92)	302 (11.89)
	b_2	208 (8.19)	208 (8.19)
	h	1278 (50.32)	1338 (52.68)
	h_1	530 (20.87)	530 (20.87)
	h_2	882 (34.72)	808 (31.81)
	c	100 (3.94)	100 (3.94)

Dimensional drawing for the pump systems with SOGEVAC SV 300 B backing pumps; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

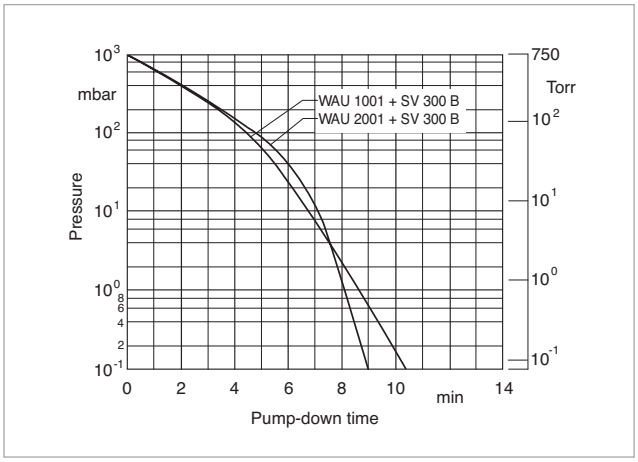
RUTA WAU

	1001/SV300B/G	2001/SV300B/G
RUVAC (WA/WAU/WS/WSU possible) P2	1001	2001
Backing pump SOGEVAC P1	SV 300 B	SV 300 B
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	730 (430)	1445 (850)
Ultimate partial pressure mbar (Torr)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)	$< 8 \times 10^{-3}$ ($< 6 \times 10^{-3}$)
Ultimate total pressure with gas ballast mbar (Torr)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)	$< 4 \times 10^{-2}$ ($< 3 \times 10^{-2}$)
Installed motor power 400 V, 50 Hz kW (hp)	9.5 (12.9)	13.0 (17.7)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	4.0 (5.4)	4.5 (6.1)
Noise level without gas ballast at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	75	79
Oil filling, total, approx. l (qt)	11 (11.63)	13 (13.74)
Weight, total, approx. kg (lbs)	560.0 (1234.8)	740.0 (1631.7)
Connecting flange Inlet port DN_1	100 ISO-K	160 ISO-K
Outlet port DN_2	2"	2"

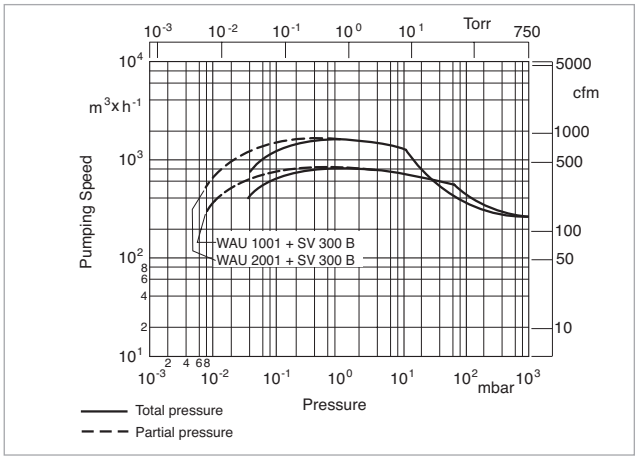
Ordering Information

RUTA WAU

	1001/SV300B/G	2001/SV300B/G
	Part No.	**Part No.**
RUVAC (WA/WAU/WS/WSU possible) P2	WAU 1001	WAU 2001
Backing pump SOGEVAC P1	SV 300 B	SV 300 B
Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WAU	**502 452 V001**	**502 453 V001**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")	RT 5/1001 **500 001 383**	RT 5/2001 **500 001 384**

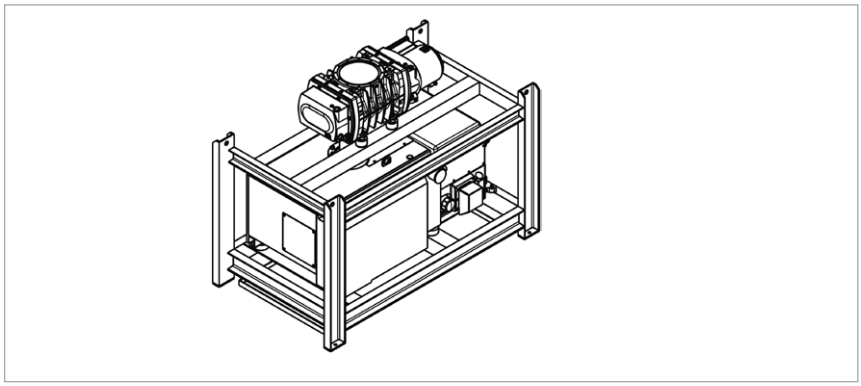


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Oil Sealed RUTA Pump Systems Two-Stage, with Single-Stage SOGEVAC Backing Pumps, Frame Version



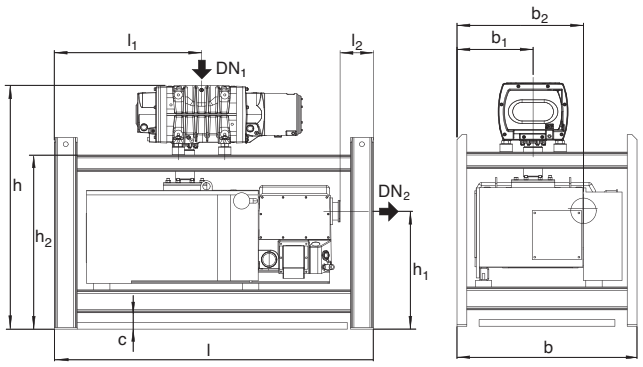
RUTA WH2500/SV630BF/G

Standard Equipment

- RUVAC WH with water cooling
- Exhaust filter with oil return line
- Oil filter
- Oil collecting pan
- Gas ballast valve: SOGEVAC SV 630 BF 24 V DC
- SOGEVAC SV 630 BF with water cooling
- SOGEVAC SV 1200 with air cooling
- Crane eyes on the frame
- Floor mounting
- The oil is supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC WA/WS)
- 24 V DC gas ballast valve or manually operated
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Special motors
- Electric control systems



Type	RUTA	2500/SV630BF/G	4400/SV630BF/G	7000/SV630BF/G
RUVAC WH	P2	2500	4400	7000
Backing pump SOGEVAC	P1	SV 630 BF	SV 630 BF	SV 630 BF
	DN_1	250 ISO-K	250 ISO-K	320 ISO-K
	DN_2	100 ISO-K	100 ISO-K	100 ISO-K
	l	1950 (76.77)	1950 (76.77)	1950 (76.77)
	l_1	900 (35.43)	800 (31.50)	800 (31.50)
	l_2	204 (8.03)	204 (8.03)	204 (8.03)
	b	1100 (43.31)	1100 (43.31)	1100 (43.31)
	b_1	465 (18.31)	465 (18.31)	465 (18.31)
	b_2	773 (30.43)	773 (30.43)	773 (30.43)
	h	1064 (41.89)	1518 (59.76)	1518 (59.76)
	h_1	720 (28.35)	720 (28.35)	720 (28.35)
	h_2	1064 (41.89)	1081 (42.56)	1093 (43.03)
	c	100 (3.94)	100 (3.94)	100 (3.94)

Dimensional drawing for the pump systems with SOGEVAC SV backing pumps

Technical Data, 50 Hz

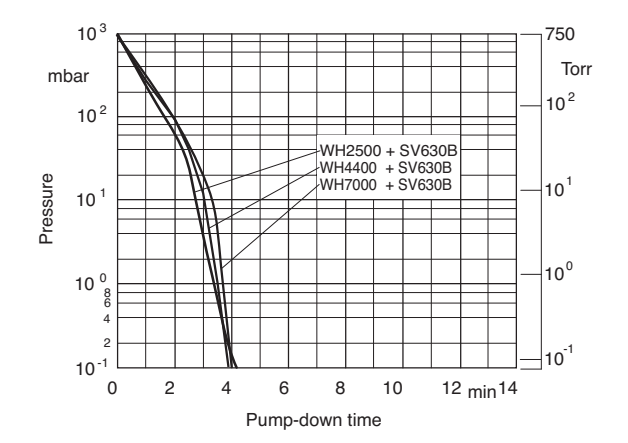
		RUTA WH 2500/ SV630BF/G	RUTA WH 4400/ SV630BF/G	RUTA WH 7000/ SV630BF/G
RUVAC WH [1]	P2	2500	4400	7000
Backing pump SOGEVAC	P1	SV 630 BF	SV 630 BF	SV 630 BF
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	1902 (1119)	3332 (1961)	4990 (2937)
Ultimate total pressure				
with gas ballast	mbar	$< 5 \times 10^{-3}$	–	–
	(Torr)	($< 3.7 \times 10^{-3}$)	–	–
without gas ballast	mbar	–	$< 5 \times 10^{-3}$	$< 5 \times 10^{-3}$
	(Torr)	–	($< 3.7 \times 10^{-3}$)	($< 3.7 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz	kW (hp	21.5 (28.8)	26.0 (34.9)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	8.5 (11.4)	9.68 (12.98)	9.84 (13.20)
Noise level without gas ballast at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	73	73	73
Oil filling, total, approx.	l (qt)	16.2 (17.1)	27.0 (4.6)	27.0 (4.6)
Weight, total, approx.	kg (lbs)	1360 (2998)	1530 (3373)	1590 (3505)
Connecting flange				
Inlet port	DN_1	250 ISO-K	250 ISO-K	320 ISO-K
Outlet port	DN_2	100 ISO-K	100 ISO-K	100 ISO-K

Ordering Information

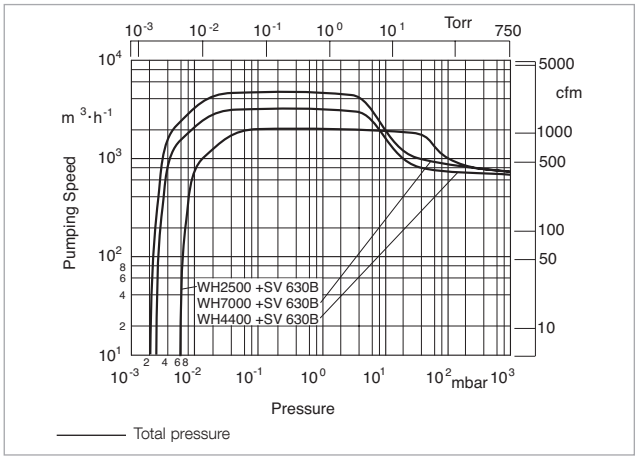
		RUTA WH 2500/ SV630BF/G	RUTA WH 4400/ SV630BF/G	RUTA WH 7000/ SV630BF/G
		Part No.	**Part No.**	**Part No.**
RUVAC WH [1]	P2	2500	4400	7000
Backing pump SOGEVAC	P1	SV 630 BF	SV 630 BF	SV 630 BF
Pump system, complete (frame version), frame mounted, with Roots vacuum pump RUVAC WH		**503161V001** [1, 2]	**503161V001** [1, 2]	**503161V001** [1, 2]

[1] Including external frequency converter

[2] With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure



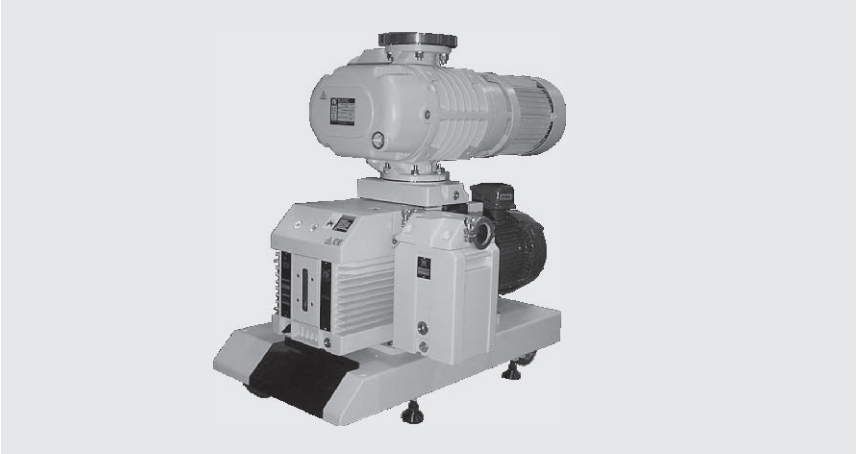
Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Pump Systems (Only available for purchase in North and South America)

RBS - B/BCS Roots Pump Systems with Two-Stage TRIVAC Backing Pumps



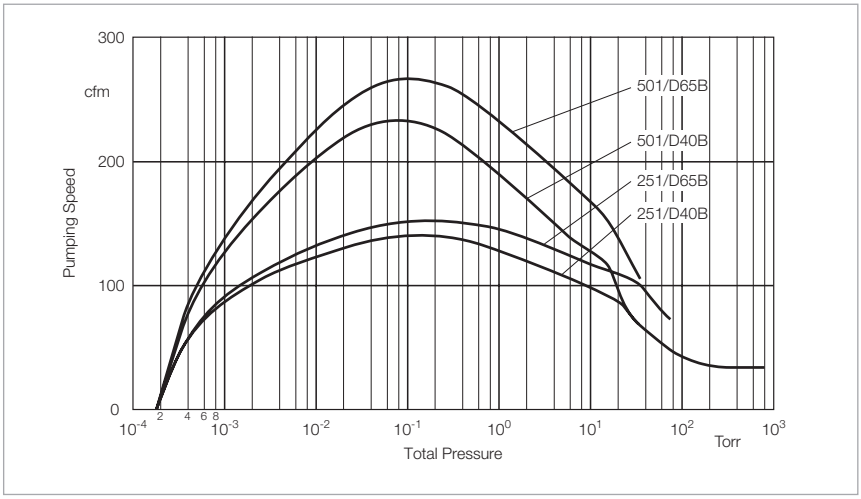
RBS - B/BCS Roots pumping system, shown with optional AF exhaust filter

Standard Equipment

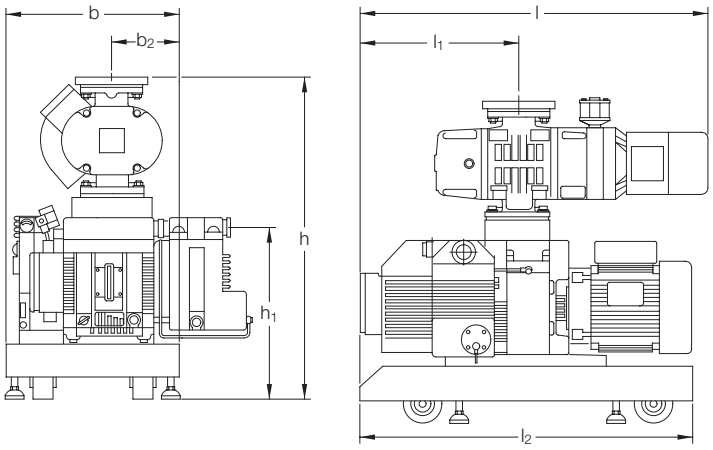
- System consists of TRIVAC dual-stage B or BCS direct drive vane pump and RUVAC blower
- Complete air-cooled system
- 18" wide frame base equipped with caster wheels and leveling pads
- Compact construction with quiet operation
- Manual operation of gas ballast
- Close-coupled RUVAC blower with ANSI inlet lange

Options

- All TRIVAC accessories, Exhaust filter, 24 V DC gas ballast valve, chemical oil filter, and electrical limit switch system
- Full frame drip pan
- Oil drain valves
- Special motor voltages and frequencies
- Special oil for unique applications
- Full electrical controls for control start/stop and monitoring of system



Pumping speed diagram for the RBS systems with WSU series Roots blowers at 60 Hz



System Close-coupled	b	b_1	b_2	h	h_1	l	l_1	l_2
D 40 B/BCS								
WSU 251	18 (457)	8 (203)	7 (178)	33 3/16 (853)	17 15/16 (456)	32 3/4 (832)	14 (356)	34 (864)
WSU 501	18 (457)	8 (203)	7 (178)	34 3/4 (883)	17 15/16 (456)	33 13/16 (859)	14 (356)	34 (864)
D 65 B/BCS								
WS/WSU 251	18 (457)	8 (203)	7 (178)	33 3/16 (853)	17 15/16 (456)	34 3/4 (883)	16 (406)	34 (864)
WS/WSU 501	18 (457)	8 (203)	7 (178)	34 3/4 (883)	17 15/16 (456)	35 13/16 (910)	16 (406)	34 (864)

Dimensional drawing for the RBS - B/BCS Roots pumping systems 18" with TRIVAC D 40/65 B backing pumps, close-coupled package; dimensions in brackets ( ) are in mm

Technical Data

RBS - B/BCS Roots Pump Systems

		251/D40B	251/D65B	501/D40B	501/D65B
RUVAC (WA/WAU/WS/WSU possible)		251	251	501	501
TRIVAC backing pump		D 40 B/BCS	D 65 B/BCS	D 40 B/BCS	D 65 B/BCS
Pumping speed @ 0.1 Torr	cfm ($m^3 \times h^{-1}$)	140 (237)	150 (254)	232 (394)	267 (453)
Ultimate total pressure	Torr (mbar)	2×10^{-4} ($< 4 \times 10^{-4}$)	2×10^{-4} ($< 4 \times 10^{-4}$)	2×10^{-4} ($< 4 \times 10^{-4}$)	2×10^{-4} ($< 4 \times 10^{-4}$)
Connecting flanges Inlet port WSU Outlet port	 DN DN	 3" ANSI 40 ISO-KF	 3" ANSI 40 ISO-KF	 3" ANSI 40 ISO-KF	 3" ANSI 40 ISO-KF
Operating voltage	V	208/230/460	208/230/460	208/230/460	208/230/460
Phase / Frequency [1]	– / Hz	3 / 60	3 / 60	3 / 60	3 / 60
Full load amps [2] RUVAC WSU TRIVAC		 5.5/5.5/3.2 9.0/8.8/4.5	 5.5/5.5/3.2 9.0/8.8/4.5	 9.0/9.0/5.2 9.0/8.8/4.5	 9.0/9.0/5.2 9.0/8.8/4.5
Displacement RUVAC TRIVAC	 cfm ($m^3 \times h^{-1}$) cfm ($m^3 \times h^{-1}$)	 179 (304) 32 (54)	 179 (304) 53 (90)	 357 (606) 32 (54)	 357 (606) 53 (90)
Maximum differential pressure	Torr (mbar)	60 (80)	60 (80)	60 (80)	60 (80)
Normal starting pressure [3]	Torr (mbar)	20 (27)	30 (40)	12 (16)	16 (21)
Oil capacity RUVAC WSU TRIVAC	 qt (l) qt (l)	 0.75 (0.7) 2.70 (2.6)	 0.75 (0.7) 3.40 (3.2)	 1.10 (1.0) 2.70 (2.6)	 1.10 (1.0) 3.40 (3.2)
Nominal rotation speed RUVAC TRIVAC	 rpm (min^{-1}) rpm (min^{-1})	 3600 (3600) 1800 (1800)	 3600 (3600) 1800 (1800)	 3600 (3600) 1800 (1800)	 3600 (3600) 1800 (1800)
Motor power RUVAC WSU TRIVAC	 hp (kW) hp (kW)	 1.9 (1.4) 3.0 (2.2)	 1.9 (1.4) 3.0 (2.2)	 3.3 (2.4) 3.0 (2.2)	 3.3 (2.4) 3.0 (2.2)

Ordering Information

RBS - B/BCS Roots Pump Systems

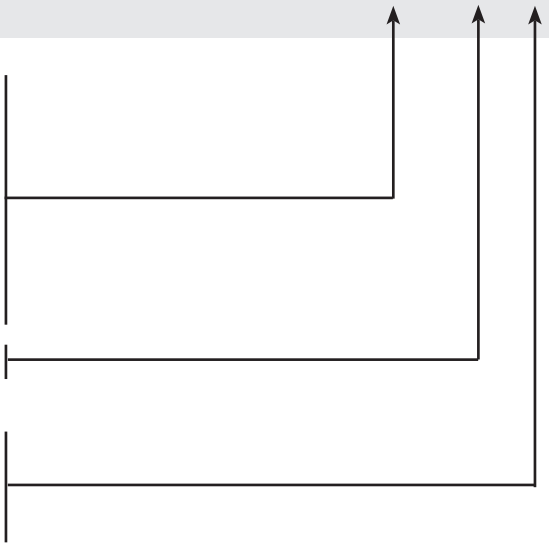
	251/D40B	251/D65B	501/D40B	501/D65B
	Part. No.			
RBS - B/BCS Roots pump system (supplied with hydrocarbon oil)	**Ordering Information see right page**			

[1] For 50 Hz systems, consult the factory
[2] Determined by operating voltage
[3] WSU pumps permit start-up at atmospheric pressure (760 Torr)

Ordering Information

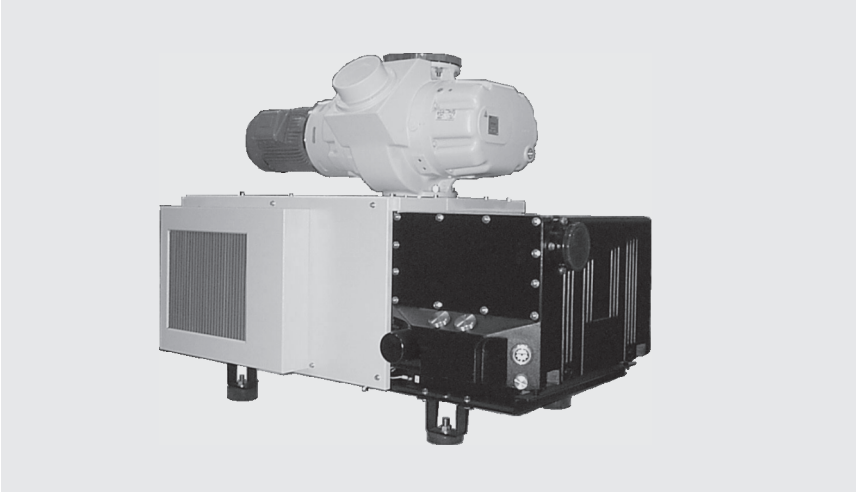
Part No. 180037V- __ 0 __

Blower / TRIVAC pump	
WSU 251 / D 40 B	**24**
WSU 251 / D 40 BCS-LVO 400	**35**
WSU 251 / D 65 B	**26**
WSU 251 / D 65 B-LVO 400	**37**
WSU 501 / D 40 B	**54**
WSU 501 / D 40 BCS-LVO 400	**65**
WSU 501 / D 65 B	**56**
WSU 501 / D 65 BCS-LVO 400	**67**
Reserved	**0**
Electrical Control Panel	
None	**0**
208 V	**1**
230 V	**2**
460 V	**3**



Pump Systems (Only available for purchase in North and South America)

HTS Close-Coupled Systems with Single-Stage SOGEVAC Backing Pumps



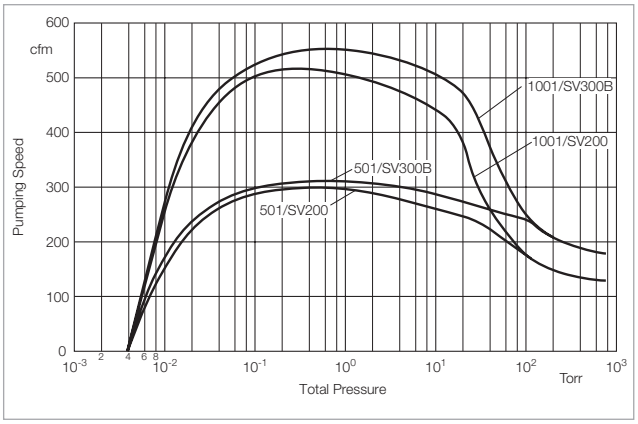
HTS close-coupled system

Standard Equipment

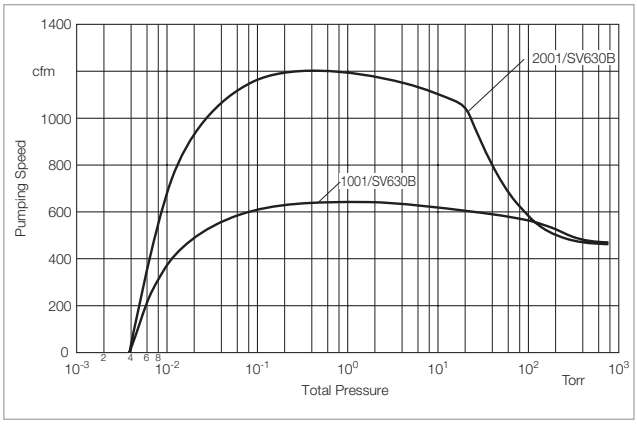
- System consists of single-stage SOGEVAC vane pump
- Complete air-cooled system
- Close-coupled RUVAC blower
- Compact construction with quiet operation
- Manual operation of gas ballast
- Spin-on type oil filter

Options

- SOGEVAC accessories: oil level monitoring, exhaust case gauge, 24 V DC gas ballast purge, water cooling
- Frame base mounted caster wheels
- Frame base mounted leveling pads
- Oil drain valves
- Inlet dust filter
- Special motor voltages and frequencies
- Special oil for unique applications
- Full NEMA12 electrical controls for stand/stop operation and monitoring of system from remote and local locations
- 24 V DC gas ballast valve

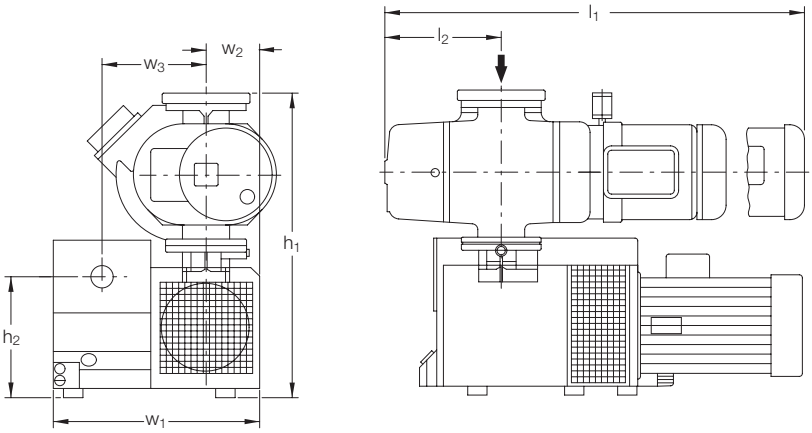


Pumping speed diagram for the HTS close-coupled systems with WSU series Roots blowers and SOGEVAC SV 200/300B at 60 Hz

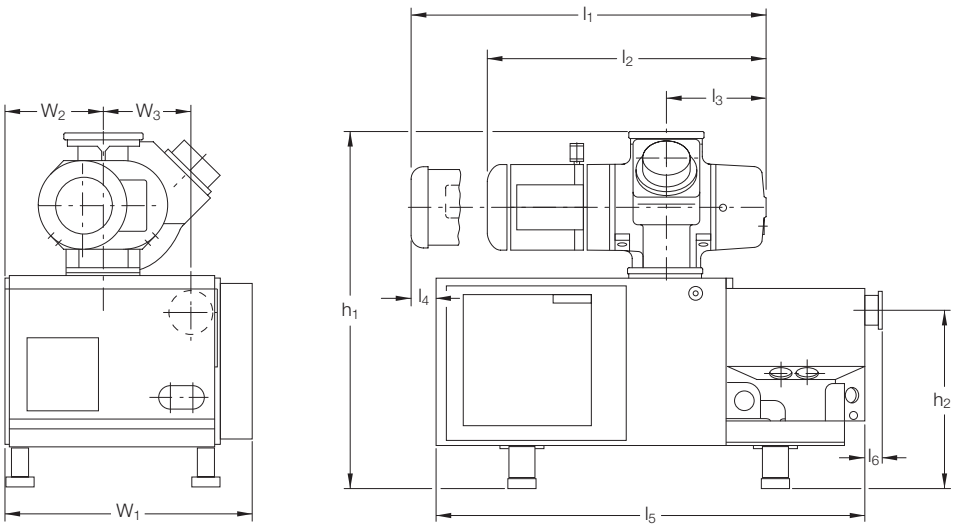


Pumping speed diagram for the HTS close-coupled systems with WSU series Roots blowers and SOGEVAC SV 630B at 60 Hz

Dimensions for SV 200 and SV 300 B only



Dimensions for SV 630 B only



Roots Pump	Vane Pump	h_1	h_2	l_1	l_2	l_3	l_5	l_6	w_1	w_2	w_3
WSU 501	SV 200	29 7/16 (748)	12 17/32 (318)	–	9 17/32 (242)	–	–	–	21 11/16 (551)	6 1/8 (156)	10 19/32 (269)
WSU 501	SV 300 B	29 7/16 (748)	12 17/32 (318)	–	9 17/32 (242)	–	–	–	21 11/16 (551)	6 1/8 (156)	10 19/32 (269)
WSU 1001	SV 200	31 7/16 (799)	12 17/32 (318)	–	11 15/16 (303)	–	–	–	21 1/16 (535)	5 1/2 (140)	10 19/32 (269)
WSU 1001	SV 300 B	31 7/16 (799)	12 17/32 (318)	–	11 15/16 (303)	–	–	–	22 13/16 (579)	7 1/4 (184)	10 19/32 (269)
WSU 2001	SV 630 B	48 5/16 (1227)	23 13/16 (605)	50 3/16 (1275)	–	14 9/16 (370)	60 3/4 (1543)	2 1/2 (64)	34 15/16 (887)	13 7/8 (352)	12 13/32 (315)

Dimensional drawing for the HTS close-coupled system with single-stage SOGEVAC backing pumps; dimensions in brackets ( ) are in mm

Technical Data

		HTS Close-Coupled Systems			
		501/SV200	501/SV300B	1001/SV200	1001/SV300B
RUVAC		WSU 501	WSU 501	WSU 1001	WSU 1001
SOGEVAC		SV 200	SV 300 B	SV 200	SV 300 B
Pumping speed @ 0.1 Torr	cfm ($m^3 \times h^{-1}$)	277 (470)	285 (483)	504 (855)	545 (925)
Ultimate total pressure	Torr	$< 8 \times 10^{-3}$	$< 8 \times 10^{-3}$	$< 8 \times 10^{-3}$	$< 8 \times 10^{-3}$
	(mbar)	($< 1 \times 10^{-2}$)	($< 1 \times 10^{-2}$)	($< 1 \times 10^{-2}$)	($< 1 \times 10^{-2}$)
Connecting flanges					
Inlet port WSU	DN	3" ANSI	3" ANSI	4" ANSI	4" ANSI
Exhaust port SOGEVAC	DN	2" NPT	2" NPT	2" NPT	2" NPT
Operating voltage	V	208/230/460	208/230/460	208/230/460	208/230/460
Phase / Frequency [1]	– / Hz	3 / 60	3 / 60	3 / 60	3 / 60
Full load amps [2]					
RUVAC WSU		7.8/10.0/5.8	7.8/10.0/5.8	13.0/14.7/8.5	13.0/14.7/8.5
SOGEVAC		21.0/18.0/9.0	29.0/25.0/12.5	21.0/18.0/9.0	29.0/25.0/12.5
Displacement					
RUVAC	cfm ($m^3 \times h^{-1}$)	357 (606)	357 (606)	707 (1200)	707 (1200)
SOGEVAC	cfm ($m^3 \times h^{-1}$)	130 (606)	200 (340)	130 (606)	200 (340)
Oil capacity					
RUVAC WSU	qt (l)	1.10 (1.00)	1.10 (1.00)	2.10 (2.00)	2.10 (2.00)
SOGEVAC	qt (l)	5.30 (5.00)	9.00 (8.50)	5.30 (5.00)	9.00 (8.50)
Nominal rotation speed					
RUVAC WAU/WSU	rpm (min^{-1})	3600 (3600)	3600 (3600)	3600 (3600)	3600 (3600)
SOGEVAC	rpm (min^{-1})	1800 (1800)	1800 (1800)	1800 (1800)	1800 (1800)
Motor power					
RUVAC WSU	hp (kW)	3.3 (2.4)	3.3 (2.4)	6.0 (4.4)	6.0 (4.4)
SOGEVAC	hp (kW)	7.5 (5.5)	10.0 (7.4)	7.5 (5.5)	10.0 (7.4)

Ordering Information

	HTS Close-Coupled Systems			
	501/SV200	501/SV300B	1001/SV200	1001/SV300B
	Part. No.			
HTS - close-coupled systems	**Ordering Information see right page**			

[1] For 50 Hz systems, consult the factory

[2] Determined by operating voltage

Technical Data

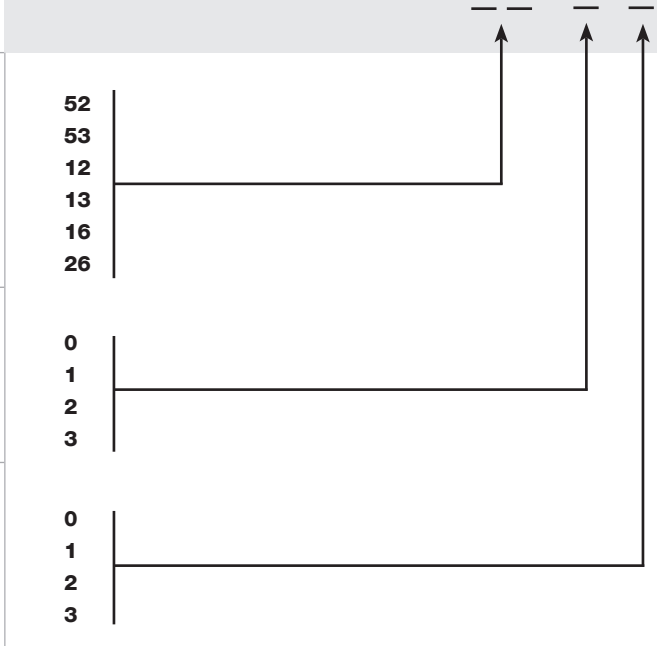
HTS Close-Coupled Systems

		1001/SV630B	2001/SV630B
RUVAC		1001	2001
SOGEVAC		SV 630 B	SV 630 B
Pumping speed @ 0.1 Torr	cfm ($m^3 \times h^{-1}$)	610 (1035)	1186 (2031)
Ultimate total pressure	Torr	$< 8 \times 10^{-3}$	$< 8 \times 10^{-3}$
	(mbar)	($< 1 \times 10^{-2}$)	($< 1 \times 10^{-2}$)
Connecting flanges			
Inlet port WSU	DN	4" ANSI	6" ANSI
Outlet port	DN	4" ANSI	4" ANSI
Operating voltage	V	460	460
Phase / Frequency [1]	– / Hz	3 / 60	3 / 60
Full load amps [2]			
RUVAC WSU		8.5	5.0
SOGEVAC		29.5	29.5
Displacement			
RUVAC	cfm ($m^3 \times h^{-1}$)	707 (1200)	1449 (2460)
SOGEVAC	cfm ($m^3 \times h^{-1}$)	495 (840)	495 (840)
Oil capacity			
RUVAC WSU	qt (l)	2.10 (2.0)	4.20 (4.0)
SOGEVAC	qt (l)	37.0 (35.0)	37.0 (35.0)
Nominal rotation speed			
RUVAC WSU	rpm (min^{-1})	3600 (3600)	3600 (3600)
SOGEVAC	rpm (min^{-1})	1170 (1170)	1170 (1170)
Motor power			
RUVAC WSU	hp (kW)	6.1 (4.5)	11.4 (8.4)
SOGEVAC	hp (kW)	25.0 (13.4)	25.0 (13.4)

Ordering Information

Part No. 180036V- _ _ _ _

Blower / TRIVAC pump	
WSU 501 / SV 200	**52**
WSU 501 / SV 300 B	**53**
WSU 1001 / SV 200	**12**
WSU 1001 / SV 300 B	**13**
WSU 1001 / SV 630 B	**16**
WSU 2001 / SV 630 B	**26**
Casters & Levelers (SV 200 & SV 300 only)	
None	**0**
Casters & Levelers	**1**
Casters only	**2**
Levelers only	**3**
Electrical Control Panel	
None	**0**
208 V (SV 200 & SV 300 only)	**1**
230 V (SV 200 & SV 300 only)	**2**
460 V	**3**



Central Vacuum Supply Systems with SOGEVAC Pumps

Pictures of various central vacuum supply systems (the right of technical changes is reserved)

Central vacuum supply systems are frequently used in those cases where a large number of minor requirements for vacuum need to be economically covered. Moreover, the systems serve the purpose of compensating for large variations in the number of vacuum consumers and increase the availability of the vacuum service.

A typical central vacuum supply system from Leybold consists chiefly of one or more SOGEVAC rotary vane vacuum pumps, a buffer vessel, an electrical cabinet with controller as well as the corresponding connection components. The systems are supplied by us fully assembled, tested as plug and play units.

Technical Data and Ordering Information

Designation	Vessel volume (l)	Nominal pumping speed ($m^3 \times h^{-1}$)	Connection (G or NPT)	Electrical power rating [1] (kW)	Type of controller	Part No.
CVS60 1 x 25	60	25	1 1/4"	0.8	BASIC	**501 792**
CVS60 1 x 40	60	40	1 1/4"	1.1	BASIC	**501 793**
CVS60 1 x 65	60	65	1 1/4"	1.5	BASIC	**501 796**
CVS150 1 x 40	150	40	1 1/4"	1.1	BASIC	**501 800**
CVS150 1 x 65	150	65	1 1/4"	1.5	BASIC	**501 803**
CVS300 1 x 40	300	40	2"	1.1	BASIC	**501 820**
CVS300 1 x 65	300	65	2"	1.5	BASIC	**501 823**
CVS300 1 x 100	300	100	2"	2.5	BASIC	**501 826**
CVS300 2 x 65	300	130	2"	3.0	FF	**501 832**
CVS300 2 x 100	300	200	2"	5.0	FF	**501 835**
CVS500 1 x 100	500	100	2"	2.5	BASIC	**501 846**
CVS500 1 x 200	500	200	2"	4.0	FF	**501 849**
CVS500 1 x 300B	500	280	2"	5.5	FF	**503 174 V001**
CVS500 2 x 40	500	80	2"	2.2	FF	**501 855**
CVS500 2 x 65	500	130	2"	3.0	FF	**501 858**
CVS500 2 x 100	500	200	2"	5.0	FF	**501 861**
CVS500 2 x 200	500	360	2"	8.0	FF	**501 864**
CVS1000 2 x 100	1000	200	2"	5.0	FF	**501 879**
CVS1000 2 x 200	1000	360	2"	8.0	FF	**501 882**
CVS1000 2 x 300B	1000	560	2"	11.0	FF	**503 175 V001**

[1] At a mains voltage of 400 V / 50 Hz, 3-ph.

Beyond the equipment which is supplied as standard (see list), the modular design of the central vacuum supply systems from Leybold allows for customization according to your specific requirements.

Optionally available are, for example:

- Higher pumping speeds and larger buffer volumes
- Electropneumatic or solenoid blocking valves
- Mobile construction on castors
- Other mains voltages
- Additional pumps, filters, fittings etc.

Controller Types for the Central Vacuum Supply Systems from Leybold

Generally a difference is made between the controller types **BASIC** and **FF** (Full Featured).

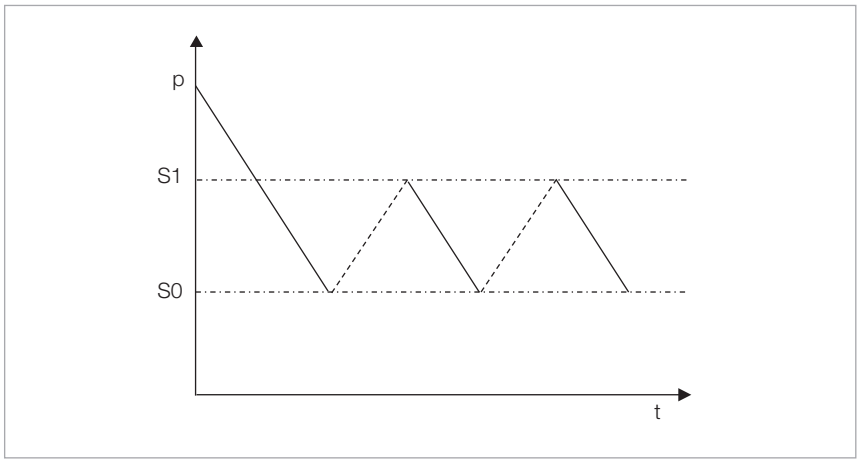
Differing custom solutions are available upon request.

BASIC Controller

The Basic controller provides for two freely selectable switching thresholds, through which an individual vacuum pump or alternatively a blocking valve (optional) can be driven.

Moreover, the controller includes an electronic pressure display and an operating hours counter.

This type of controller is suited for systems equipped with a single pump up to a nominal pumping speed of 100 m^3/h (58.9 cfm).



Basic control with one pump

Operating Principle of the BASIC Controller

Starting at atmospheric pressure, the central vacuum supply system is evacuated down to the intended “lower operating pressure” S0. As soon as the pressure has attained the level of S0, the vacuum pump is switched off automatically, respectively the optional blocking valve is closed.

When switching on the consumers, the pressure in the system rises again until the “upper operating pressure” is reached thereby tripping the switch-on threshold S1 of the pump, respectively attaining the opening pressure of the valve.

Provided pumping speed of the pump and vacuum consumption are balanced, the operating pressure will change between S0 and S1. At reduced consumption, the system pressure will reduce until the switching threshold S0 is reached again causing the pump to switch off, respectively the valve to close etc.

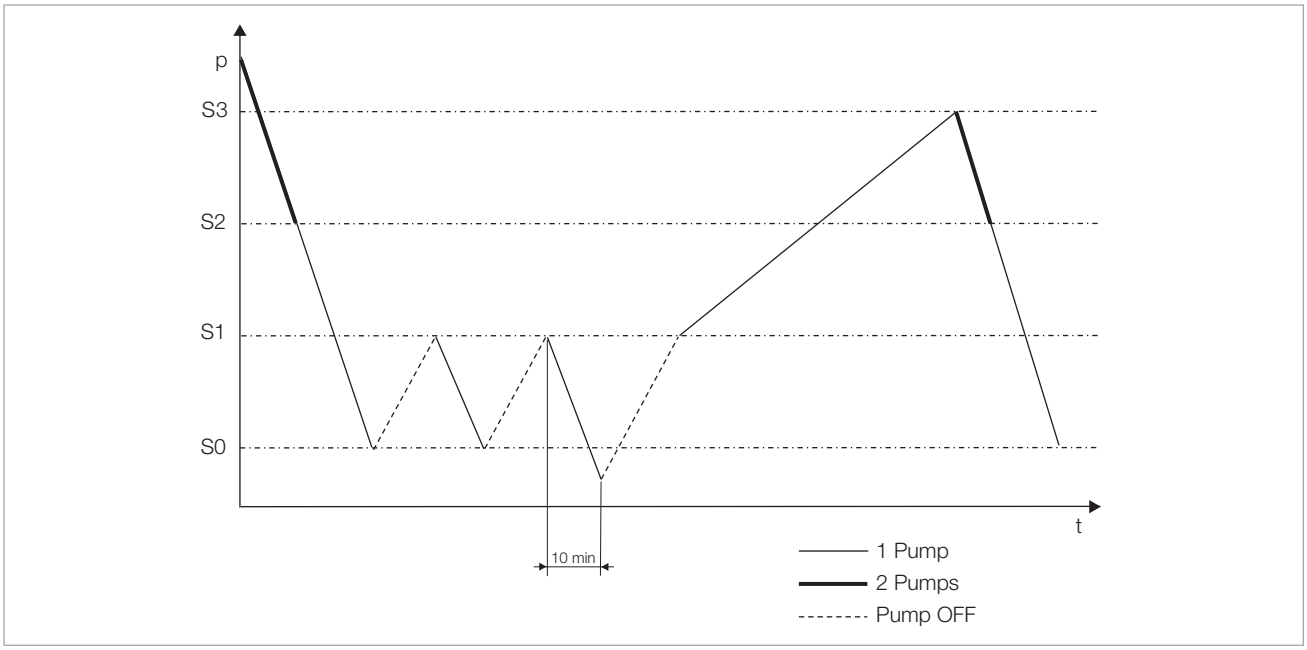
FF Controller

Basically the FF controller provides for four freely selectable switching thresholds and has thus been designed to operate two pumps running in parallel. Depending on the design rating and current demand, the base load or master pump will operate alone or jointly together with the spare pump.

In order to spread the number of operating hours equally between the pumps, master pump and spare pump are interchanged in regular intervals. In case a pump fails, the controller effects an automatic change to the spare pump.

For operating vacuum pumps having a nominal pumping speed of over 100 m^3/h (58.9 cfm), a delayed shutdown facility has been integrated which will restrict the number of switching cycles to 6 per hour.

Through the use of a Programmable Logic Controller (PLC), the FF controller permits flexible coverage of quite differing requirements.



FF controller with two pumps and an example for delayed shutdown (pumps over 100 m^3/h (58.9 cfm))

Operating Principle of the FF Controller

Just as for the Basic controller, the system is, upon switching on, evacuated down to the lower operating pressure S0. This is effected with both pumps running in parallel (master pump and spare pump) until the shutdown threshold for the spare pump S2 is reached. Thereafter, the master pump alone will ensure that the lower operating pressure is reached and is then also switched off. When the system pressure increases due to the number of consumers or leaks to the level of S1, then the master pump will be switched on automatically etc.

In the case of vacuum pumps having a pumping speed of over 100 m^3/h (58.9 cfm) and a running time of the pump of less than 10 minutes, then the standard switch off delay can be responsible for the pressure to drop below S0. This will prevent too frequent switching on and off of the pumps.

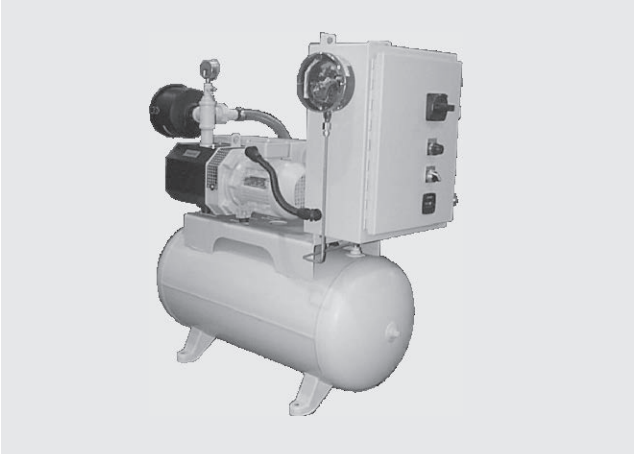
If for process reasons the pressure is not allowed to drop below the lower operating pressure, we recommend the use of electropneumatic or solenoid blocking valves.

If the current vacuum demand cannot be met by the master pump alone, the system pressure will increase to the upper switching pressure S3 upon which the spare pump is automatically started.

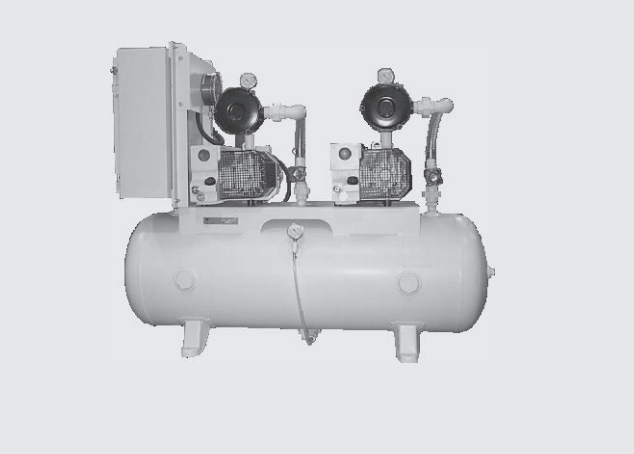
With both pumps running in parallel, the system is then again evacuated until the switch off threshold S2 for the spare pump is reached again etc.

Only available for purchase in North and South America

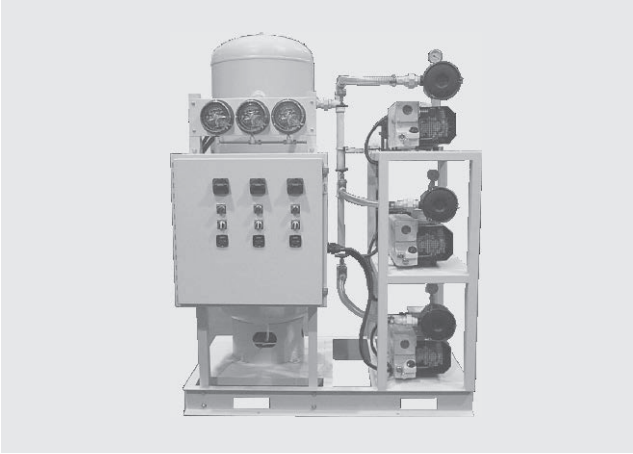
Central Vacuum Supply Systems



Central vacuum supply system, simplex



Central vacuum supply system, duplex



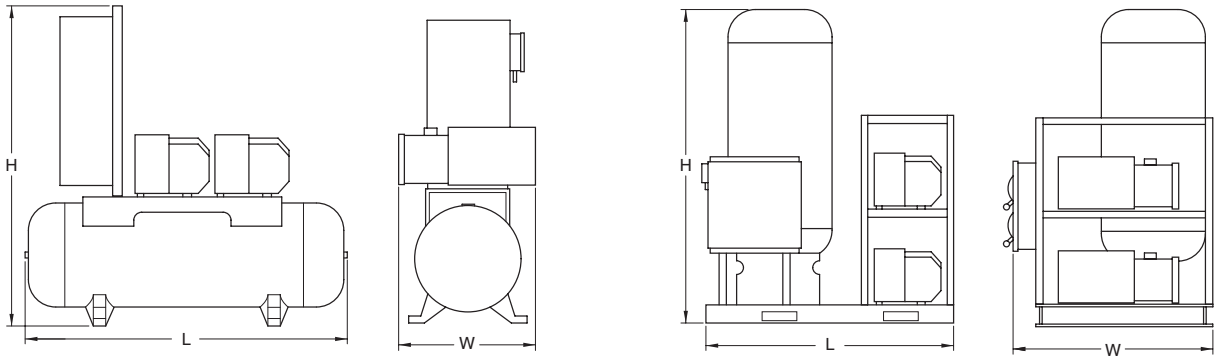
Central vacuum system, triplex

Standard Equipment

- ASME® rated receiver tank
- Flexible configurations for one, two, or three SOGEVAC pumps
- Manual isolation valves
- Simple operation, high reliability, easy maintenance
- Complete package with gauges and NEMA12 controls
- Standard “ON/OFF/AUTO” switch
- Elapsed time meters
- Inlet particulate filters
- Lead/Lag or continuous operation of pumps
- Adjustable pressure switch for control of vacuum level
- Air-cooled SOGEVAC pumps with built-in “anti-suckback” valves

Options

- Tank or stack mounted pumps
- Larger receiver tank
- Special inlet filters
- Automatic isolation valves
- Special design controls per customer specification



Pump model	Tank size (gal)	L	W	H
Tank mount - simplex				
SV 16, SV 25	30	42 (1067)	20 (508)	51 (1295)
SV 40 B, SV 65 B	60	50 (1270)	25 (635)	48 (1219)
SV 100 B	80	65 (1651)	25 (635)	56 (1422)
SV 200, SV 300	120	70 (1778)	28 (711)	58 (1473)
Tank mount - duplex				
SV 16, SV 25	60	50 (1270)	27 (686)	53 (1346)
SV 40 B, SV 65 B	80	65 (1651)	30 (762)	53 (1346)
SV 100 B	120	71 (1803)	32 (813)	53 (1346)
SV 200	240	84 (2134)	38 (965)	64 (1626)
SV 300	240	84 (2134)	43 (1092)	64 (1626)
Stack mount - duplex and triplex				
SV 16, SV 25	60	45 (1143)	38 (965)	56 (1422)
SV 40 B	80	49 (1245)	42 (1067)	56 (1422)
SV 65 B	120	62 (1575)	45 (1143)	88 (2235)
SV 100 B	120	68 (1727)	42 (1067)	88 (2235)
SV 200	200	68 (1727)	50 (1270)	91 (1626)
SV 300	200	68 (1727)	58 (1473)	91 (1626)

Central vacuum supply systems, tank mounted [left] and stack mounted [right]; dimensions in inch, dimensions in brackets ( ) are in mm

Technical Data

Performance Characteristics

		SV 16	SV 25	SV 40 B	SV 65 B	SV 100 B	SV 200	SV 300
Free air displacement	cfm ($m^3 \times h^{-1}$)	11 (18.6)	17.0 (29.0)	31.2 (53.0)	41.8 (71.0)	68.9 (117.0)	129.5 (219.8)	200.3 (340.0)
Actual pumping speed	cfm ($m^3 \times h^{-1}$)	10 (16.9)	15 (25.5)	27.7 (47.0)	37.7 (64.0)	61.8 (105.0)	117.8 (200.0)	170.8 (289.9)
Guaranteed base pressure	Torr	0.4	0.4	0.4	0.4	0.4	0.06	0.06
Base pressure with gas ballast	Torr	1.1	1.1	1.1	1.1	1.0	0.5	0.5
Water vapor tolerance	Torr	30.0	30.0	22.5	22.5	22.5	30.0	30.0
Water vapor pumping with gas ballast	qt/hr	0.32	0.48	0.95	1.32	1.8	5.7	7.8
Noise level at 3 feet with 1 pump running without gas ballast	dB(A)	56	56	63	64	64	73	74
Motor	hp	1.0	1.5	2.0	2.5	4.0	7.5	10.0
Pump rotational speed	rpm	1750	1500	1750	1750	1750	1750	1750
Oil capacity	qt	2.0	2.0	1.05	2.1	2.1	5.5	9.0
Inlet / exhaust - NPT	in.	1/2 / 1/2	1/2 / 1/2	1-1/4 / 1-1/4	1-1/4 / 1-1/4	1-1/4 / 1-1/4	2 / 2	2 / 2
Pump weight	lbs	50.7	52.9	99.3	114.8	194.3	341.8	430.0

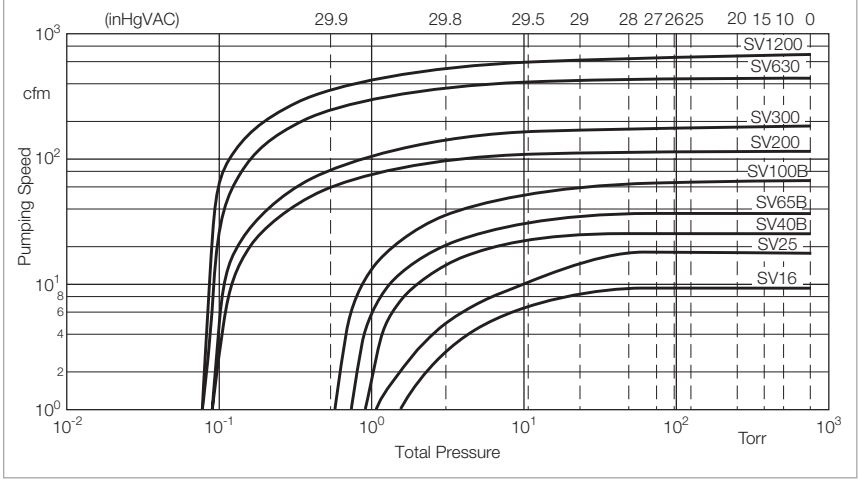
Technical Data

		Tank Mount Simplex	Tank Mount Duplex	Stack Mount Duplex and Simplex
SV 16, SV 25	Tank size (gal)	30	60	60
SV 40 B	Tank size (gal)	60	80	80
SV 65 B	Tank size (gal)	60	120	120
SV 100 B	Tank size (gal)	80	120	120
SV 200	Tank size (gal)	120	240	200
SV 300	Tank size (gal)	120	240	200

Ordering Information

Part No. C – _ _ _ _ _ XX

System	
Simplex	S
Duplex	D
Triplex	T
Pumps	
SV 16 (1 hp)	016
SV 25 (1.5 hp)	025
SV 40 B (2.5 hp)	040
SV 65 B (3 hp)	065
SV 100 B (4 hp)	100
SV 200 (7.5 hp)	200
SV 300 (10 hp)	300
Mounting	
Tank mount	T
Stack mount	S
Voltage	
460/3/60	A
230/3/60	B
230/1/60 (available for SV 16/SV 25 only)	C
208/3/60 (available for SV 25 only)	D
115/1/60 (available for SV 16 only)	E
Duty	
Continuous	C
Demand Start/Stop	D



Pumping speed characteristics for the central vacuum supply systems at 60 Hz

Notes

Only available for purchase in North and South America

Tank Mounted Medical Vacuum Systems

NFPA 99C compliant and designed for use in medical applications - hospitals, out-patient surgical and other medical facilities

Tank mounted medical vacuum system

Leybold tank mounted systems are completely assembled with interconnecting piping, are factory tested and leak-checked prior to shipment. Some items may be disassembled for protection during shipment. Required mechanical re-assembly requirements will be clearly noted, as well as needed electrical connections, and are the responsibility of the installer.

System Features

Key features for these duplex systems include two SOGEVAC series oil sealed rotary vane vacuum pumps with displacements up to 69 cfm each, an ultimate vacuum of better than 29.95" Hg, and automatic oil recirculation system with integral coalescing exhaust demisters as standard. ASME rated receiver tanks, NEMA12 / UL listed electrical enclosure and inter-connecting hardware. Each turn-key system is fully assembled and tested at Leybold Vacuum's factory and includes an operation manual and 12 month waranty.

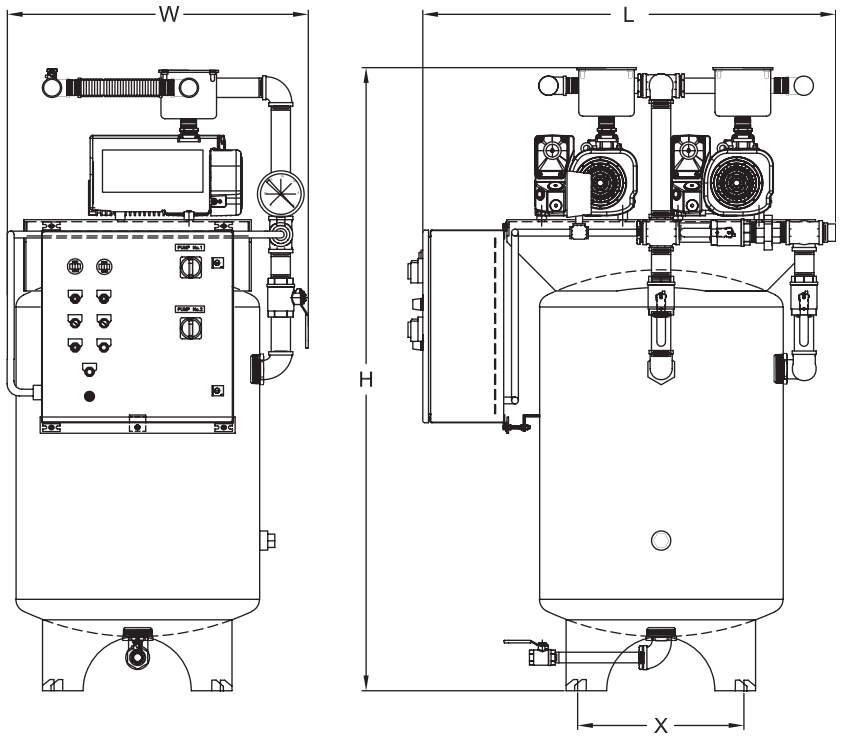
Other System Features

Vacuum pumps and systems:

- Direct-coupled TEFC, IP 55 rated motors
- Integral gas ballast
- Anti suck back valve
- Air-cooled design
- NPT type inlet and exhaust connections
- Inlet protection
  - particulate filters rated for 10 micron retention
  - Isolation ball valves
  - Pump check valves
- Vacuum gauge, 0 - 30" Hg
- Vertical receiver, ASME coded, manual drain valve and tank bypass

Local duplex motor control center:

- 2x magnetic motor starters with overload protection
- Main fused disconnect switch
- 2x through the door disconnect switches
- 2x individual control transformers
- 2x elapsed time meters
- 2x hand-off-auto switches
- Lag pump audible alarm with indicator light
- Automatic alternation
  - Lead / Lag operation
- 2x dual set-point vacuum switches
- Emergency stop
- NEMA12, UL listed enclosure
- System wired for either 208/230/460 V, 3 phase, 60 Hz operation



Model	Vacuum tank (gal)	Length (L)	Height (H)	Width (W)	Base (X)
VTMD-25-M	80	42 (1067)	72 (1829)	32 (813)	14.8 (376)
VTMD-40-M	80	42 (1067)	72 (1829)	32 (813)	14.8 (376)(
VTMD-65-M	120	52 (1321)	76 (1930)	34 (864)	19.0 (483)
VTMD-100-M	120	52 (1321)	76 (1930)	35 (889)	19.0 (483)

Tank mounted medical vacuum systems; dimensions in inch, dimensions in brackets ( ) are in mm

Technical Data

		VTMD-25-M	VTMD-40-M	VTMD-65-M	VTMD-100-M
Displacement (per pump)	cfm	18.3	31.2	41.8	69.0
Capacity 19" HG (VAC) (per pump)	scfm	6.7	11.4	15.3	25.1
Motor (per pump)	hp (W)	1.5 (2.0)	2.0 (2.7)	3.0 (4.1)	5.0 (6.8)
Vacuum tank	gal	80	80	120	120
Vacuum inlet	NPT	1.5"	1.5"	1.5"	1.5"
Vacuum outlet [1]	NPT	1.25"	1.25"	1.25"	1.25"
Weight	lbs (kg)	700 (305)	750 (340)	1125 (510)	1300 (589)

Ordering Information

	VTMD-25-M	VTMD-40-M	VTMD-65-M	VTMD-100-M
	Part. No.	Part. No.	Part. No.	Part. No.
Tank mounted medical vacuum system				
208 V, 3 phase, 60 Hz	S 170 530	S 170 533	S 170 499	S 170 490
230 V, 3 phase, 60 Hz	S 170 531	S 170 534	S 170 536	S 170 538
460 V, 3 phase, 60 Hz	S 170 532	S 170 535	S 170 537	S 170 539

[1] System consists of two outlet flanges

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, without palette

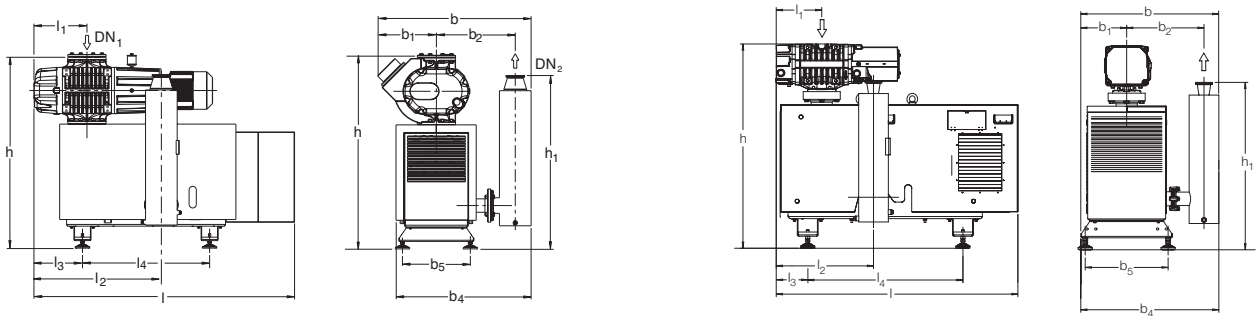
RUTA WAU2001/SP630/A

Standard Equipment

- RUVAC WAU with air cooling
- RUVAC WH with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- Gear oil collecting pan integrated within the screw pump
- Gear oil supplied with the pump
- Screw pump SCREWLINE SP 630 F with water cooling
- Screw pump SCREWLINE SP 250 with air cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC WA/WS)
- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump SCREWLINE SP 630 with air cooling



Type	RUTA	501/SP250/A	1001/SP250/A	2001/SP630F/A	700/SP250/A
RUVAC WA/WAU/WS/WSU	P2	501	1001	2001	–
RUVAC WH	P2	–	–	–	700
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 630 F	SP 250
	DN_1	63 ISO-K	100 ISO-K	160 ISO-K	100 ISO-K
	DN_2	63 ISO-K	63 ISO-K	100 ISO-K	63 ISO-K
	l	1350 (53.15)	1409 (55.47)	1804 (71.02)	1350 (53.15)
	l_1	239 (9.41)	298 (11.73)	367 (14.45)	258 (10.16)
	l_2	533 (20.98)	592 (23.31)	882 (34.72)	552 (21.73)
	l_3	160 (6.30)	219 (8.62)	336 (13.23)	179 (7.05)
	l_4	880 (34.65)	880 (34.65)	880 (34.65)	880 (34.65)
	b	761 (29.96)	828 (32.60)	1059 (41.69)	648 (25.51)
	b_1	260 (10.24)	306 (12.05)	403 (15.87)	260 (10.24)
	b_2	438 (17.24)	438 (17.24)	546 (21.50)	438 (17.24)
	b_4	783 (30.83)	783 (30.83)	783 (30.83)	783 (30.83)
	b_5	470 (18.50)	470 (18.50)	470 (18.50)	470 (18.50)
	h	1213 (47.76)	1239 (48.78)	1342 (52.84)	1158 (45.59)
	h_1	954 (37.56)	954 (37.56)	1221 (48.07)	949 (37.36)

Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version, without palette.
Left with WAU pumps, right with WH pump. Dimensions in brackets ( ) are in inch

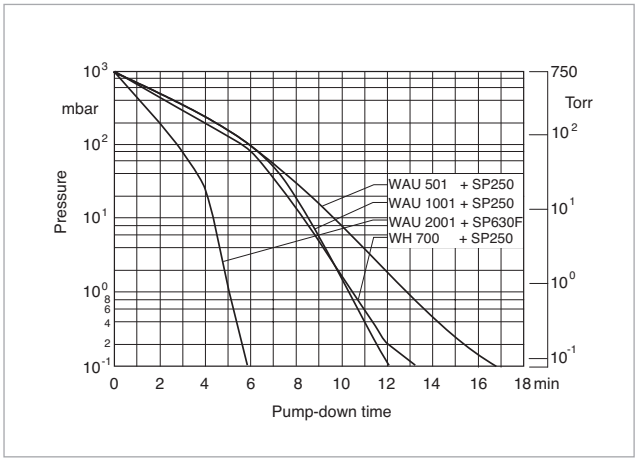
Technical Data, 50 Hz

		RUTA			
		WAU 501/SP250/A	WAU 1001/SP250/A	WAU 2001/SP630(F)/A	WH 700/SP250/A
RUVAC (WA/WAU/WS/WSU possible)	P2	501	1001	2001	–
RUVAC WH	P2	–	–	–	700
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 630 (F)	SP 250
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	445.0 (262.1)	830.0 (488.9)	1745.0 (1027.8)	635 (374)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)
Installed motor power 400 V, 50 Hz	kW (hp)	9.7 (13.0)	11.5 (15.6)	22.5 (30.6)	9.7 (13.0)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	6.3 (8.6)	6.7 (9.1)	12.0 (16.3)	6.6 (8.9)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	75	77	79	75
Total weight with palette, approx.	kg (lbs)	720 (1187)	850 (1876)	1100 (2428)	720 (1587)
Connecting flange					
Inlet port	DN_1	63 ISO-K	100 ISO-K	160 ISO-K	100 ISO-K
Outlet port	DN_2	63 ISO-K	63 ISO-K	100 ISO-K	63 ISO-K

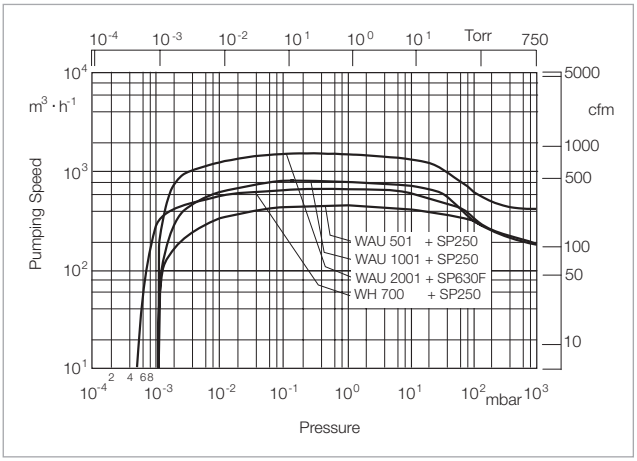
Ordering Information

		RUTA			
		WAU 501/SP250/A	WAU 1001/SP250/A	WAU 2001/SP630(F)/A	WH 700/SP250/A
		Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WAU 501	WAU 1001	WAU 2001	–
RUVAC WH	P2		–	–	WH 700
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 630 (F)	SP 250
Pump system, complete (adaptor version), Without pallet with water-cooled SCREWLINE		**502 465 V001**	**502 467 V001**	**502 471 V001**	**503 153 V001** [1]
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/501 **500 001 382**	RT 5/1001 **500 001 383**	RT 5/2001 **500 001 384**	– **–**

[1] Including external frequency converter



Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, with palette

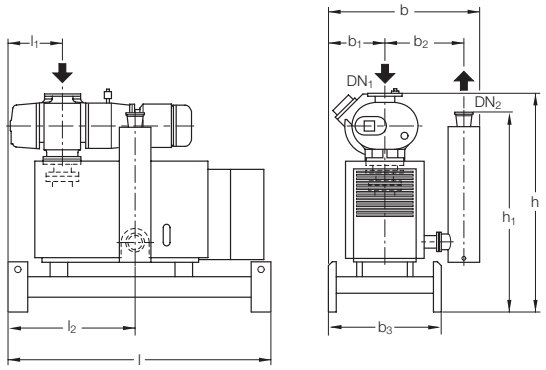
RUTA WAU2001/SP630/A

Standard Equipment

- RUVAC WAU with air cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- Gear oil collecting pan integrated within the screw pump
- Gear oil supplied with the pump
- Screw pump SCREWLINE SP 630 F with water cooling
- Screw pump SCREWLINE SP 250 with air cooling
- CE approval

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump SCREWLINE SP 630 with air cooling



Type		with palette		
	RUTA	501/SP250/A	1001/SP250/A	2001/SP630F/A
RUVAC WA/WAU/WS/WSU	P2	501	1001	2001
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 630 F
	DN_1	63 ISO-K	100 ISO-K	160 ISO-K
	DN_2	63 ISO-K	63 ISO-K	100 ISO-K
	l	1448 (57.01)	1488 (58.58)	1850 (72.84)
	l_1	287 (11.30)	327 (12.87)	379 (14.92)
	l_2	581 (22.87)	621 (24.45)	894 (35.20)
	b	923 (36.34)	923 (36.34)	1056 (41.58)
	b_1	400 (15.75)	400 (15.75)	400 (15.75)
	b_2	438 (17.24)	438 (17.24)	546 (21.50)
	b_3	800 (31.50)	800 (31.50)	800 (31.50)
	h	1377 (54.21)	1403 (55.24)	1509 (59.41)
	h^1	1121 (44.13)	1121 (44.13)	1388 (54.65)

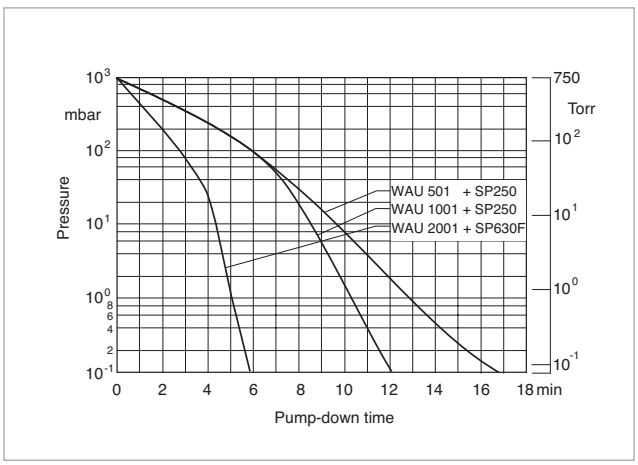
Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version; left and middle with palette, right on castors
Dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

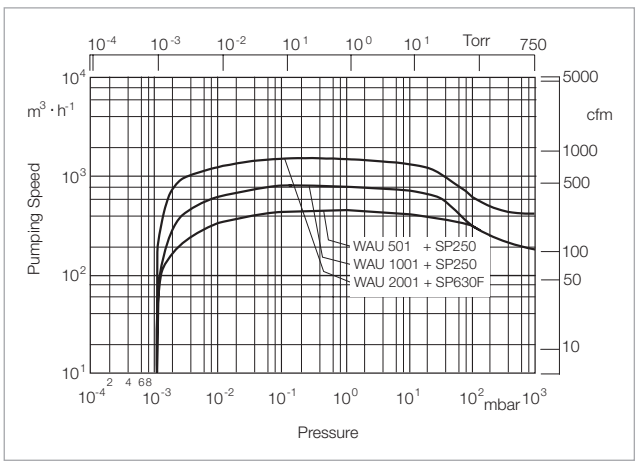
	RUTA WAU		
	501/SP250/A	1001/SP250/A	2001/SP630(F)/A
RUVAC (WA/WAU/WS/WSU possible) P2	501	1001	2001
Backing pump SCREWLINE P1	SP 250	SP 250	SP 630 (F)
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	445.0 (262.1)	830.0 (488.9)	1745.0 (1027.8)
Ultimate total pressure without gas ballast mbar (Torr)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)
Installed motor power 400 V, 50 Hz kW (hp)	9.7 (13.2)	11.5 (15.6)	22.5 (30.6)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	6.3 (8.6)	6.7 (9.1)	12.0 (16.3)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	75	77	79
Total weight with palette, approx. kg (lbs)	720.0 (1589.4)	850.0 (1876.4)	1100.0 (2428.3)
Connecting flange			
Inlet port DN_1	63 ISO-K	100 ISO-K	160 ISO-K
Outlet port DN_2	63 ISO-K	63 ISO-K	100 ISO-K

Ordering Information

	RUTA WAU		
	501/SP250/A	1001/SP250/A	2001/SP630(F)/A
	Part No.	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible) P2	WAU 501	WAU 1001	WAU 2001
Backing pump SCREWLINE P1	SP 250	SP 250	SP 630 (F)
Pump system, complete (adaptor version), pallet mounted,			
with water-cooled SCREWLINE	–	–	**502 472 V002**
with air-cooled SCREWLINE	**502 466 V001**	**502 468 V001**	**502 472 V003**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")	RT 5/501 **500 001 382**	RT 5/1001 **500 001 383**	RT 5/2001 **500 001 384**

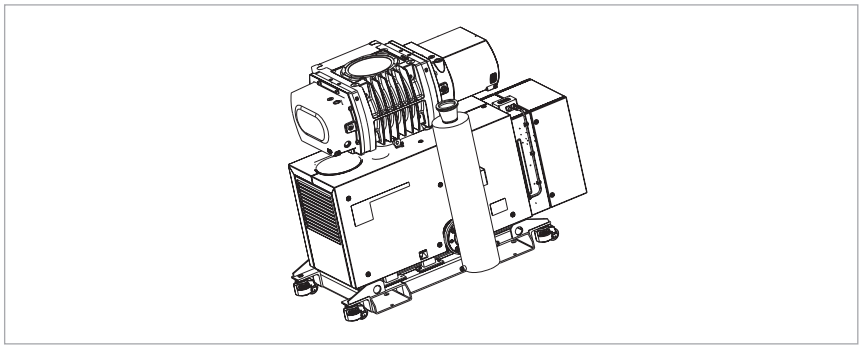


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE Backing Pump, Adaptor Version, with palette



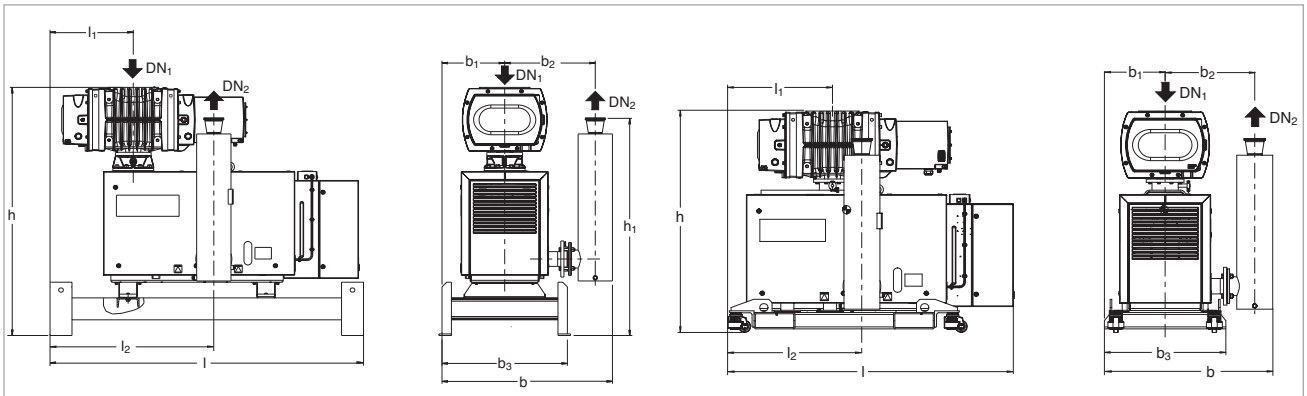
RUTA WH4400/SP630/A on castors

Standard Equipment

- RUVAC WH with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- Gear oil collecting pan integrated within the screw pump
- Gear oil supplied with the pump
- Screw pump SCREWLINE SP 630 F with water cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump SCREWLINE SP 630 with air cooling



Type		with palette	on castors
	RUTA	4400/SP630F/A	4400/SP630F/A
RUVAC WH	P2	4400	4400
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F
	DN_1	250 ISO-K	250 ISO-K
	DN_2	100 ISO-K	100 ISO-K
	l	2000 (78.74)	1748 (68.82)
	l_1	531 (20.91)	639 (25.16)
	l_2	1045 (41.14)	819 (32.24)
	b	1088 (42.84)	1026 (40.39)
	b_1	400 (15.75)	370 (14.57)
	b_2	578 (22.76)	546 (21.50)
	b_3	800 (31.50)	740 (21.13)
	h	1583 (62.32)	1354 (53.31)
	h_1	1388 (54.65)	1182 (46.54)

Dimensional drawing of the pump systems with dry compressing SCREWLINE SP backing pump, adaptor version; left with palette, right on castors.
Dimensions in brackets ( ) are in inch

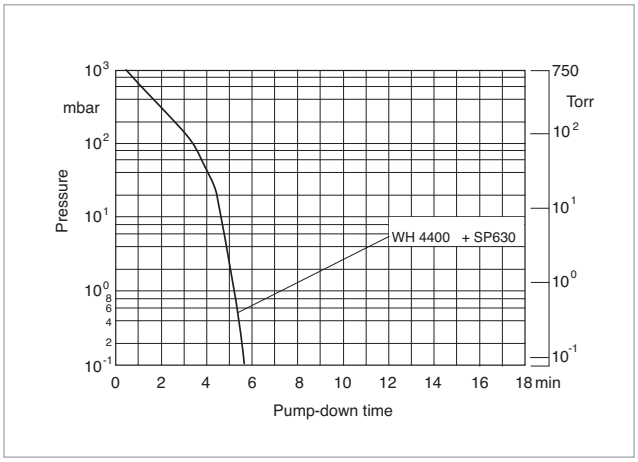
Technical Data, 50 Hz

	RUTA WH 4400/SP630F/A
RUVAC WH P2	4400
Backing pump SCREWLINE P1	SP 630 F
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	3380 (1990)
Ultimate total pressure without gas ballast mbar (Torr)	$< 1 \times 10^{-3}$ ($< 7.5 \times 10^{-4}$)
Installed motor power 400 V, 50 Hz kW (hp)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	12.93 (17.34)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	73
Total weight	
with palette, approx. kg (lbs)	1350 (2932)
on castors, approx. kg (lbs)	1980 (4365)
Connecting flange	
Inlet port DN_1	250 ISO-K
Outlet port DN_2	100 ISO-K

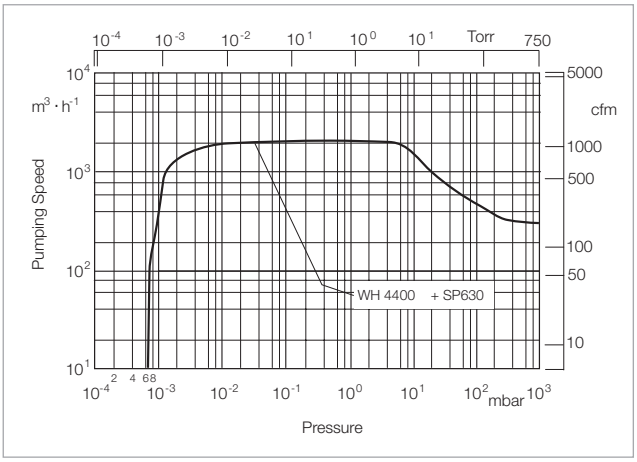
Ordering Information

	RUTA WH 4400/SP630F/A
	Part No.
RUVAC WH P2	4400
Backing pump SCREWLINE P1	SP 630 F
Pump system, complete (adaptor version), with water-cooled SCREWLINE	
pallet mounted	**503 162 V001** [1]
castor mounted	**502 873 V001** [1]

[1] Including external frequency converter

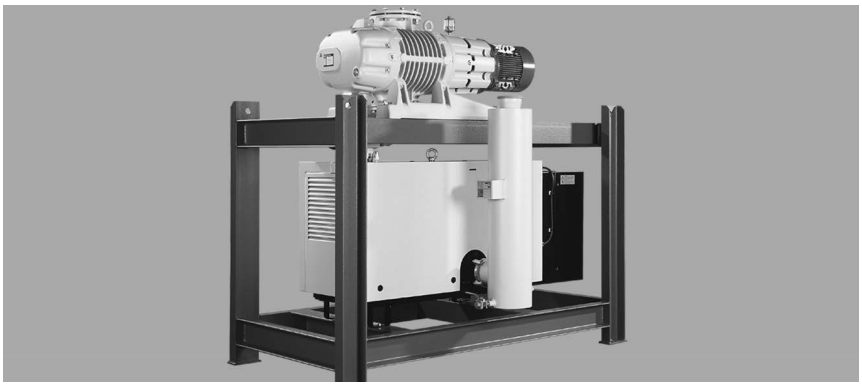


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 250 Backing Pump, Frame Version



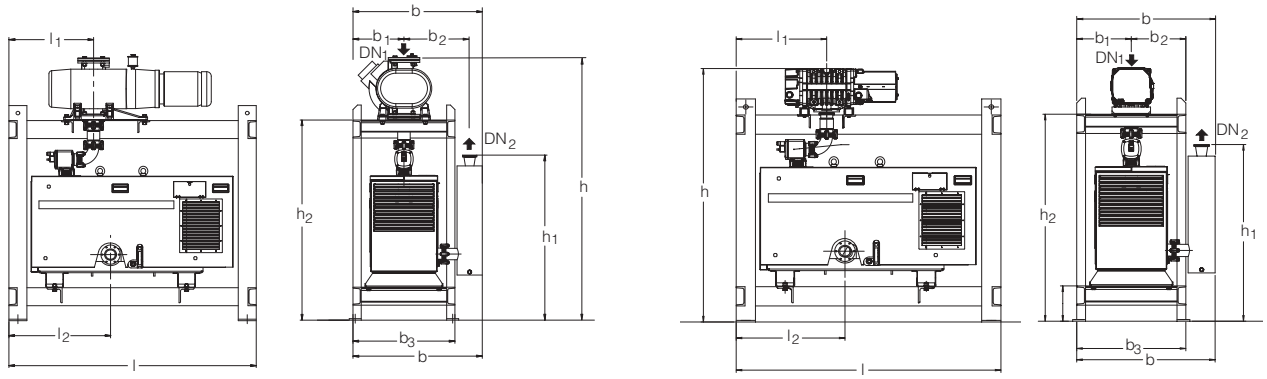
RUTA WAU2001/SP630/G

Standard Equipment

- RUVAC WH with water cooling
- RUVAC WAU with air cooling
- SCREWLINE SP 250 with air cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- Screw pump with air cooling
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve



Type	RUTA	501/SP250/G	1001/SP250/G	2001/SP250/G	700/SP250/G	2500/SP250/G
RUVAC WA/WAU/WS/WSU	P2	501	1001	2001	–	–
RUVAC WH	P2	–	–	–	700	2500
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 250	SP 250	SP 250
	DN_1	63 ISO-K	100 ISO-K	160 ISO-K	100 ISO-K	250 ISO-K
	DN_2	63 ISO-K	63 ISO-K	63 ISO-K	63 ISO-K	63 ISO-K
	l	1650 (64.96)	1650 (64.96)	1650 (64.96)	1650 (64.96)	1650 (64.96)
	l_1	565 (22.24)	565 (22.24)	565 (22.24)	564 (22.21)	664 (26.14)
	l_2	678 (26.69)	678 (26.69)	678 (26.69)	678 (26.69)	678 (26.69)
	b	863 (33.98)	863 (33.98)	863 (33.98)	863 (33.98)	863 (33.98)
	b_1	340 (13.39)	340 (13.39)	340 (13.39)	340 (13.39)	340 (13.39)
	b_2	438 (17.24)	438 (17.24)	438 (17.24)	438 (17.24)	438 (17.24)
	b_3	680 (26.77)	680 (26.77)	680 (26.77)	680 (26.77)	680 (26.77)
	h	1670 (65.75)	1771 (69.72)	1947 (76.65)	1580 (62.21)	1739 (68.47)
	h_1	1101 (43.35)	1101 (43.35)	1101 (43.35)	1101 (43.35)	1081 (42.56)
	h_2	1330 (52.36)	1375 (54.13)	1417 (55.79)	1290 (5079)	1315 (51.77)

Dimensional drawing of the pump systems with dry compressing SCREWLINE SP 250 backing pump, frame version; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

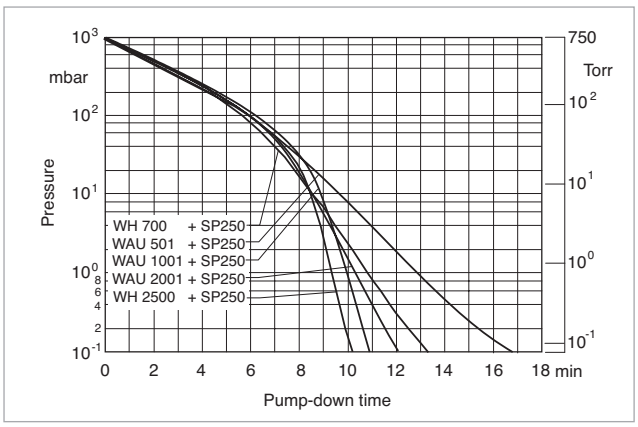
		RUTA WAU 501/ SP250/G	RUTA WAU 1001/ SP250/G	RUTA WAU 2001/ SP250/G	RUTA WH 700/ SP250/G	RUTA WH 2500/ SP250/G
RUVAC (WA/WAU/WS/WSU possible)	P2	501	1001	2001	–	–
RUVAC WH	P2	–	–	–	700	2500
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 250	SP 250	SP 250
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	445 (262)	830.0 (489)	1530 (901)	635 (374)	1680 (988)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 3 \times 10^{-3}$ ($< 2.2 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz	kW (hp)	9.7 (13.2)	11.5 (15.6)	15.0 (20.4)	9.7 (13.2)	13.5 (18.1)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	6.3 (8.6)	6.7 (9.1)	7.6 (10.3)	6.6 (8.9)	7.3 (9.8)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	74	77	80	75	70
Weight, total, approx.	kg (lbs)	860 (1896)	950 (2097)	1140 (2517)	860 (1896)	1000 (2205)
Connecting flange Inlet port Outlet port	 DN_1 DN_2	 63 ISO-K 63 ISO-K	 100 ISO-K 63 ISO-K	 160 ISO-K 63 ISO-K	 100 ISO-K 63 ISO-K	 250 ISO-K 63 ISO-K

Ordering Information

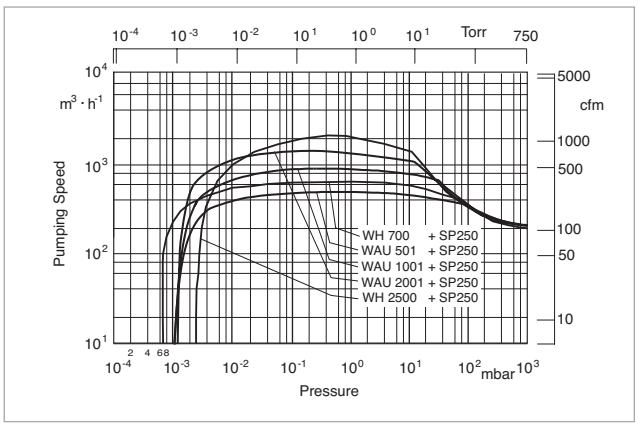
		RUTA WAU 501/ SP250/G	RUTA WAU 1001/ SP250/G	RUTA WAU 2001/ SP250/G	RUTA WH 700/ SP250/G	RUTA WH 2500/ SP250/G
		Part No.	**Part No.**	**Part No.**	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WAU 501	WAU 1001	WAU 2001	–	–
RUVAC WH	P2	–	–	–	700	2500
Backing pump SCREWLINE	P1	SP 250	SP 250	SP 250	SP 250	SP 250
Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WAU RUVAC WH	 	 **502 531 V001** –	 **502 532 V001** –	 **502 533 V001** –	 – **503 154 V001** [1]	 – **503 158 V001** [1, 2]
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/501 **500 001 382**	RT 5/1001 **500 001 383** [2]	RT 5/2001 **500 001 384** [2]	– –	– –

[1] Including external frequency converter

[2] With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure



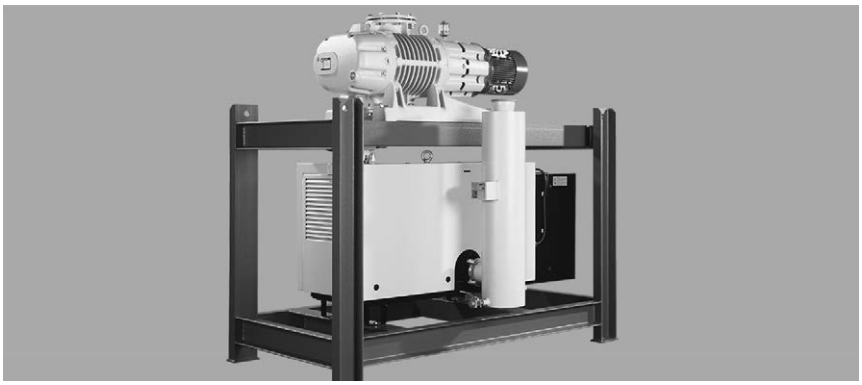
Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Vacuum Pump Systems

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Frame Version



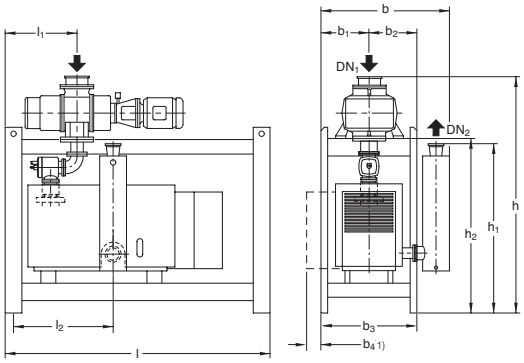
RUTA WAU2001/SP630F/G

Standard Equipment

- RUVAC RA with water cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- CE approval

Options

- Frequency converter RUVATRONIC RT for controlling the speed of the Roots pump
- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Castors
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling



Type	RUTA	3001/SP630F/G	5001/SP630F/G	7001/SP630F/G	9001/SP630F/G
RUVAC RA	P2	3001	5001	7001	9001
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
	DN_1	250 ISO-K	250 ISO-K	250 ISO-K	320 ISO-K
	DN_2	100 ISO-K	100 ISO-K	100 ISO-K	100 ISO-K
	l	1960 (77.17)	2400 (94.49)	1960 (77.17)	2340 (92.13)
	l_1	600 (23.62)	701 (27.60)	600 (23.62)	727 (28.62)
	l_2	895 (35.24)	995 (39.17)	895 (35.24)	1021 (40.20)
	b	1056 (41.58)	1116 (43.94)	1116 (43.94)	1171 (46.10)
	b_1	400 (15.75)	460 (18.11)	460 (18.11)	515 (20.28)
	b_2	546 (21.50)	546 (21.50)	546 (21.50)	546 (21.50)
	b_3	800 (31.50)	930 (36.61)	920 (36.22)	1030 (40.55)
	h	2025 (79.72)	2215 (87.21)	2156 (84.88)	2235 (87.99)
	h_1	1388 (54.65)	1388 (54.65)	1388 (54.65)	1388 (54.65)
	h_2	1411 (55.55)	1411 (55.55)	1411 (55.55)	1411 (55.55)

Dimensional drawing of the pump systems RUTA with dry compressing SCREWLINE SP 630 F backing pump, frame version; dimensions in brackets ( ) are in inch

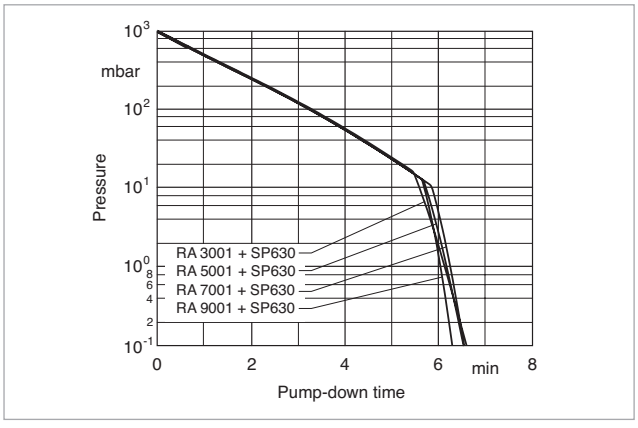
Technical Data, 50 Hz

		RUTA RA			
		3001/SP630F/G	5001/SP630F/G	7001/SP630F/G	9001/SP630F/G
RUVAC RA	P2	3001	5001	7001	9001
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	3050 (1797)	4040.0 (2379.6)	5030 (2963)	6000 (3534)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz	kW (hp)	26.0 (35.0)	30.0 (40.0)	33.5 (45.0)	37.0 (50.0)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	13.4 (18.2)	13.5 (18.4)	13.6 (18.5)	13.2 (18.0)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	82	79	82	80
Weight, total, approx.	kg (lbs)	1550 (3420)	1900 (4190)	2000 (4410)	2630 (5800)
Connecting flange					
Inlet port	DN_1	250 ISO-K	250 ISO-K	250 ISO-K	320 ISO-K
Outlet port	DN_2	100 ISO-K	100 ISO-K	100 ISO-K	100 ISO-K

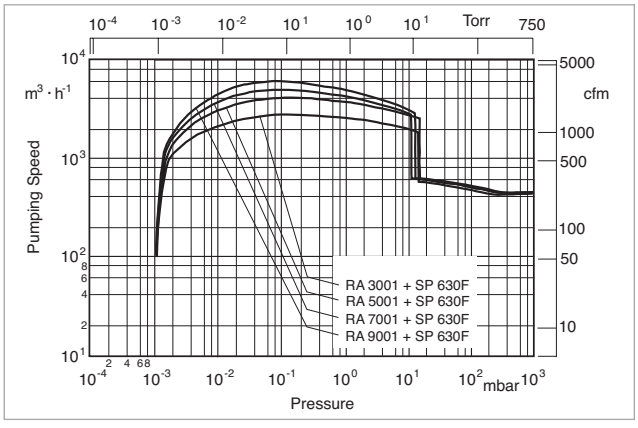
Ordering Information

		RUTA RA			
		3001/SP630F/G	5001/SP630F/G	7001/SP630F/G	9001/SP630F/G
		Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC	P2	RA 3001	RA 5001	RA 7001	RA 9001
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC RA with air-cooled vacuum pump Screw pump SCREWLINE SP 630		**502 512 V001**	**502 513 V001**	**502 514 V001**	**502 515 V001**
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/3001 **500 001 385** [1]	RT 5/5001 **500 001 386** [1]	RT 5/7001 **500 001 387** [1]	RT 5/9001 **500 001 388** [1]

[1] With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure

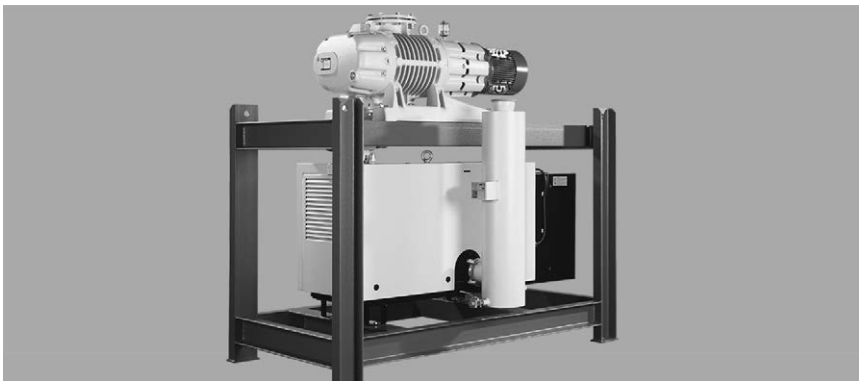


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Frame Version



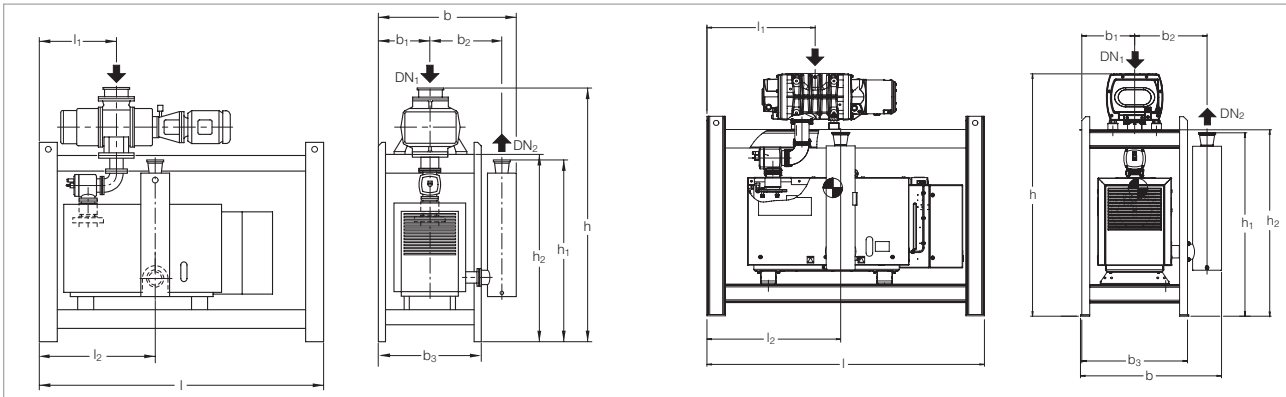
RUTA WAU2001/SP630F/G

Standard Equipment

- RUVAC WH with water cooling
- RUVAC WAU with air cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- CE approval
- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling

Options

- Frequency converter for controlling the speed of the Roots pump (only RUVAC RA/WA/WS)



Type	RUTA	2001/SP630F/G	2500/SP630F/G	4400/SP630F/G	7000/SP630F/G
RUVAC WA/WAU/WS/WSU	P2	2001	–	–	–
RUVAC WH	P2	–	2500	4400	7000
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
	DN_1	160 ISO-K	250 ISO-K	250 ISO-K	320 ISO-K
	DN_2	100 ISO-K	63 ISO-K	100 ISO-K	100 ISO-K
	l	1960 (77.17)	2100 (82.68)	2100 (82.68)	2100 (82.68)
	l_1	600 (23.62)	819 (32.24)	719 (28.31)	719 (28.31)
	l_2	895 (35.24)	1012 (39.84)	1012 (39.84)	1012 (39.84)
	b	1056 (41.58)	1068 (42.05)	1068 (42.05)	1068 (42.05)
	b_1	400 (15.75)	400 (15.75)	400 (15.75)	400 (15.75)
	b_2	546 (21.50)	548 (21.58)	548 (21.58)	548 (21.58)
	b_3	800 (31.50)	800 (31.50)	800 (31.50)	800 (31.50)
	h	1784 (70.24)	1834 (72.21)	1915 (75.39)	1923 (75.71)
	h_1	1388 (54.65)	1388 (54.65)	1388 (54.65)	1388 (54.65)
	h_2	1254 (49.37)	1410 (55.51)	1410 (55.51)	1410 (55.51)

Dimensional drawing of the pump systems RUTA with dry compressing SCREWLINE SP 630 F backing pump, frame version; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

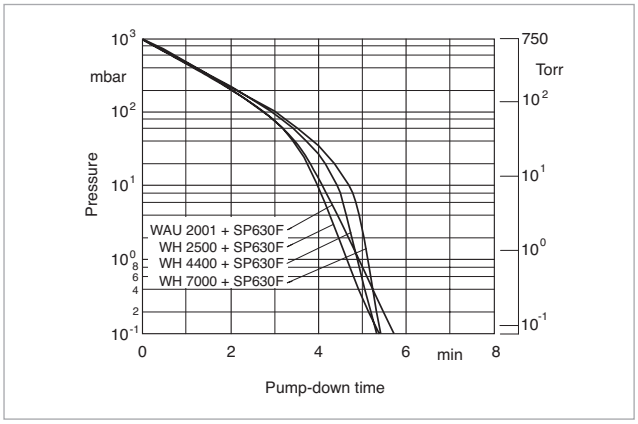
		RUTA			
		WAU 2001/SP630F/G	WH 2500/SP630F/G	WH 4400/SP630F/G	WH 7000/SP630F/G
RUVAC (WA/WAU/WS/WSU possible)	P2	2001	–	–	–
RUVAC WH	P2	–	2500	4400	7000
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	1745 (1028)	1956 (1151)	3380 (1990)	5093 (2998)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 5 \cdot 10^{-3}$ ($< 3.7 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)	$< 1 \times 10^{-3}$ ($< 0.75 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz	kW (hp)	22.5 (30.0)	21.5 (28.8)	26.0 (34.9)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	12.0 (16.3)	11.7 (16.7)	12.93 (17.34)	13.11 (17.58)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	79	73	73	73
Weight, total, approx.	kg (lbs)	1300 (2866)	1300 (2866)	1550 (3417)	1600 (3527)
Connecting flange					
Inlet port	DN_1	160 ISO-K	250 ISO-K	250 ISO-K	320 ISO-K
Outlet port	DN_2	100 ISO-K	63 ISO-K	100 ISO-K	100 ISO-K

Ordering Information

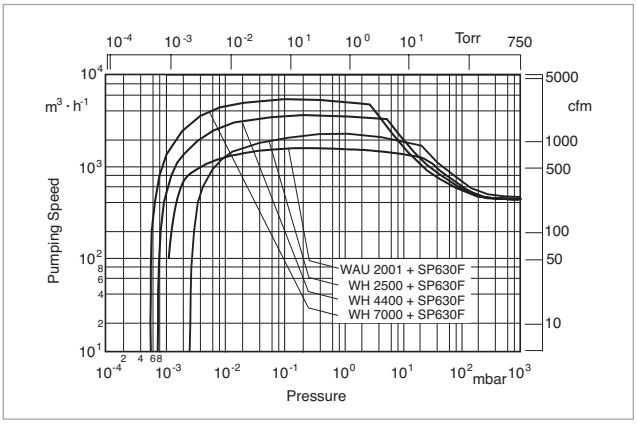
		RUTA			
		WAU 2001/SP630F/G	WH 2500/SP630F/G	WH 4400/SP630F/G	WH 7000/SP630F/G
		Part No.	**Part No.**	**Part No.**	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WAU 2001	–	–	–
RUVAC WH	P2	–	2500	4400	7000
Backing pump SCREWLINE	P1	SP 630 F	SP 630 F	SP 630 F	SP 630 F
Pump system, complete (adaptor version), frame mounted,					
with Roots vacuum pump RUVAC WAU		**502 511 V001**	**–**	**–**	**–**
with Roots vacuum pump RUVAC WH		**–**	**503 159 V001** [1), 2)]	**503 163 V001** [1), 2)]	**503 168 V001** [1), 2)]
Frequency converter RUVATRONIC (see description in Chapter "Accessories")		RT 5/2001	–	–	–
		500 001 384	**–**	**–**	**–**

[1)] Including external frequency converter

[2)] With this combination, continuous operation of the Roots pump is not possible at atmospheric pressure

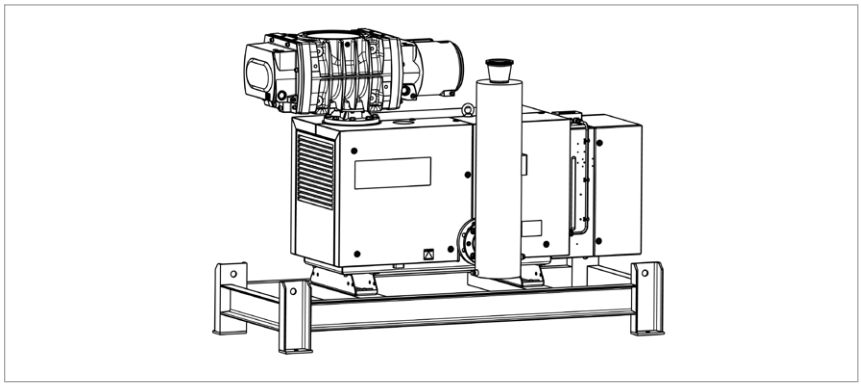


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with SCREWLINE SP 630 F Backing Pump, Adaptor Version



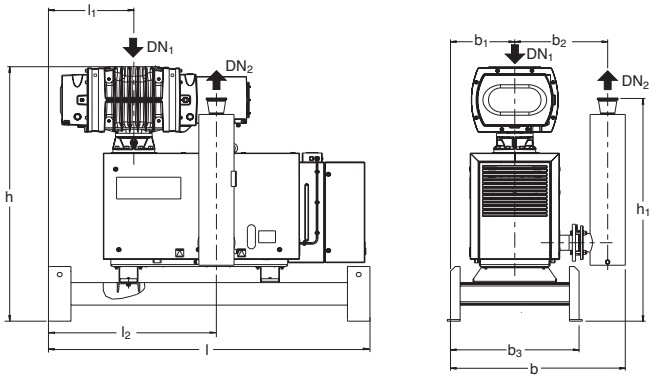
RUTA WH2500/SP630F/A

Standard Equipment

- RUVAC WH with water cooling
- SCREWLINE SP 630 F with water cooling
- Silencer
- SP-GUARD
- Manually operated gas ballast
- SECUVAC valve 24 V DC
- Gear oil collecting pan integrated within the screw pump
- Crane eyes on the frame
- Floor mounting
- Gear oil supplied with the pump
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)

Options

- Condensate drain valve at the silencer
- Sound proofing box
- Vibration absorbers
- Different types of floor mounts
- Oil drain valve on each pump
- Electric control systems
- Non-return valve
- Screw pump with air cooling



Type	RUTA	2001/SP630F/A
RUVAC WH	P2	2500
Backing pump SCREWLINE	P1	SP 630 F
	DN_1	250 ISO-K
	DN_2	100 ISO-K
	l	431 (16.97)
	l_1	1045 (41.14)
	l_2	2000 (78.74)
	b	1088 (42.84)
	b_1	400 (15.75)
	b_2	578 (22.76)
	b_3	800 (31.50)
	h	1473 (57.99)
	h_1	1388 (54.65)

Dimensional drawing of the pump system with dry compressing SCREWLINE SP 630 F backing pump, adaptor version; dimensions in brackets ( ) are in inch

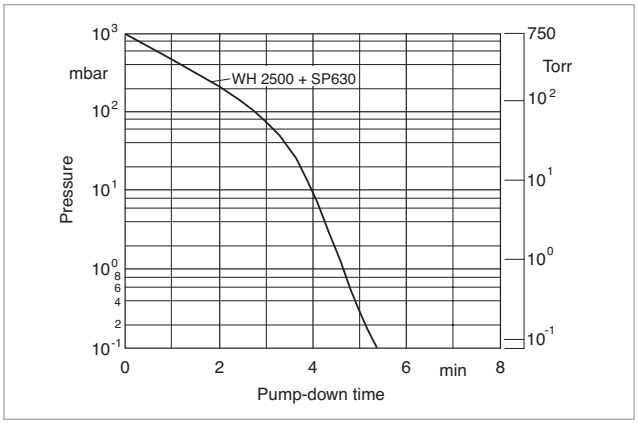
Technical Data, 50 Hz

	RUTA WH 2500/SP630F/A
RUVAC WH P2	2500
Backing pump SCREWLINE P1	SP 630 F
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	1956 (1151)
Ultimate total pressure without gas ballast mbar (Torr)	$< 5 \times 10^{-3}$ ($< 3.7 \times 10^{-3}$)
Installed motor power 400 V, 50 Hz kW (hp)	21.5 (28.8)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	11.7(16.7)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	73
Weight, total, approx. kg (lbs)	1200 (2645)
Connecting flange	
Inlet port DN_1	250 ISO-K
Outlet port DN_2	100 ISO-K

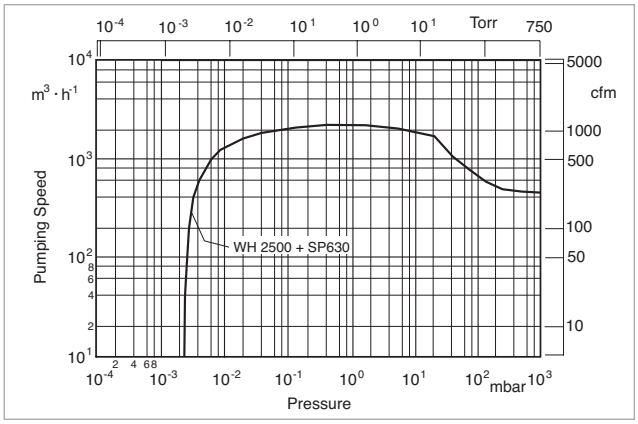
Ordering Information

	RUTA WH 2500/SP630F/A
	Part No.
RUVAC WH P2	2500
Backing pump SCREWLINE P1	SP 630 F
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH	**503 160 V001** [1]

[1] Including external frequency converter



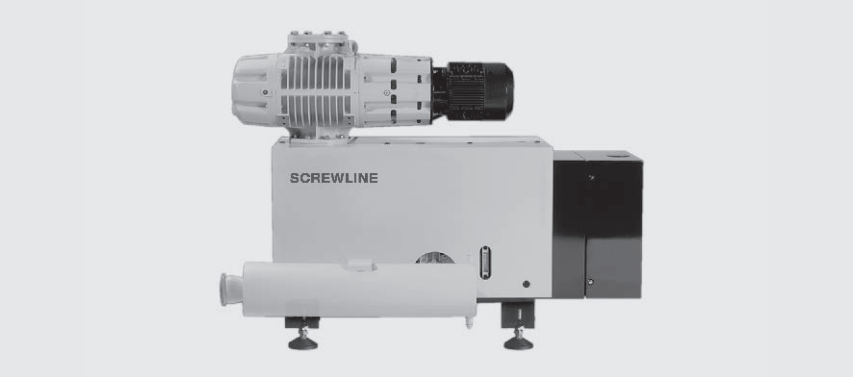
Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Pump Systems (Only available for purchase in North and South America)

SP Close-Coupled Systems with SP Dry Compressing Backing Pumps



SP close-coupled system

Advantages to the User

- Reduced maintenance and lower operating costs
- Compact close-coupled design without frame
- Oil-free compression in multiple pump stages
- Optimum leak tightness with WSU boosters
- Air-cooled
- Assembled and tested

Standard Equipment

- SCREWLINE SP 630 / WSU 1001 close-coupled pump system offering 645 ACFM at 0.3 Torr vacuum
- SCREWLINE SP 630 / WSU2001 close-coupled pump system offering 1235 ACFM at 0.3 Torr vacuum

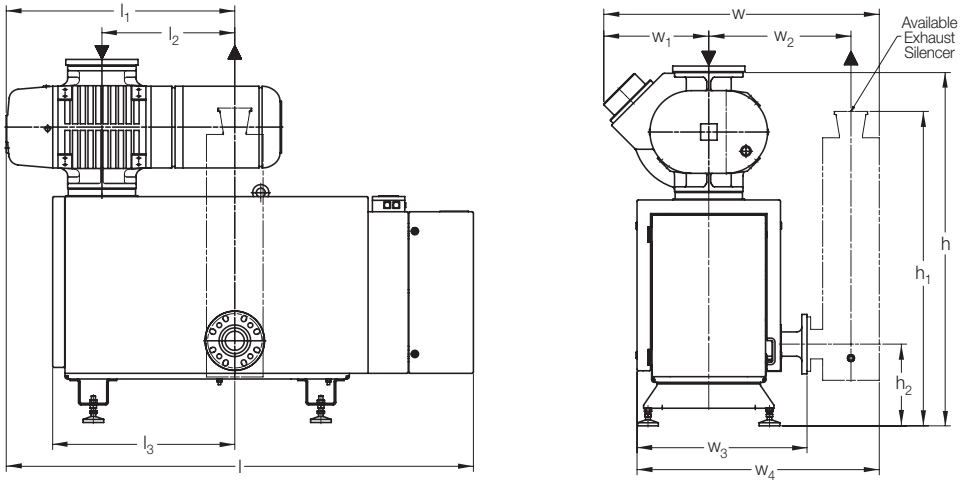
Options

- Electrical controls
- Exhaust silencer (loose)
- Inlet filter (loose)

The screw pump SCREWLINE SP 630 dry compressing screw-type vacuum pump is an environmentally friendly alternative to traditional oil sealed rotary piston and vane vacuum pumps. This innovative and robust vacuum pump produces a pumping speed of 371 cfm and better than 0.0075 Torr vacuum. SP 630 major advantages include improved environment, reduced maintenance, lower operating costs through less disposal and the elimination of expensive water cooling all with no oil contamination as the need for lubricating oil in the pumps' compression stage has been eliminated.

When used in conjunction with the Leybold WSU booster pumps, pumping speeds can be significantly increased while achieving oil-free compression in multi-ple vacuum pump stages.

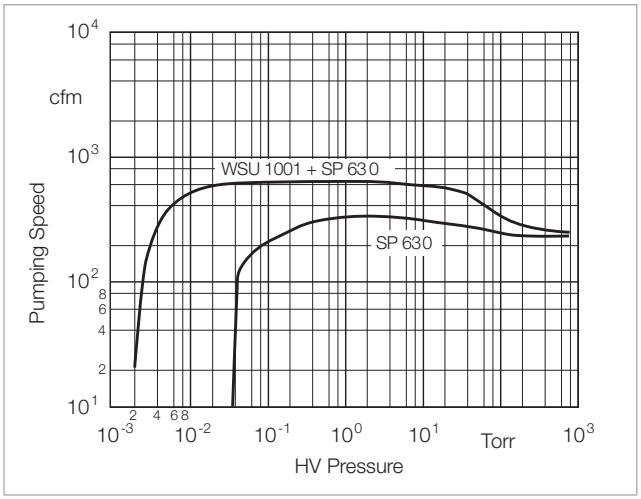
Leybold WSU boosters offer a canned motor design, which eliminates the need for shaft seals and flanged-on motors. A vacuum tight can separates the motor rotor and stator coils. This unique Leybold design provides the advantage of a more leak tight vacuum system. The WSU version booster incorporates a by-pass valve feature, which allows for automatic adjustment to varying pressure differentials between the inlet and outlet of the pump. The result is elimination of costly pressure switches/ amplifiers and faster pump down while starting at atmospheric pressure with the aforementioned SP 630 vacuum pump.



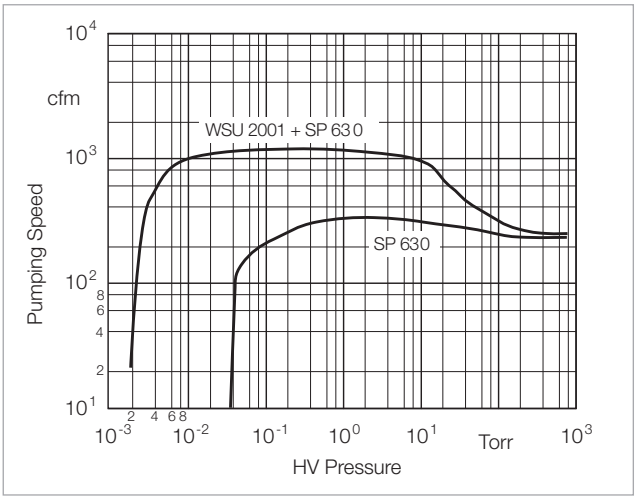
Roots Pump	Vane Pump	h	h_1	h_2	l	l_1	l_2
WSU 1001	SP 630	50 1/4 (1276)	47 7/8 (1216)	12 7/16 (316)	68 1/2 (1740)	32 3/16 (818)	20 1/4 (514)
WSU 2001	SP 630	53 25/32 (1366)	47 7/8 (1216)	12 7/16 (316)	71 5/32 (1807)	34 13/16 (884)	20 1/4 (514)

Roots Pump	Vane Pump	l_3	w	w_1	w_2	w_3	w_4
WSU 1001	SP 630	27 3/4 (705)	37 31/32 (964)	12 (305)	21 21/32 (550)	25 7/8 (657)	36 29/32 (937)
WSU 1001	SP 630	27 3/4 (705)	41 31/32 (1066)	16 (406)	21 21/32 (550	25 7/8 (657)	36 29/32 (937)

Dimensional drawing for the SP close-coupled system with SCREWLINE SP 630 dry compressing backing pumps; dimensions in brackets ( ) are in mm



Pumping speed diagram for the SP close-coupled system
with WSU 1001 Roots blower and SCREWLINE SP 630 at 60 Hz



Pumping speed diagram for the SP close-coupled system
with WSU 2001 Roots blower and SCREWLINE SP 630 at 60 Hz

Technical Data, 60 Hz

		SP Close-Coupled Systems	
		1001/SP630	2001/SP630
RUVAC (WSU possible)	P2	1001	2001
Backing pump SCREWLINE	P1	SP 630	SP 630
Pumping speed 60 Hz at 0.3 Torr	$m^3 \times h^{-1}$ (cfm)	1.092 (643)	2.085 (1,227)
Ultimate total pressure without gas ballast	mbar (Torr)	< 1 x 10^{-3} (< 7.5 x 10^{-4})	< 1 x 10^{-3} (< 7.5 x 10^{-4})
Installed motor power	kW (hp)	16.2 (21.6)	22.5 (30.0)
Noise level with silencer at 10^{-1} mbar (7.5 x 10^{-2} Torr)	dB(A)	78	79
Weight, total, approx.	kg (lbs)	870 (1922)	1100 (2430)
Connecting flange Inlet port Outlet port	 DN_1 DN_2	 160 ISO-K 100 ISO-K	 160 ISO-K 100 ISO-K

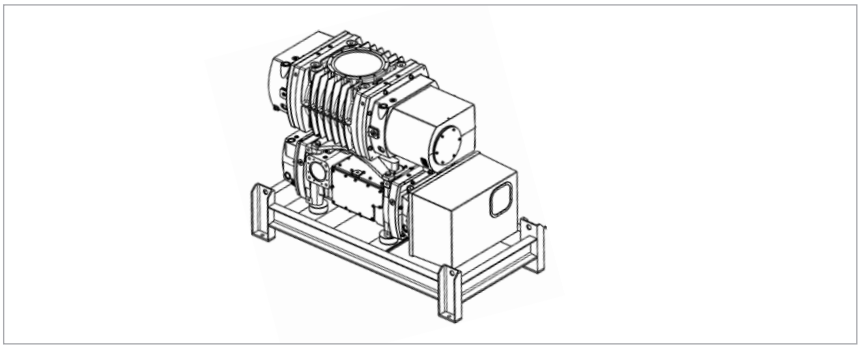
Ordering Information

		SP Close-Coupled Systems	
		1001/SP630	2001/SP630
		Part No.	**Part No.**
RUVAC (WA/WAU/WS/WSU possible)	P2	WSU 1001	WSU 2001
Backing pump SCREWLINE	P1	SP 630	SP 630
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WAU		**180 038 V1600**	**180 038 V2600**

Notes

Further Products

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 650 Backing Pump, Adaptor Version



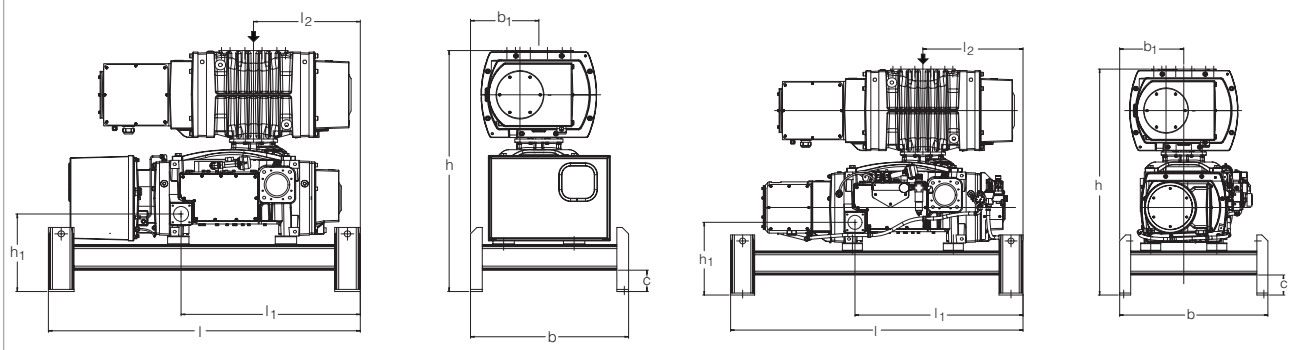
RUTA WH4400/DV650/A

Standard Equipment

- RUVAC WH and DRYVAC with water cooling
- DRYVAC DV with built-in frequency converter
- DRVAC DV-r including external frequency converter
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Innovative motor design with efficiency class IE2
- Gas ballast with manual valve
- Leak detection port
- Lubricant: synthetic oil (LVO 210)

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC
- Seal gas connection
- Gear chamber evacuation RUVAC WH
- Frequency converter for RUVAC pump
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Type	RUTA	WH4400/DV650/A	WH4400/DV650-r/A
RUVAC WH	P2	4400	4400
Backing pump DRYVAC DV	P1	650	650-r
	DN_1	250 ISO-K	250 ISO-K
	DN_2	100 ISO-K	100 ISO-K
	l	1460 (57.48)	1460 (57.48)
	l_1	839 (33.03)	839 (33.03)
	l_2	500 (19.69)	500 (19.69)
	b	740 (29.13)	740 (29.13)
	b_1	320 (12.60)	320 (12.60)
	c	100 (3.94)	100 (3.94)
	h	1128 (44.41)	1128 (44.41)
	h_1	363 (14.29)	363 (14.29)

Dimensional drawing of the pump system with dry compressing DRYVAC DV 650 (left) and DV 650-r (right) backing pump, adaptor version; dimensions in brackets ( ) are in inch

Technical Data, 50 Hz

RUTA WH

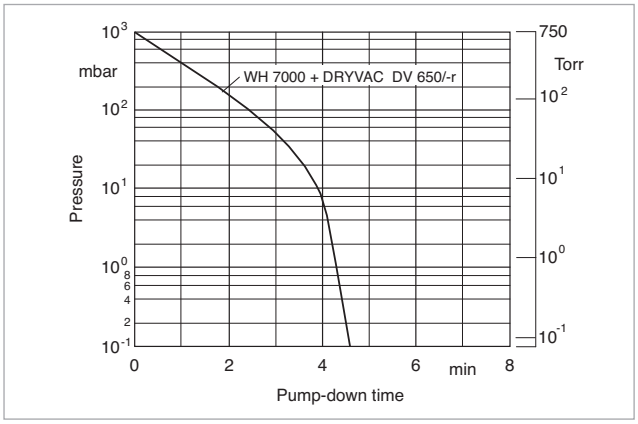
		4400/DV650/A	4400/DV650-r/A
RUVAC WH	P2	4400	4400
Backing pump DRYVAC DV	P1	650	650-r
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	3400 (2000)	3400 (2000)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 5.0 \cdot 10^{-4}$ (3.8×10^{-4})	$< 5.0 \cdot 10^{-4}$ (3.8×10^{-4})
Installed motor power 400 V, 50 Hz	kW (hp)	26.0 (34.9)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	9.3 (12.5)	9.3 (12.5)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	< 68	< 68
Weight, total, approx.	kg (lbs)	1550 (3417)	1550 (3417)
Connecting flange			
Inlet port	DN_1	250 ISO-K	250 ISO-K
Outlet port	DN_2	100 ISO-K	100 ISO-K

Ordering Information

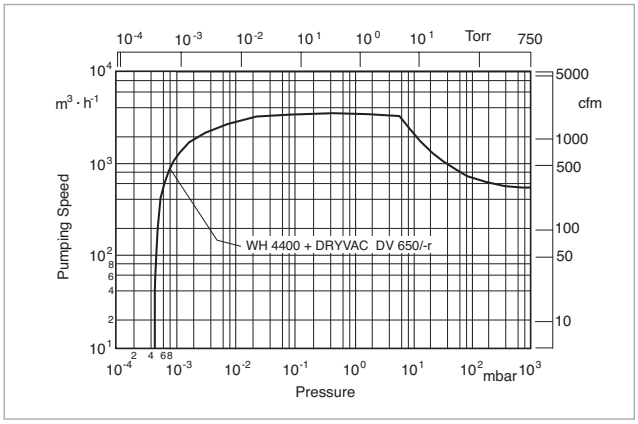
RUTA WH

		4400/DV650/A	4400/DV650-r/A
		Part No.	**Part No.**
RUVAC WH	P2	4400	4400
Backing pump DRYVAC DV	P1	650	650-r
Pump system, complete (adaptor version), pallet mounted, with Roots vacuum pump RUVAC WH		**503 166 V001** [1]	**503 167 V001** [1]

[1] Including external frequency converter

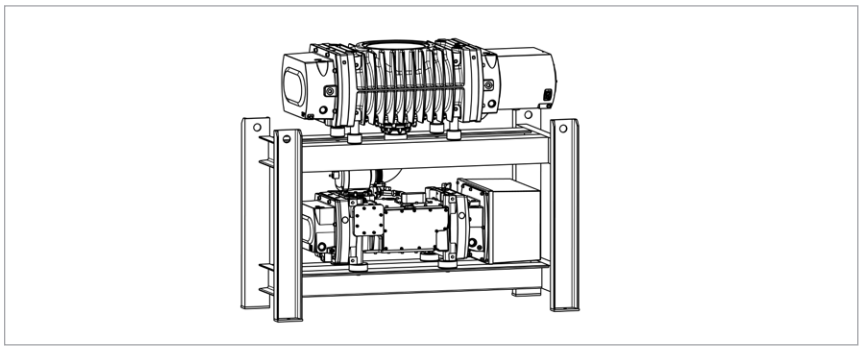


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 650 Backing Pump, Frame Version



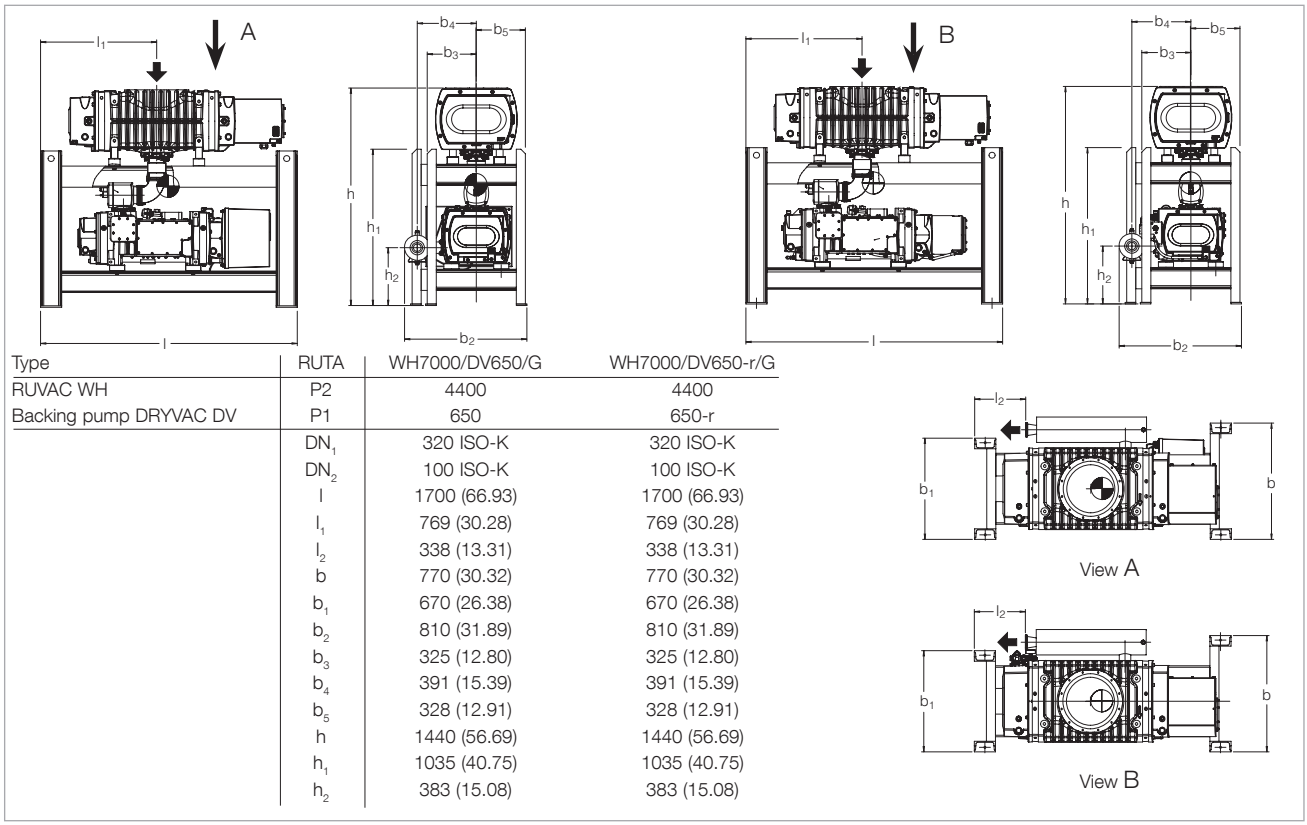
RUTA WH7000/DV650/G

Standard Equipment

- RUVAC WH and DRYVAC with water cooling
- DRYVAC DV with built-in frequency converter
- DRYVAC DV-r including external frequency converter
- RUVAC WH including external frequency converter (frequency converter permits pumping speed control)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Innovative motor design with efficiency class IE2
- Gas ballast with manual valve
- Leak detection port
- Lubricant: synthetic oil (LVO 210)
- SECUVAC valve 24 V DC

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC
- Seal gas connection
- Gear chamber evacuation RUVAC WH
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides



Type	RUTA	WH7000/DV650/G	WH7000/DV650-r/G
RUVAC WH	P2	4400	4400
Backing pump DRYVAC DV	P1	650	650-r
	DN_1	320 ISO-K	320 ISO-K
	DN_2	100 ISO-K	100 ISO-K
	l	1700 (66.93)	1700 (66.93)
	l_1	769 (30.28)	769 (30.28)
	l_2	338 (13.31)	338 (13.31)
	b	770 (30.32)	770 (30.32)
	b_1	670 (26.38)	670 (26.38)
	b_2	810 (31.89)	810 (31.89)
	b_3	325 (12.80)	325 (12.80)
	b_4	391 (15.39)	391 (15.39)
	b_5	328 (12.91)	328 (12.91)
	h	1440 (56.69)	1440 (56.69)
	h_1	1035 (40.75)	1035 (40.75)
	h_2	383 (15.08)	383 (15.08)

Dimensional drawing of the pump system with dry compressing DRYVAC DV 650 (left) and DV 650-r (right) backing pump, frame version; dimensions in brackets ( ) are in inch; (shown with optional silencer)

Technical Data, 50 Hz

RUTA WH

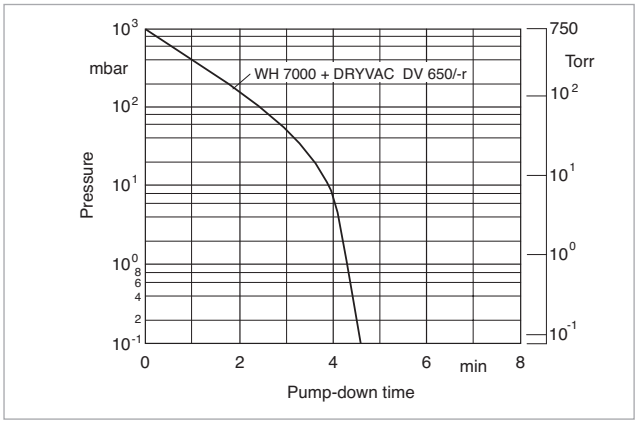
		7000/DV650/G	7000/DV650-r/G
RUVAC WH	P2	7000	7000
Backing pump DRYVAC DV	P1	650	650-r
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	5100 (3001)	5100 (3001)
Ultimate total pressure without gas ballast	mbar (Torr)	< $5.0 \cdot 10^{-4}$ (3.8×10^{-4})	< $5.0 \cdot 10^{-4}$ (3.8×10^{-4})
Installed motor power 400 V, 50 Hz	kW (hp)	26.0 (34.9)	26.0 (34.9)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	9.36 (12.56)	9.36 (12.56)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr)	dB(A)	< 68	< 68
Weight, total, approx.	kg (lbs)	1600 (3527)	1600 (3527)
Connecting flange			
Inlet port	DN_1	320 ISO-K	320 ISO-K
Outlet port	DN_2	100 ISO-K	100 ISO-K

Ordering Information

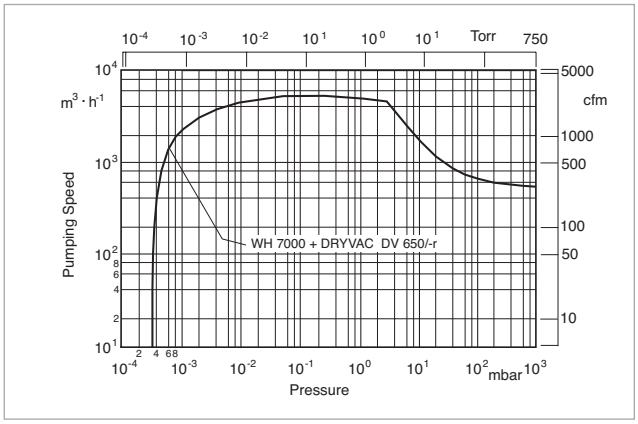
RUTA WH

		7000/DV650/G	7000/DV650-r/G
		Part No.	**Part No.**
RUVAC WH	P2	7000	7000
Backing pump DRYVAC DV	P1	650	650-r
Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WH		**503 170 V001** [1]	**503 171 V001** [1]

[1] Including external frequency converter

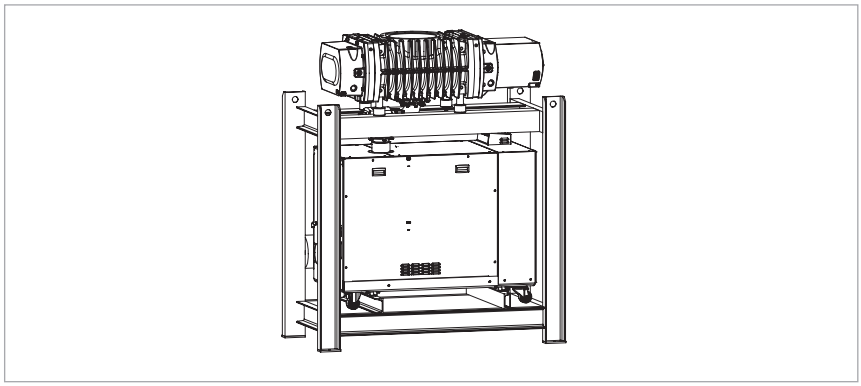


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

Dry Compressing Vacuum Pump System RUTA with DRYVAC DV 1200 Backing Pump, Frame Version



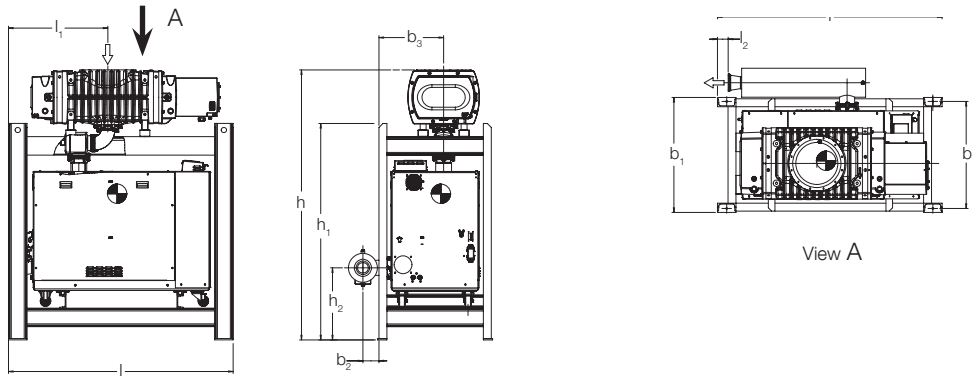
RUTA WH7000/DV1200/G

Standard Equipment

- RUVAC WH and DRYVAC with water cooling
- DRVAC DV 1200 with built-in frequency converter
- RUVAC WH with water cooling and external frequency converter
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Innovative motor design with efficiency class IE2
- Gas ballast with electropneumatic valve 24 V DC
- Integrated valve 24 V DC for seal gas supply
- Leak detection port
- Control via Profibus (DRYVAC)
- Lubricant: synthetic oil (LVO 210)

Options

- Exhaust silencer
- Bus interface
- Non-return valve for DRYVAC
- Seal gas connection
- Gear chamber evacuation
- Electrical controller
- Oil drain tap
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides



Type	RUTA	WH7000/DV1200/G
RUVAC WH	P2	7000
Backing pump DRYVAC DV	P1	1200
	DN_1	320 ISO-K
	DN_2	100 ISO-K
	l	1700 (66.93)
	l_1	752 (29.61)
	l_2	81 (3.19)
	b	870 (34.25)
	b_1	870 (34.25)
	b_2	122 (4.80)
	b_3	489 (19.25)
	h	2043 (80.43)
	h_1	1638 (64.49)
	h_2	546 (21.50)

Dimensional drawing of the pump system with dry compressing DRYVAC DV 1200, frame version; dimensions in brackets ( ) are in inch

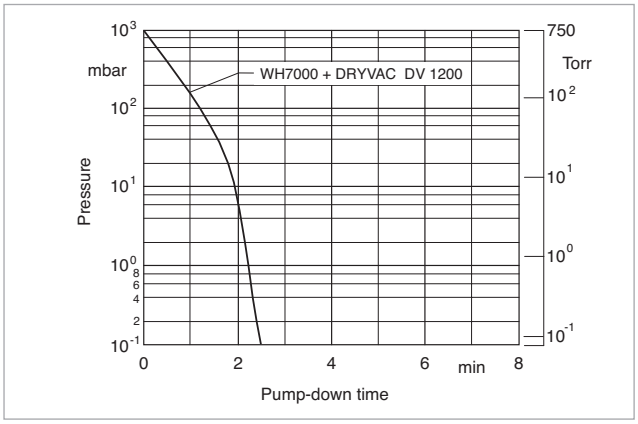
Technical Data, 50 Hz

	RUTA WH 7000/DV1200/G
RUVAC WH P2	7000
Backing pump DRYVAC DV P1	1200
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr) $m^3 \times h^{-1}$ (cfm)	5537 (3259)
Ultimate total pressure without gas ballast mbar (Torr)	< 6.0×10^{-4} (4.5×10^{-4})
Installed motor power 400 V, 50 Hz kW (hp)	41.0 (55)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr) kW (hp)	16.2 (21.7)
Noise level with silencer at 10^{-1} mbar (7.5×10^{-2} Torr) dB(A)	< 68
Weight, total, approx. kg (lbs)	2450 (5410)
Connecting flange	
Inlet port DN_1	320 ISO-K
Outlet port DN_2	100 ISO-K

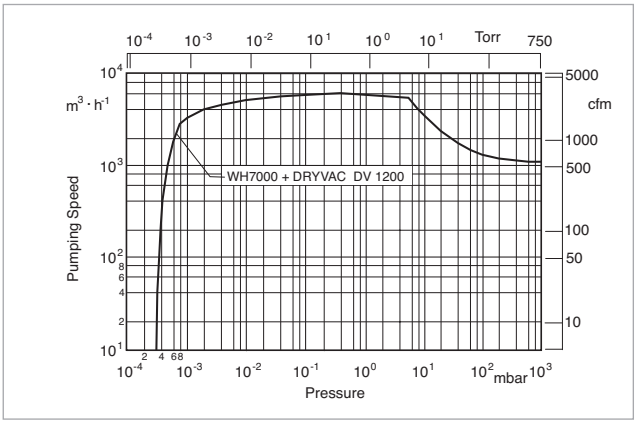
Ordering Information

	RUTA WH 7000/DV1200/G
	Part No.
RUVAC WH P2	7000
Backing pump DRYVAC DV P1	1200
Pump system, complete (adaptor version), frame mounted, with Roots vacuum pump RUVAC WH	**503 172 V001** [1]

[1] Including external frequency converter

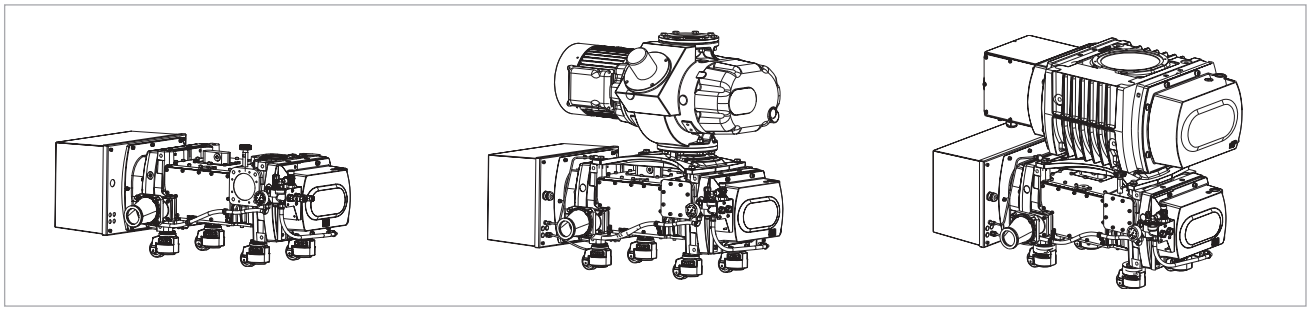


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Load Lock Pump Systems Adaptor Version



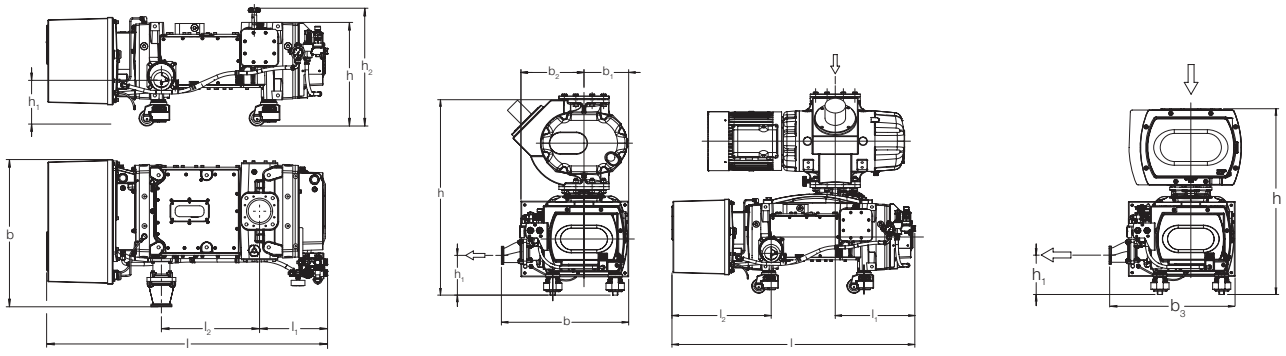
DRYVAC load lock pump system RUTA DV650S (left), RUTA WSU2001/DV650S/A (middle) and RUTA WHU4400/DV650S/A (right)

Standard Equipment

- DRYVAC DV S and RUVAC WHU with water cooling
- RUVAC WSU with air cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Seal gas connection
- Gear chamber evacuation
- RUVAC WAU
- Frequency converter for RUVAC pump
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Type	RUTA	DV650S	WSU2001/DV650S/A	WHU4400/DV650S/A
RUVAC	P2	–	WSU 2001	WHU 4400
Backing pump DRYVAC DV S	P1	650	650	650
	DN_1	100 ISO-K/PN6	160 ISO-K	250 ISO-K
	DN_2	63 ISO-K	63 ISO-K	63 ISO-K
	l	1285 (50.60)	1285 (50.60)	1321 (52.01)
	l_1	311 (12.24)	421 (16.58)	457 (17.99)
	l_2	449 (17.68)	525 (20.67)	864 (34.02)
	b	–	673 (26.50)	610 (24.02)
	b_1	–	236 (9.29)	270 (10.63)
	b_2	–	334 (13.15)	340 (13.39)
	b_3	–	–	707 (27.84)
	h	474 (18.66)	1034 (40.71)	993 (39.09)
	h_1	210 (8.27)	210 (8.27)	210 (8.27)
	h_2	539 (21.22)	–	–

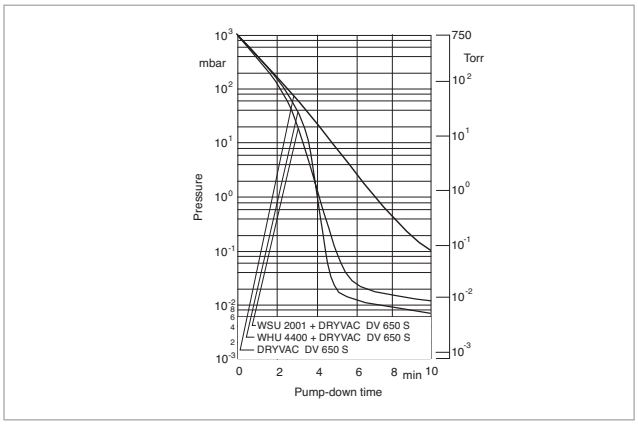
Dimensional drawing of the load lock pump systems with dry compressing DRYVAC backing pump, adaptor version:
RUTA DV650S (left), RUTA WSU2001/DV650S/A (middle) and RUTA WHU4400/DV650S/A (right); dimensions in brackets ( ) are in inch

Technical Data

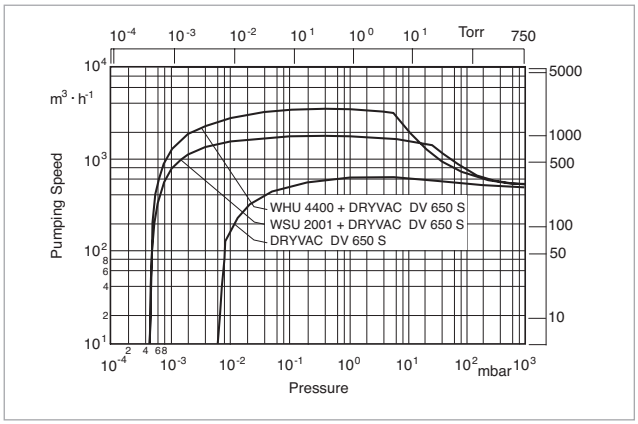
		DV650S	RUTA WSU2001/DV650S/A	RUTA WHU4400/DV650S/A
RUVAC WSU/WHU (WAU possible)	P2	–	WSU 2001	WHU 4400
Backing pump DRYVAC DV S on castors	P1	650	650	650
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	520 (306)	1760 (1036)	3400 (2000)
Ultimate total pressure without gas ballast	mbar (Torr)	< 5.0×10^{-3} (3.75×10^{-4})	< 5.0×10^{-3} (3.75×10^{-4})	< 5.0×10^{-3} (3.75×10^{-4})
Installed motor power, 3-ph.				
380-480 V, 50/60 Hz	kW (hp)	15.0 (20.4)	–	–
400-460 V, 50/60 Hz	kW (hp)	–	22.5 (30.6)	33.5 (45.6)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	6.9 (9.4)	8.4 (11.4)	9.3 (12.6)
Noise level with permanently attached exhaust line at ultimate total pressure	dB(A)	65	70	70
Operating agent	LVO	410	400 / 410	400 / 410
Total oil filling, approx.	l (imp qt)	1.2 (1.05)	4.2 (3.0 / 1.2) 3.65 (2.6 / 1.05)	5.95 (4.75 / 1.2) 5.25 (4.2 / 1.05)
Total weight, approx.	kg (lbs)	590 (1300)	1100 (2425)	1350 (2976)
Permissible ambient temperature	°C	+5 to +50	+12 to +40	+10 to +40
Connecting flange				
Inlet port				
top	1 x DN_1	100 ISO-K	160 ISO-K	250 ISO-K
side	2 x DN_1	PN6	–	–
Outlet port	DN_2	63 ISO-K	63 ISO-K	63 ISO-K

Ordering Information

		DV650S	RUTA WSU2001/DV650S/A	RUTA WHU4400/DV650S/A
		Part No.	**Part No.**	**Part No.**
RUVAC WSU/WHU	P2	–	WSU 2001	WHU 4400
Backing pump DRYVAC DV S on castors	P1	650	650	650
Load lock pump system, complete (adaptor version) with Roots vacuum pump RUVAC		**503 261 V001**	**503 255 V001**	**503 256 V001**

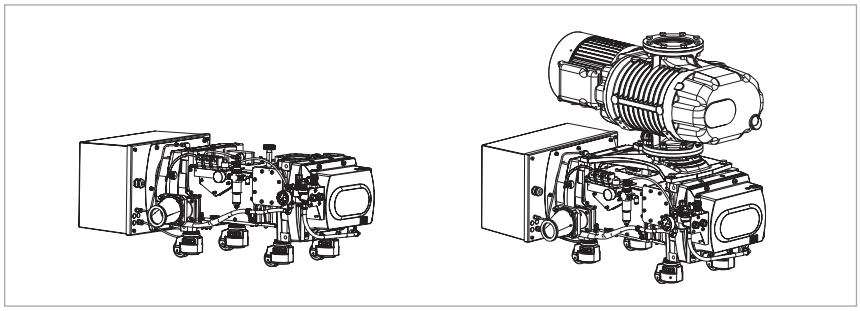


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Process Pump Systems Adaptor Version



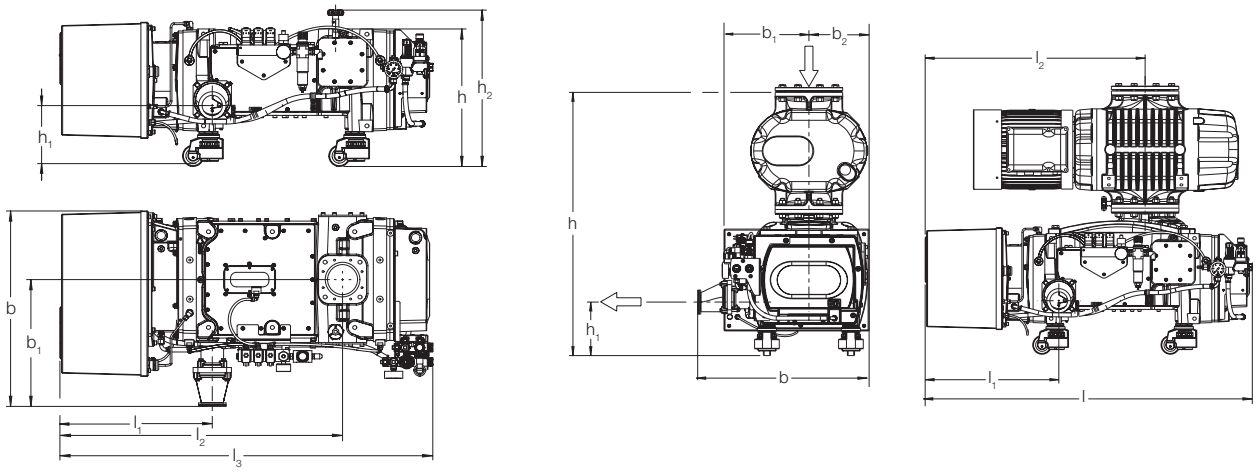
DRYVAC process pump system RUTA DV650C (left) and RUTA WS2001/DV650C/A (right)

Standard Equipment

- DRYVAC DV C with water cooling
- RUVAC WS with air cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Seal gas module, threefold
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Gear chamber evacuation
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Type	RUTA	DV650C	WS2001/DV650C/A
RUVAC	P2	–	WS 2001
Backing pump DRYVAC DV C	P1	650	650
	DN_1	100 ISO-K/PN6	160 ISO-K
	DN_2	63 ISO-K	63 ISO-K
	l	1285 (50.60)	1285 (50.60)
	l_1	525 (20.67)	864 (34.02)
	l_2	974 (38.35)	525 (20.67)
	b	673 (26.50)	673 (26.50)
	b_1	437 (17.21)	133 (5.24)
	b_2	–	236 (9.29)
	h	474 (18.66)	1034 (40.71)
	h_1	210 (8.27)	210 (8.27)
	h_2	539 (21.22)	–

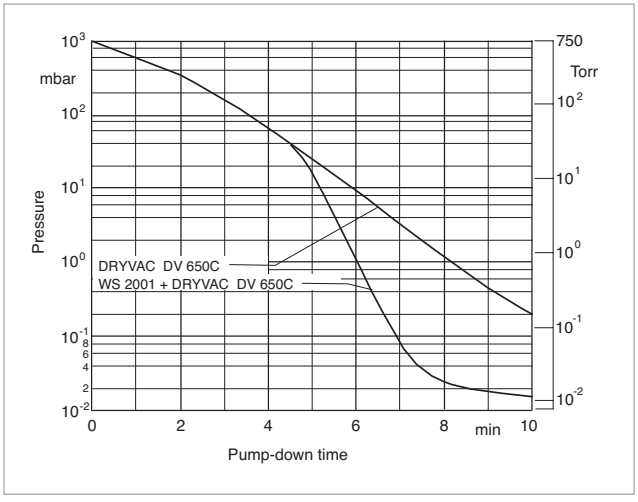
Dimensional drawing of the process pump systems with dry compressing DRYVAC backing pump, adaptor version: RUTA DV650C (left) and RUTA WS2001/DV650C/A (right); dimensions in brackets ( ) are in inch

Technical Data

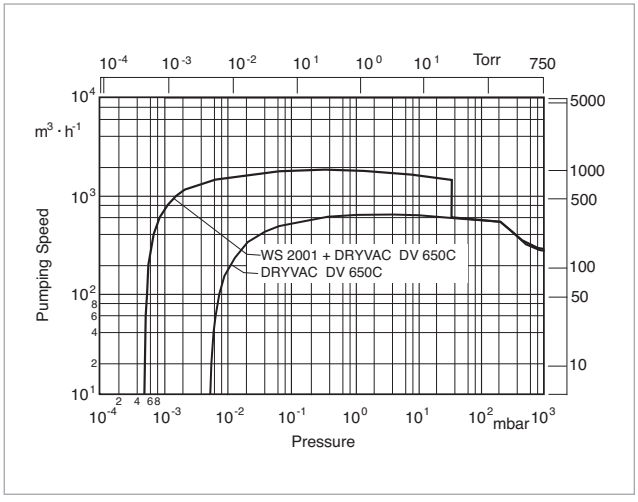
		RUTA	
		DV650C	WS2001/DV650C/A
RUVAC WS	P2	–	2001
Backing pump DRYVAC DV C on castors	P1	650	650
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	520 (306)	1760 (1036)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 5 \times 10^{-3}$ (3.75×10^{-3})	$< 5 \times 10^{-4}$ (3.75×10^{-4})
Installed motor power, 3-ph. 380-480 V, 50/60 Hz 400-460 V, 50/60 Hz	kW (hp) kW (hp)	15.0 (20.4) –	– 22.5 (30.6)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	6.9 (9.4)	8.4 (11.4)
Noise level with permanently attached exhaust line at ultimate total pressure	dB(A)	65	70
Operating agent	LVO	410	400/410
Total oil filling, approx.	l (imp qt)	1.2 (1.05)	4.2 (3.0/1.2) 3.65 (2.6 / 1.05)
Total weight, approx.	kg (lbs)	590 (1300)	1100 (2425)
Permissible ambient temperature	°C	+5 to +50	+12 to +40
Connecting flange Inlet port top side Outlet port	 $1 \times DN_1$ $2 \times DN_1$ DN_2	 100 ISO-K PN6 63 ISO-K	 160 ISO-K – 63 ISO-K

Ordering Information

		RUTA	
		DV650C	WS2001/DV650C/A
		Part No.	**Part No.**
RUVAC WS	P2	–	2001
Backing pump DRYVAC DV C on castors	P1	650	650
Process pump system, complete (adaptor version) with Roots vacuum pump RUVAC		**503 262 V001**	**503 263 V001**

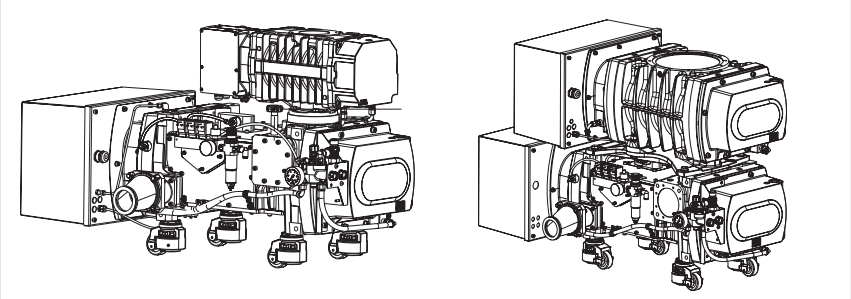


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Process Pump Systems with RUVAC WH Backing Pump Adaptor Version



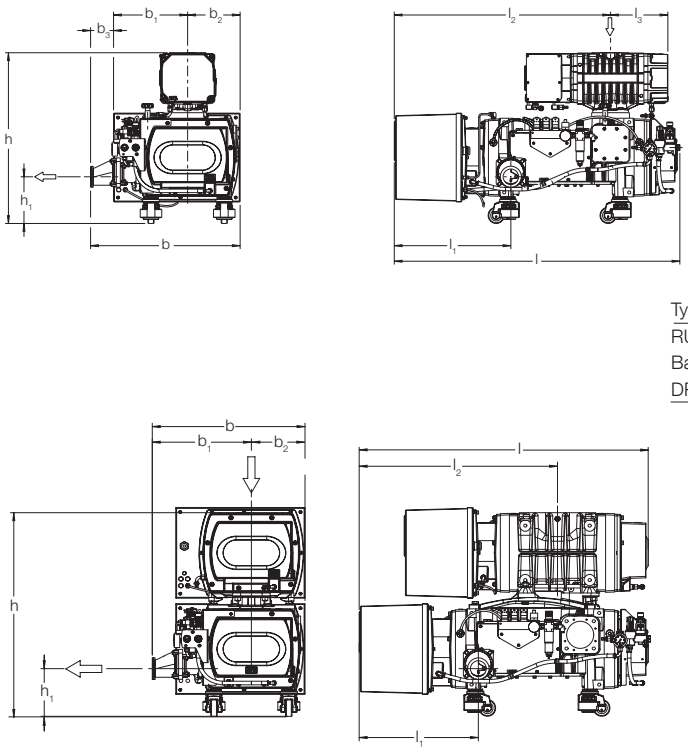
DRYVAC process pump system RUTA WH700FU/DV650C/A (left) and RUTA WH2500/DV650C/A (right)

Standard Equipment

- DRYVAC DV C and RUVAC WH with water cooling
- Rollable pump system with locking foot
- Hermetically sealed
- Seal gas module, threefold
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- Exhaust silencer
- Bus interface
- Gear chamber evacuation
- Electrical controller
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Frame



Type	RUTA	WH702/DV650C/A	WH2500/DV650C/A
RUVAC	P2	WH 700FU	WH 2500
Backing pump			
DRYVAC DV C	P1	650	650
	DN_1	100 ISO-K	250 ISO-K
	DN_2	63 ISO-K	63 ISO-K
	l	1256 (49.45)	1274 (50.16)
	l_1	525 (20.67)	525 (20.67)
	l_2	974 (38.35)	874 (34.41)
	l_3	258 (10.16)	–
	b	673 (26.50)	673 (26.50)
	b_1	334 (13.15)	437 (17.21)
	b_2	236 (9.29)	236 (9.29)
	b_3	103 (4.06)	–
	h	769 (30.28)	898 (35.35)
	h_1	210 (8.27)	210 (8.27)

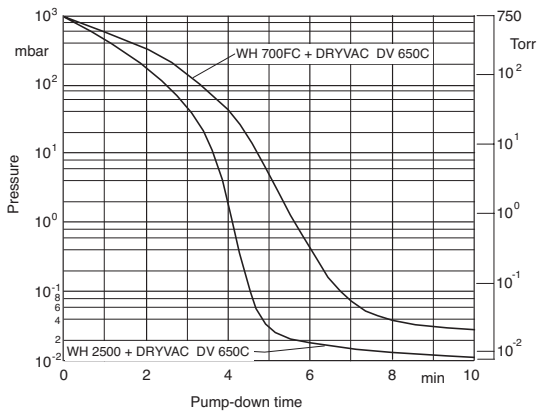
Dimensional drawing of the process pump systems with dry compressing DRYVAC backing pump, adaptor version: RUTA WH700FU/DV650C/A (top) and RUTA WH2500/DV650C/A (below); dimensions in brackets ( ) are in inch

Technical Data

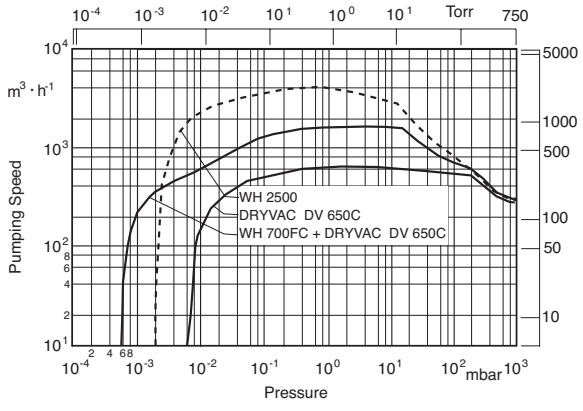
		RUTA WH	
		700FU/DV650C/A	2500/DV650C/A
RUVAC WH	P2	700FU	2500
Backing pump DRYVAC DV C on castors	P1	650	650
Pumping speed, 50 Hz at 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	1220 (718)	3115 (1834)
Ultimate total pressure without gas ballast	mbar (Torr)	$< 6 \times 10^{-4}$ (4.5×10^{-4})	$< 5 \times 10^{-4}$ (3.75×10^{-4})
Installed motor power, 3-ph.			
380-480 V, 50/60 Hz	kW (hp)	17.2 (23.4)	–
400-460 V, 50/60 Hz	kW (hp)	–	21.2 (28.8)
Electrical power consumption at 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	7.4 (10.1)	8.6 (11.7)
Noise level with permanently attached exhaust line at ultimate total pressure	dB(A)	70	70
Operating agent	LVO	400/410	410
Total oil filling, approx.	l (imp qt)	2.1 (0.9/1.2 1.9 (0.8/11)	2.4 (1.2/1.2) 2.1 (1.05/1.05)
Total weight, approx.	kg (lbs)	800 (1764)	1100 (2425)
Permissible ambient temperature	°C	+12 to +50	+10 to +50
Connecting flange			
Inlet port			
top	1 x DN_1	100 ISO-K	250 ISO-K
side	2 x DN_1	–	–
Outlet port	DN_2	63 ISO-K	63 ISO-K

Ordering Information

		RUTA WH	
		700FU/DV650C/A	2500/DV650C/A
		Part No.	**Part No.**
RUVAC WH	P2	700FU	2500
Backing pump DRYVAC DV C on castors	P1	650	650
Process pump system, complete (adaptor version) with Roots vacuum pump RUVAC		**503 257 V001**	**503 258 V001**

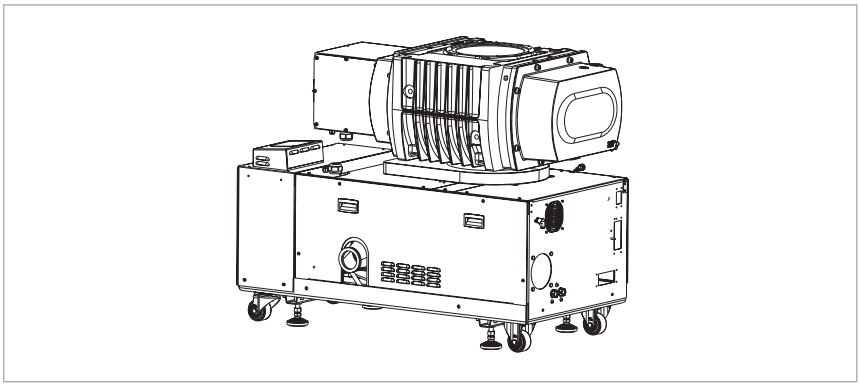


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

DRYVAC Pump Systems, enclosed Adaptor Version



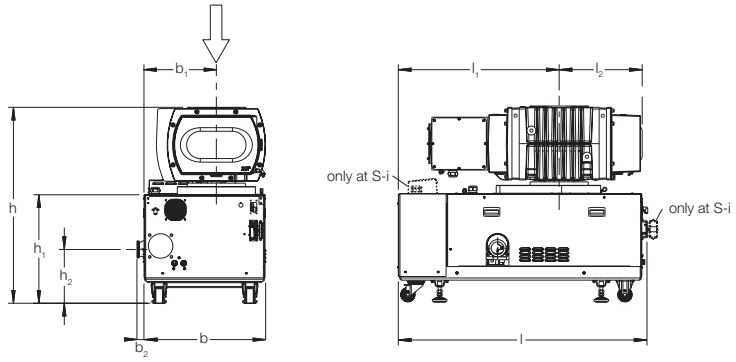
RUTA WHU4400/DV650S-i/A/E

Standard Equipment

- DRYVAC DV S and RUVAC WHU with water cooling
- Pump system partly enclosed and electrically prewired
- With integrated PLC (Part No. 503259V001)
- Pumps independently electrically controllable (Part No. 503260V001)
- Hermetically sealed
- Integrated protection functions (discharge pressure, temperatures and current consumption)
- Relay module (digital I/O)
- Non-return valve
- Leak detection port
- Lubricant: synthetic oil (LVO 400/410)

Options

- RUVAC WS / WSU / WH
- Exhaust silencer
- Bus interface
- Seal gas connection
- Gear chamber evacuation
- Frequency converter for RUVAC pump
- Oil drain valve
- Cooling water monitoring
- Quick couplings for water connections, blocking on both sides
- Housing suction facility



Type	RUTA	WHU4400/DV650S/A/E	WHU4400/DV650S-i/A/E
RUVAC WHU	P2	4400	4400
Backing pump DRYVAC DV S	P1	650	650-i
	DN_1	250 ISO-K	250 ISO-K
	DN_2	63 ISO-K	63 ISO-K
	l	1373 (54.06)	1369 (53.90)
	l_1	886 (34.88)	886 (34.88)
	l_2	457 (17.99)	457 (17.99)
	b	677 (26.65)	677 (26.65)
	b_1	398 (15.67)	398 (15.67)
	b_2	39 (1.54)	39 (1.54)
	h	1079 + 35 (42.48 + 1.38)	1079 + 35 (42.48 + 1.38)
	h_1	597 + 35 (23.50 + 1.38)	597 + 35 (23.50 + 1.38)
	h_2	296 + 35 (11.65 + 1.38)	296 + 35 (11.65 + 1.38)

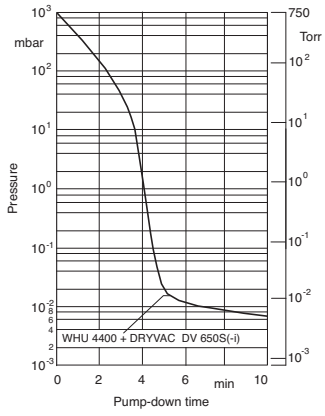
Dimensional drawing of the enclosed pump systems with DRYVAC DV650S(-i) backing pumps; dimensions in brackets ( ) are in inch

Technical Data

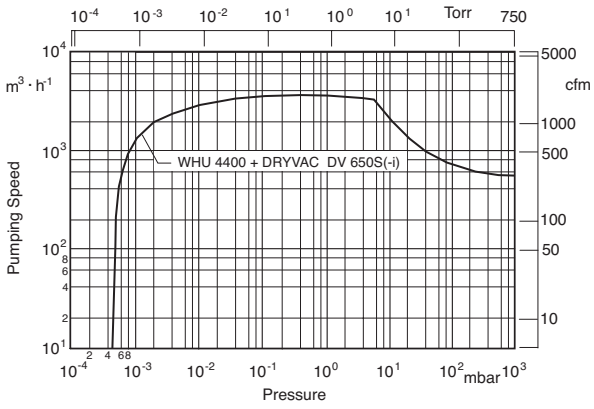
		RUTA WHU 4400/DV650S/A/E	RUTA WHU 4400/DV650S-i/A/E
RUVAC WHU (WH possible)	P2	4400	4400
Backing pump DRYVAC DV S			
with enclosure, silencer, castors	P1	650	–
and additional PLC	P1	–	650-i
Pumping speed, 50 Hz at 1 x 10^{-1} mbar (7.5×10^{-2} Torr)	$m^3 \times h^{-1}$ (cfm)	3400 (2000)	3400 (2000)
Ultimate total pressure without gas ballast	mbar (Torr)	< 5.0×10^{-3} (3.75×10^{-3})	< 5.0×10^{-3} (3.75×10^{-3})
Installed motor power, 3-ph. 400-460 V, 50/60 Hz	kW (hp)	33.5 (45.6)	33.5 (45.6)
Electrical power consumption at 1 x 10^{-1} mbar (7.5×10^{-2} Torr)	kW (hp)	9.3 (12.6)	9.3 (12.6)
Noise level with permanently attached exhaust line at ultimate total pressure	dB(A)	70	70
Operating agent	LVO	400/410	400/410
Total oil filling, approx.	l (imp qt)	5.95 (4.75/1.2) 5.25 (4.2/1.05)	5.95 (4.75/1.2) 5.25 (4.2/1.05)
Total weight, approx.	kg (lbs)	1350 (2976)	1350 (2976)
Permissible ambient temperature	°C	+10 to +40	+10 to +40
Connecting flange			
Inlet port	DN_1	250 ISO-K	250 ISO-K
Outlet port	DN_2	63 ISO-K	63 ISO-K

Ordering Information

		RUTA WHU 4400/DV650S/A/E	RUTA WHU 4400/DV650S-i/A/E
		Part No.	**Part No.**
RUVAC WHU (WH possible)	P2	4400	4400
Backing pump DRYVAC DV S	P1	650	650-i
Enclosed pump system, complete (adaptor version) with Roots vacuum pump RUVAC		**503 260 V001**	**503 259 V001**

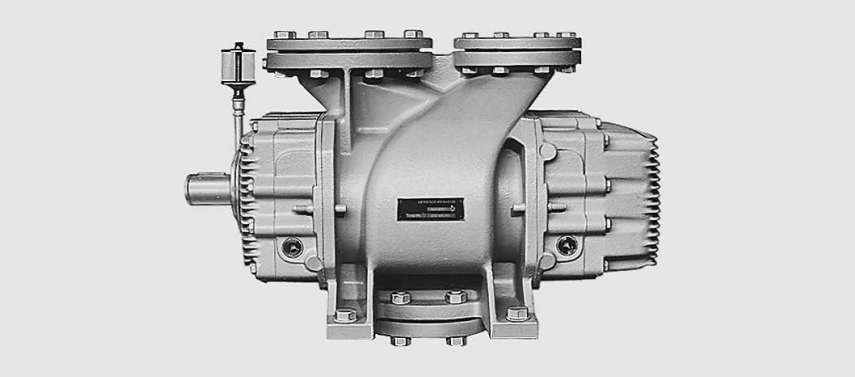


Pump-down time diagram for a 10 m^3 tank at 50 Hz



Pumping speed diagram at 50 Hz

RUVAC RAV Roots Vacuum Pumps with Pre-Admission Cooling

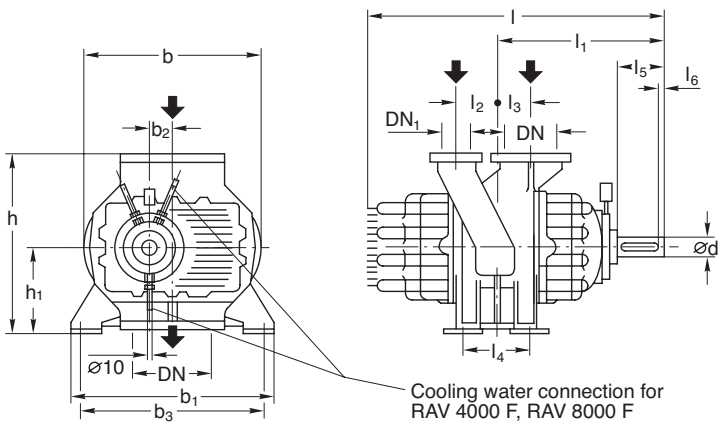


Typical Applications

- Short pump-down cycles on large volumes
- Oil-free compression of high volume flows of gases and vapors against atmospheric pressure
- Single-stage (G) or in combination with RAV F as backing pump
- Operating pressures in the rough vacuum range
- CE approval

Advantages to the User

- **RUVAC RAV G**
  Operating pressure range of 150 mbar (112.5 Torr) against atmospheric pressure;
  total leak rate < 10^{-1} mbar x l x s^{-1} (7.5×10^{-2} Torr x l x s^{-1})
- **RUVAC RAV F**
  In combination with backing pumps the attainable operating pressures extend down into the medium vacuum range;
  leak rate < 10^{-2} mbar x l x s^{-1} (7.5×10^{-3} Torr x l x s^{-1})
- When series-connected the operating pressures extend down into the medium vacuum range:
  - two-stages to 25 mbar (18.75 Torr)
  - multiple stage to 10^{-3} mbar (7.5×10^{-4} Torr)
- Motors for special supply voltages and frequencies or protected types are available
- Pre-admission silencer and filter for the cooling gas inlet as well as silencers for the exhaust side (option/single-stage)
- Downstream gas cooler (option/ multistage)
- C version (chemical version/option)
- Special materials (option)
- Pressure burst resistant version (option)



Type RUVAC RAV		DN DIN 2533	DN1 DIN 2533	l	l1	l2	l3	l4	l5	l6	b	b1	b2	b3	Type F d	Type G d	h	h1
250 F/G	mm	80	50	529	283	90	100	125	50	5	321	332	34	300	25 k6	28 k6	313	132
	in.			20.83	11.14	3.54	3.94	4.92	1.97	0.20	12.64	13.07	1.34	11.81	0.98 k6	1.10 k6	12.32	5.20
500 F/G	mm	100	50	604	324	120	100	150	70	5	321	390	42.6	350	25 k6	38 k6	370	160
	in.			23.78	12.76	4.72	3.94	5.91	2.76	0.20	12.64	15.35	1.68	13.78	0.98 k6	1.50 k6	14.57	6.30
1000 F/G	mm	100	80	705	380	125	115	210	90	5	427	440	53.3	400	42 k6	45 k6	410	180
	in.			27.76	14.96	4.92	4.53	8.27	3.54	0.20	16.81	17.32	2.10	15.75	1.65 k6	1.77 k6	16.14	7.09
2000 F/G	mm	150	100	806	423	160	130	270	80	5	476	570	67.6	510	42 k6	55 k6	450	200
	in.			31.73	16.65	6.30	5.12	10.63	3.15	0.20	18.74	22.44	2.66	20.08	1.65 k6	2.17 k6	17.72	7.87
4000 F/G	mm	250 [1]	150	1143	610	250	200	410	95	5	682	800	106	720	55 k6	70 m6	680	315
	in.			45.0	24.02	9.84	7.87	16.14	3.74	0.20	26.85	31.50	4.17	28.35	2.17 k6	2.76 m6	26.77	12.40
8000 F/G	mm	300 [1]	200 [1]	1337	717	300	230	525	100	8	954	910	135	830	70 k6	90 m6	760	355
	in.			52.64	28.23	11.81	9.06	20.67	3.94	0.31	37.56	35.83	5.31	32.68	2.76 k6	3.54 m6	29.92	13.98

[1] DIN 2532 DN1 = Pre-inlet

Dimensional drawing for the RUVAC RAV pumps

Technical Data, 50 Hz

		RUVAC RAV					
		250 G	500 G	1000 G	2000 G	4000 G	8000 G
Pumping speed [1]	$m^3 \times h^{-1}$ (cfm)	250 (147)	500 (295)	1000 (589)	2000 (1178)	3700 (2179)	8100 (4771)
Nominal speed	min^{-1} (rpm)	3000 (3000)	3000 (3000)	3000 (3000)	3000 (3000)	1500 (1500)	1500 (1500)
Max. permissible pressure difference [2]	mbar (Torr)	850 (637)	850 (637)	850 (637)	850 (637)	850 (637)	850 (637)
Connecting flange	DN	80	100	100	150	250	300
Max. permissible motor power							
for direct drive	kW (hp)	11.0 (15.0)	18.5 (25.2)	30.0 (40.8)	55.0 (74.8)	95.0 (129.3)	200.0 (272.1)
for belt drive	kW (hp)	11.0 (15.0)	18.5 (25.2)	30.0 (40.8)	55.0 (74.8)	95.0 (129.3)	200.0 (272.1)
Weight	kg (lbs)	95 (210)	160 (353)	225 (496)	310 (684)	720 (1588)	1230 (2712)

Ordering Information

	RUVAC RAV					
	250 G	500 G	1000 G	2000 G	4000 G	8000 G
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
Roots vacuum pump RUVAC RAV G	upon request	upon request	upon request	upon request	upon request	upon request

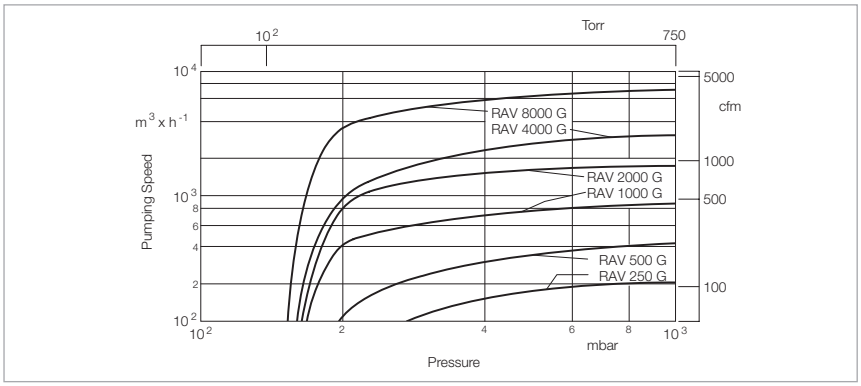
Technical Data, 50 Hz

		RUVAC RAV					
		250 F	500 F	1000 F	2000 F	4000 F	8000 F
Pumping speed [1]	$m^3 \times h^{-1}$ (cfm)	250 (147)	500 (295)	1000 (589)	2000 (1178)	3700 (2179)	8100 (4771)
Nominal speed	min^{-1} (rpm)	3000 (3000)	3000 (3000)	3000 (3000)	3000 (3000)	1500 (1500)	1500 (1500)
Max. permissible pressure difference [2]	mbar (Torr)	850 (637)	850 (637)	850 (637)	850 (637)	850 (637)	850 (637)
Connecting flange	DN	80	100	100	150	250	300
Max. permissible motor power							
for direct drive	kW (hp)	11.0 (15.0)	18.5 (25.2)	30.0 (40.8)	55.0 (74.8)	95.0 (129.3)	200.0 (272.1)
for belt drive	kW (hp)	4.0 (5.4)	4.0 (5.4)	7.5 (10.2)	15.0 (20.4)	37.0 (50.3)	75 (102.0)
Gear oil, approx.	l (qt)	0.9 (0.95)	1.1 (1.6)	1.5 (1.59)	2.5 (2.64)	12.0 (12.68)	11.0 (11.63)
Weight, approx.	kg (lbs)	95 (210)	160 (353)	225 (496)	310 (684)	720 (1588)	1230 (2712)
Cooling water connection, fitting for tube		–	–	–	–	10 x 1	10 x 1
Cooling water requirement, approx.	l x h^{-1}	–	–	–	–	60	60

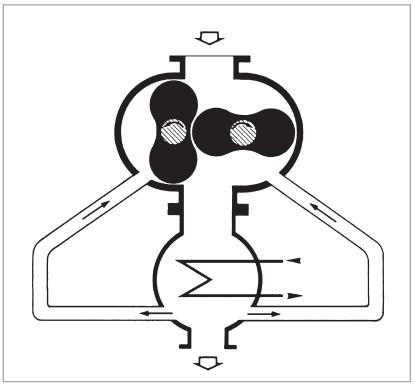
Ordering Information

	RUVAC RAV					
	250 F	500 F	1000 F	2000 F	4000 F	8000 F
	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
Roots vacuum pump RUVAC RAV F	upon request	upon request	upon request	upon request	upon request	upon request

[1] To DIN 28 400 and following numbers
[2] RUVAC RAV G and RAV F with direct drive



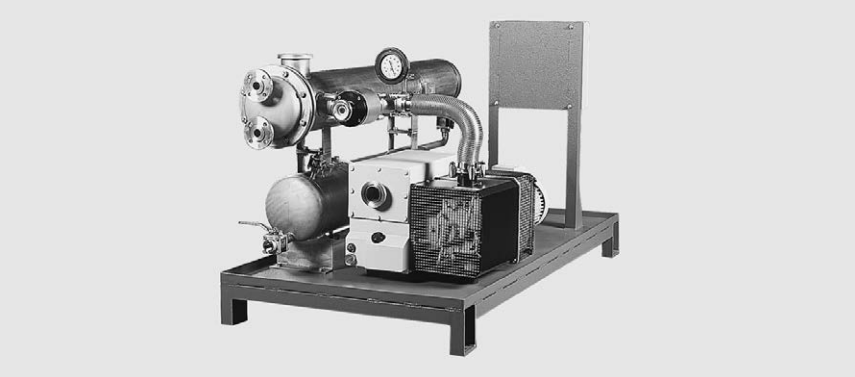
Pumping speed diagram of RUVAC RAV at 50 Hz



Operating diagram of RUVAC RAV vacuum pumps with pre-admission cooling

Vacuum Pump Systems

TVD Pump Systems for Drying, Evaporation and Distillation Applications



TVD 200

Advantages to the User

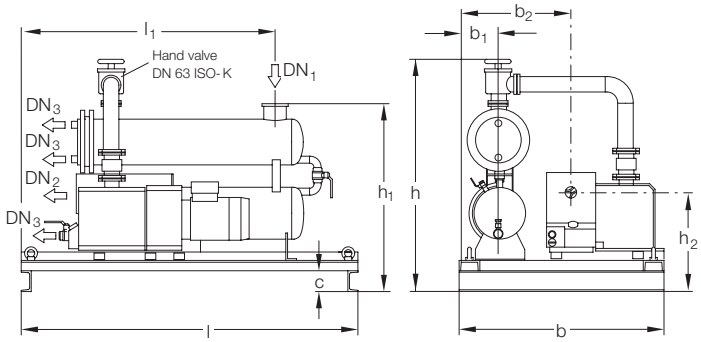
- Operating agent may be reused, for example by returning cleaned water to the process
- Reduction of the quantities which need to be disposed of by 80%
- Low temperature distillation/drying
- Condensate may be drained during vacuum operation
- CE approval

Typical Applications

- Drying of powders and solids, for example
- Cleaning of waste water
- Vacuum distillation

Standard Equipment

- Condenser at the intake side
- Receiver with condensate level indicator
- Manually operated valves on the receiver
- SOGEVAC rotary vane vacuum pump with integrated exhaust filters, anti-suckback valve and gas ballast valve



Type		DN1	DN2	DN3	l	l1	b	b1	b2	h	h1	h2	c
TVD 40	mm	63 ISO-K	1 1/4"	1"	1000	590	700	160	445	1000	785	341	100
	in.			1"	39.37	23.23	27.56	6.30	17.52	39.37	30.91	13.43	3.94
TVD 65	mm	63 ISO-K	1 1/4"	1"	1280	755	700	160	445	1165	950	341	100
	in.			1"	50.39	29.72	27.56	6.30	17.52	45.87	33.46	13.43	3.94
TVD 100	mm	100 ISO-K	2"	1"	1400	755	940	160	561	1165	950	345	100
	in.			1"	55.12	29.72	37.01	6.30	22.09	45.87	33.46	13.58	3.94
TVD 200	mm	100 ISO-K	2"	1"	1800	765	940	150	501	1175	960	473	100
	in.			1"	70.87	30.12	37.01	6.30	19.72	46.25	37.80	18.62	3.94

Dimensional drawing for the TVD pump systems

Options

- Valve between condenser and rotary vane vacuum pump
- Pressure gauge for checking the condensate pressure
- Solenoid valves at the receiver
- Receiver with proximity switch for monitoring the condensate level
- Electric control for automatic operation of the pump system
- Mobile pallet with castors
- Cold water replacement for mobile applications

Technical Data, 50 Hz

		TVD 40	TVD 65	TVD 100	TVD 200
Condenser, effective surface area, approx.	m^2	1	2	3	5
Receiver, usable volume	l (qt)	30.0 (31.71)	50.0 (52.85)	50.0 (52.85)	50.0 (52.85)
Rotary vane vacuum pump	SOGEVAC	SV 40	SV 65	SV 100	SV 200
Nominal pumping speed	$m^3 \times h^{-1}$ (cfm)	46.0 (27.1)	65.0 (38.3)	100.0 (58.9)	180.0 (106.0)
Pumping speed at 50 Hz					
for air	$m^3 \times h^{-1}$ (cfm)	46.0 (27.1)	53.0 (31.2)	94.0 (55.4)	170.0 (100.1)
for water vapor at 50 mbar (37.5 Torr)	$m^3 \times h^{-1}$ (cfm)	280.0 (165.0)	560.0 (330.0)	840.0 (495.0)	1400.0 (825.0)
Ultimate total pressure with standard gas ballast	mbar (Torr)	< 1.5 (< 1.1)	< 1.5 (< 1.1)	< 1.5 (< 1.1)	< 0.7 (< 0.53)
Noise level [1]	dB(A)	63	64	70	69
Condensing capacity for water	$l \times h^{-1}$	10	20	30	50
Installed motor power 400 V, 50 Hz	kW (hp)	1.1 (1.5)	1.5 (2.0)	2.2 (3.0)	4.0 (4.2)

[1] Operating at ultimate pressure with gas ballast

Technical Data, 50 Hz

		SV 40	SV 65	SV 100	SV 200
Weight (with oil filling), approx.	kg (lbs)	125 (276)	150 (331)	200 (441)	300 (662)
Oil filling	l (qt)	2.0 (2.11)	2.0 (2.11)	3.5 (3.70)	5.0 (5.29)
Connecting flanges					
Inlet port	DN_1	63 ISO-K	63 ISO-K	100 ISO-K	100 ISO-K
Outlet port	DN_2	1 1/4"	1 1/4"	2"	2"

Ordering Information

	TVD 40	TVD 65	TVD 100	TVD 200
	Part No.	Part No.	Part No.	Part No.
Pump system	021 01	021 02	021 03	021 04

Accessories for oil sealed and dry compressing Pump Systems

Sound Proofing

A sound proofing box is available as an optional extra so as to reduce the noise down to the permissible level.

Depending on the size of the pumping system, noise reductions between 15 and 20 dB(A) are obtained using our standard sound proofing arrangements.

Custom designs of the sound proofing box allow the noise level to be reduced by up to 35 dB(A).

RUTA RA 3001/S630F/G with sound proofing box

The maintenance side is designed as a door component. A window insert may be provided in the door or in the side walls to facilitate checking of the oil levels.

Ventilation is performed by means of an electric fan, the fresh air and exhaust ducts are located within the sound proofing box. Further optional extras which may be fitted include closed air circulation with integrated, water-cooled heat exchanger and a connection port for a central exhaust system.

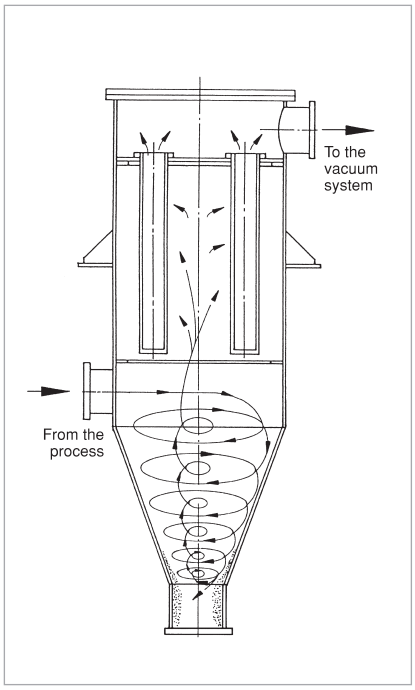
Isolation against Vibrations

RUTA vacuum pump systems produce only slight vibrations. To reduce these vibrations even further, vibration absorbers can be fitted under the pump system.

Dust Separators

Vacuum processes where large amounts of particles or dusts are contributed by the process require special devices to protect the vacuum pumps.

Leybold has developed – even for high flow rate applications – special dust separators, which can be installed ahead of the intake of the RUTA vacuum pump systems. The dust separators have two stages. The first stage is a cyclone that collects dust particles of coarse and medium size, the fine dust are trapped in filter elements. Dust separators are customdesigned for the specific process and the required pumping speed.



Diagrammatic section through a dust separator

Dust Filter without Cyclone

See further down in this chapter.

Filtering surface	m^2	0.2	0.5	1.0	2.0	3.0	5.0
suitable for pumping speeds							
min.	$m^3 \times h^{-1}$ (cfm)	100 (58.9)	300 (176.7)	600 (353.4)	1000 (589)	1500 (883.5)	3000 (1767)
max.	$m^3 \times h^{-1}$ (cfm)	300 (176.7)	800 (471.2)	1500 (883.5)	3000 (1767)	4000 (2356)	8000 (4712)
Reduction of pumping speed at							
≤ 1 mbar (< 0.75 Torr)	%	11	11	11	11	11	11
≤ 6 mbar (< 4.5 Torr)	%	9	9	9	9	9	9
≤ 20 mbar (< 15 Torr)	%	5	5	5	5	5	5
without dust load							

Frequency converter RUVATRONIC RT 5

The electronic frequency inverters RUVATRONIC RT 5/251 to 5/16000 have been designed specially for use in connection with Leybold Roots pumps of the RUVAC type.
For each Roots vacuum pump size, a matching frequency converter is available.

The main characteristics of the RUVATRONIC RT 5 are:

Simulation of a pressure equalization line

The software of the frequency inverters is adapted to each pump and ensures that the risk of mechanically overloading the pump can be excluded. In the case of too high pressure differences, the rotational speed will be decreased automatically until the load is reduced to within the pump's limits.

RUVAC Roots vacuum pumps of the types WA, WS and RA (without pressure equalization line) can be switched on together with the forepump at atmospheric pressure. Through this, the pumpdown time can be reduced drastically.
The minimum pumping speed of the backing pump needs to be considered in this case.

Pump	Required pumping speed for the backing pump
WA/WS 251	50 m^3/h (29 cfm)
WA/WS 501	100 m^3/h (59 cfm)
WA/WS 1001	200 m^3/h (118 cfm)
WA/WS 2001	410 m^3/h (241 cfm)
RA 3001	650 m^3/h (383 cfm)
RA 5001	930 m^3/h (547 cfm)
RA 7001	1250 m^3/h (736 cfm)
RA 9001	3240 m^3/h (1907 cfm)

Operation at up to 3 predefined speeds
Via floating contacts, the pump can be operated at one of the 3 predefined speeds. Switching over to another pre-defined speed is possible during operation.

Operation at any rotational speed
With a 0 to 10 V signal, any speed can be pre-defined to operate the pump between the minimum and maximum rotational speed. The software reliably ensures that the rotational speed cannot drop below the minimum speed or exceed the maximum speed.

Increase in the pumping speed
By operating the Roots vacuum pumps at frequencies over 50 Hz, the nominal pumping speed of the pumps can be increased. Depending on the type of pump, an increase between 20 and 100% is possible.

Note
Please enquire about possible application limitations (process dependent).

Electric Controller

In order to drive all electrical appliances within the pump systems, the pump systems may be equipped with standard control cabinets which contain:

- Motor protection switch (rated for the pumps used in each case)
- Contactors
- Main switch interlocked in accordance with VDE 0113
- Relays for necessary control/ sub-systems
- ON/OFF push-button for each pump
- Power supply for the installed monitoring facilities
- Fault indicators arranged on a lamp panel
- Switch-over (through an external contact) from local to remote operation.

The control cabinet may be fitted either to the frame of the pump system or it may be wallmounted.

Beside the standard systems, we manufacture control systems for much more complex systems:

- Remote control module as a 19" rack module (1/4 width, 3 HU). The start/stop push-buttons and the related indicators for operation and fault are located on the front panel
- Pre- and post-operation control
- Pressure dependant control
- Time-dependant control
- Program control
- Control for explosion hazard areas
- Combinations of the aforementioned versions
- Programmable control (PC)
- Vacuum gauge with pressure readout in the control cabinet.

Pressure Control

Basically there are several ways in which to control the pressure.

The equipment which is supplied as standard for the **DOWNSTREAM** or **BYPASS** control systems selected by Leybold consists of:

- Pressure measurement
- Controller with control unit
- Control valve with position indicator
- Engineering.

The **Downstream Control System** throttles the pumping speed of the vacuum pump by changing the conductance of the valve.

The advantages offered by this arrangement are:

- No supply of other gases
- Closed system
- The intake pressure of the pump system is lower than its operating pressure (thus saving energy, among other things).

The second method is the **Bypass Control System**. Here the pressure is maintained at a constant level by admitting an additional quantity of gas.

The advantages offered by this arrangement are:

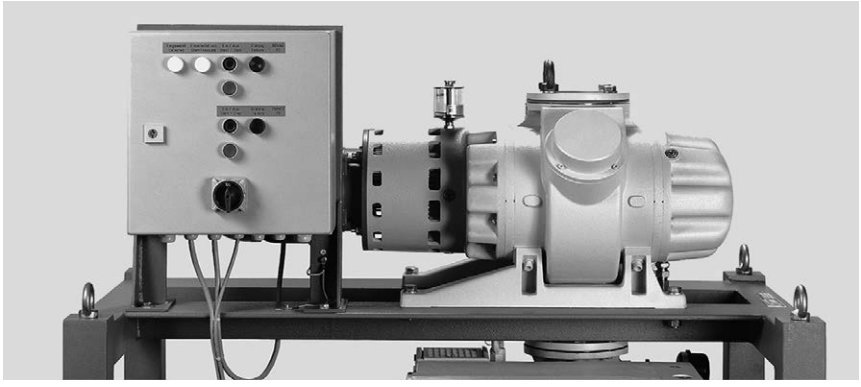
- Simple design
- Much smaller valve
- No reduction of the intermediate pressure within the pump.

In order to design a pressure control system we need the following information:

- Amount of gas
- Type of gas
- Pressure
- Length of the piping
- Type of auxiliary energy (electric/ pneumatic)
- Explosion protection required yes/no.

Additional complex control arrangements are available, for example with:

- Adjustable pressure characteristic
- Adjustable timing
- Speed control
- Combination with other control facilities.



Control panel on RUTA WAU1001/SV200/G

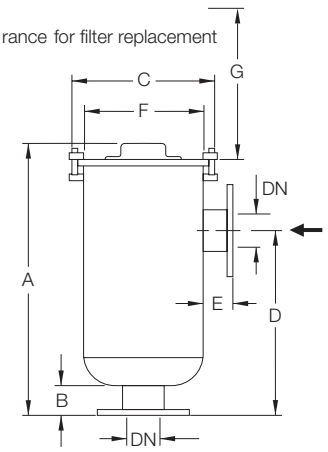
Dust Filter F-xxx-C

The highly efficient dust filters F-xxx-C are fitted to the inlet of the RUVAC pumps. The filter protects the Roots vacuum pumps against the intake of dust.

The dust filters are equipped with an easy to replace filter element. In the case of the filters F-1001-C or larger, the gas enters into the housing above the filter element. Thus the likelihood of puncturing the filter is reduced.

In the case of the dust filter F-501-C, the filter element is protected by a baffle.

All vacuum dust filters are rated for pressures up to 1200 mbar (900 Torr) abs. max.



Type		DN	A	B	ø C	D	E	F	G
F-501-C	mm	65 [1]	312	76	222	185	76	195	235
	in.		12.28	2.99	8.74	7.28	2.99	7.68	9.25
F-1001-C	mm	100 [1]	692	76	356	470	74	310	381
	in.		27.24	2.99	14.02	18.50	2.91	12.20	15.00
F-2001-C	mm	150 [1]	740	102	470	521	102	406	254
	in.		29.13	4.02	18.50	20.51	4.02	15.98	10.00
F-2001-C plus	mm	150 [1]	740	102	470	521	99	413	508
	in.		29.13	4.02	18.50	20.51	3.90	16.26	20.00
F-5001-C	mm	200 [2]	1031	102	572	648	103	505	508
	in.		40.59	4.02	22.52	25.51	4.02	19.88	20.00
F-7001-C	mm	250 [2]	1454	102	686	1143	99	616	838
	in.		57.24	4.02	27.01	45.00	3.90	24.33	32.99
F-9001-C	mm	300 [2]	1454	102	686	1143	99	616	838
	in.		57.24	4.02	27.01	45.00	3.90	24.33	32.99
F-13001-C	mm	300 [2]	1784	102	686	1448	99	616	635
	in.		70.24	4.02	27.01	57.01	3.90	24.33	25.00

[1] The hole pattern corresponds to PN 6 and may be connected by using collar flanges to ISO-K components

[2] The hole pattern corresponds to PN 10

Dimensional drawing for the dust filters F-xxx-C

Technical Data

Dust Filter F-xxx-C

		Polyester filter cartridge	Paper filter cartridge
Separation at 10 µm	%	> 99.9	–
Separation at 5 µm	%	> 99	> 99.9
Separation at 2 µm	%	–	> 99
Temperature	°C (°F)	-25 to +100 (-13 to +212)	-25 to +100 (-13 to +212)
Dust filter for			
WA/WS/WAU/WSU 501		F-501-C	F-501-C
WA/WS/WAU/WSU 1001, WH 700		F-1001-C	F-1001-C
WA/WS/WAU/WSU 2001, WH 2500		F-2001-C / F-2001-C plus	F-2001-C / F-2001-C plus
RA 3001, RA 5001, WH 4400, WH 7000		F-5001-C	F-5001-C
RA 7001		F-7001-C	F-7001-C
RA 9001		F-9001-C	F-9001-C
RA 13000		F-13001-C	F-13001-C

Technical Data

Dust Filter

		F-501-C	F-1001-C	F-2001-C	F-2001-C plus
Surface area, approx.					
Polyester	m^2	0.4	1.0	1.5	2.6
Paper	m^2	1.3	3.0	4.0	6.3
Weight, approx.	kg (lbs)	7.0 (15.45)	29.0 (64.02)	50.0 (110.38)	51.0 (112.58)

Technical Data

Dust Filter

		F-5001-C	F-7001-C	F-9001-C	F-13001-C
Surface area, approx.					
Polyester	m^2	4.5	9.0	9.0	14.0
Paper	m^2	11.5	26.0	26.0	37.0
Weight, approx.	kg (lbs)	83.0 (138.22)	171.0 (377.48)	171.0 (377.48)	209.0 (461.37)

Ordering Information

Dust Filter F-xxx-C

	Part No.	Part No.
Dust Filter	Polyester filter element	Paper filter element
F-501-C Replacement filter element FE-501-C	**500 001 403** **500 005 629**	**500 001 404** **500 005 630**
F-1001-C Replacement filter element FE-1001-C	**500 000 301** **500 000 313**	**500 000 302** **500 000 314**
F-2001-C Replacement filter element FE-2001-C	**500 000 303** **500 000 315**	**500 000 304** **500 000 316**
F-2001-C plus [1] Replacement filter element FE-2001-C plus	**500 001 367** **500 005 631**	**500 001 368** **500 005 632**
F-5001-C Replacement filter element FE-5001-C	**500 000 305** **500 000 317**	**500 000 306** **500 000 318**
F-7001-C Replacement filter element FE-7001/9001-C	**500 000 307** **500 000 319**	**500 000 308** **500 000 320** (2 pieces are required)
F-9001-C Replacement filter element FE-7001/9001-C	**500 000 309** **500 000 319**	**500 000 310** **500 000 320** (2 pieces are required)
F-13001-C Replacement filter element FE-13001-C	**500 000 311** **500 000 321** (2 pieces are required)	**500 000 312** **500 000 322** (2 pieces are required)

[1] For increased quantities of dust

Bellows with Vibration Absorbers

Bellows with vibration absorbers

The bellows serve the purpose of connecting pipes to vacuum pumps without introducing any mechanical tensions.

Technical Data

		Bellows with Vibration Absorbers		
		KIT DN 63 ISO-K	KIT DN 100 ISO-K	KIT DN 160 ISO-K
Length	mm (in.)	132 (5.20)	132 (5.20)	150 (5.91)
Lateral movement, max.	mm (in.)	7.5 (0.30)	9.5 (0.37)	3.5 (0.14)
Axial movement, max.	mm (in.)	20 (0.79)	28 (1.10)	22 (0.87)

Ordering Information

		Bellows with Vibration Absorbers		
		KIT DN 63 ISO-K	KIT DN 100 ISO-K	KIT DN 160 ISO-K
		Part No.	Part No.	Part No.
Bellows with vibration absorbers consisting of		503 189 V001	503 189 V002	503 189 V003
Bellows	Quantity	1	1	1
Centering ring	Quantity	2	2	2
Clamp (set of 4 pieces)	Quantity	2	2	2
Support bracket	Quantity	4	8	8
Rubber/metal absorber	Quantity	2	4	4
Hexagon nut M 12	Quantity	12	24	24
Threaded rod M 12				
105 mm long	Quantity	4	8	8
Washer	Quantity	12	24	24

Technical Data

		Bellows with Vibration Absorbers		
		KIT DN 200 ISO-K	KIT DN 250 ISO-K	KIT DN 320 ISO-K
Length	mm (in.)	150 (5.91)	200 (7.87)	250 (9.84)
Lateral movement, max.	mm (in.)	3.5 (0.14)	4.5 (0.18)	4.5 (0.18)
Axial movement, max.	mm (in.)	20 (0.79)	30	50

Ordering Information

		Bellows with Vibration Absorbers		
		KIT DN 200 ISO-K	KIT DN 250 ISO-K	KIT DN 320 ISO-K
		Part No.	Part No.	Part No.
Bellows with vibration absorbers consisting of		503 189 V004	503 189 V005	503 189 V006
Bellows	Quantity	1	1	1
Centering ring	Quantity	2	2	2
Clamp (set of 4 pieces)	Quantity	3	3	4
Support bracket	Quantity	12	12	16
Rubber/metal absorber	Quantity	6	6	8
Hexagon nut M 12	Quantity	36	36	48
Threaded rod M 12				
90 mm long	Quantity	12	12	–
105 mm long	Quantity	–	–	16
Washer	Quantity	36	36	48

Bus Interfaces for Monitoring

Wi-Fi and Profibus interface kit for SP-GUARD

Bus interfaces for remote reading of the SP-GUARD monitoring system for the screw pumps SCREWLINE SP 250 and SP 630.
Item can be ordered as retrofit kit or together with the pump unit.

Advantages to the User

- Interface box for assembly on screw pump SCREWLINE SP 250 and SP 630
- Read out of vibration levels, oil temperatures, warning and failure functions
- The interface box is mounted next to the SP-GUARD
- Interface box needs a 24 V DC supply on-site (24 V DC supply of the SP-GUARD can be used)

Available Interfaces

- Profibus
- Wi-Fi

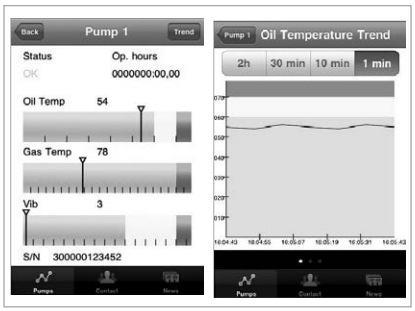
Further interfaces upon request:

- Profinet
- DeviceNet
- Ethernet
- CAN bus
- Interbus
- etc.

Ordering Information

Interface Kit SP-GUARD

	Part No.
Interface kit SP-GUARD Profibus	**502 898 V001**
Profibus kit and Wi-Fi with iPhone for SP-GUARD	**503 264 V901**
Profibus interface kit and Wi-Fi for SP-GUARD	**503 183 V901**
SCREWLINE SP 630 screw pump with Profibus interface	**502 899 V001**
Further combinations	**upon request**



Various indications on the mobile equipment

Profibus interface kit for SP-GUARD

Smart phone / tablet PC for readout (Wi-Fi)

Miscellaneous to oil sealed and dry compressing Pump Systems

Checklist for Inquiries

To Leybold GmbH

Dept. Systems

Fax: +49 (0)221/347 - 31206

e-Mail:
vacuum.solutions@leybold.com

From company: _____

Name/Department: _____

Phone: _____ Date: _____

Fax: _____ First page of: _____

MAKE USE OF OUR KNOW-HOW !

Simply fax the completed checklist to us. Our engineers will design a pump system which exactly matches your requirements. You will receive an offer shortly.

1. **In what kind of application will the pump system be used (e.g. drying, distillation)?**

_____

_____

_____

2. **Is the process run**

❑ continuously ❑ in batches:

_____

_____

_____

3. **What is the volume of the vacuum chamber?**

_____ m^3

_____

4. **What pump-down times are required/desired?**

_____ $min^3 \times h^{-1}$

_____

5. **What operating pressures are planned?**

_____ mbar

_____

6. **How high is the ambient temperature?**

- when installed in the building:

min. _____ °C / max. _____ °C

- when installed out in the open

min. _____ °C / max. _____ °C

7. **How high is the intake temperature?**

_____ °C

8. **What is the composition of the gas which is to be pumped.**

Designation:

a) _____ b) _____

c) _____ d) _____

e) _____ f) _____

9. **Quantity (kg/h or Nm^3/h), traces (%):**

a) _____ b) _____

c) _____ d) _____

e) _____ f) _____

10. **In case of materials not commonly listed in the tables please state:**

a) Molecular mass _____

b) Thermal capacity _____

c) Vapor pressure _____

d) Viscosity _____

e) Melting point _____

f) Special characteristics _____

11. **Must explosion hazard regulations be observed?**

❑ yes ❑ no

if yes, which? _____

_____

_____

12. **What kind of electrical supplies are available?**

a) Voltage _____

b) Frequency _____

13. **What kind of mechanical connection specifications are planned?**

a) Length of the intake line

_____

b) Diameter of the intake line

_____

14. **Which cooling media are available (water, brine, etc.)? Which temperature?**

_____ min. _____ °C

_____ max. _____ °C

General
to High Vacuum Pump Systems TMP

The requirements of production or research engineers concerning the vacuum technology they have to employ are usually widely different. In most cases pumping speed and operating pressure must be accurately matched to suit a particular process. The wide range of vacuum pumps and standard accessories available offers many options.

Sometimes it is just this flexibility which causes difficulties when having to decide between the various configurations of a particular pump system. Based on our experience and by listening to our customers' demands, we have therefore compiled a range of turn-key vacuum systems based on standard components.

Before leaving the factory they are subjected to both functional tests and leak tests. By adding components from our standard range or special of accessories they may be easily adapted to meet specific requirements.

Application and Accessories

Pump systems	PT 50	PT 151 / PT 361	PT 50 KIT	PT 151 KIT	PT 361 KIT	PT 80 DRY	PT 80 H DRY	TURBOLAB 80	TURBOLAB 350	TURBOLAB 450	PT 151 DRY	PT 361 DRY	PT 300 DRY
Application													
Microbalances	■	■	■	■	■	■	■	■	■	■	■	■	■
Sputtering	■	■	■	■	■	■	■	■	■	■	■	■	■
Spectroscopy	■	■	■	■	■	■	■	■	■	■	■	■	■
Production of TV and monitor picture tubes	■	■	■	■	■	■	■	■	■	■	■	■	■
Surface refining	■	■	■	■	■	■	■	■	■	■	■	■	■
Evaporation coating systems	■	■	■	■	■	■	■	■	■	■	■	■	■
Beam guidance systems	■	■	■	■	■	■	■	■	■	■	■	■	■
Laboratory pump systems	■	■	■	■	■	■	■	■	■	■	■	■	■
Accessories													
Control unit for turbomolecular pump systems	■	■				■	■				■	■	■
Air cooling unit	■	■	■	■	■	▲	▲	■	■	■	■	■	▲
Flange heater	■	■	■	■	■	■	■	■	■	■	■	■	■
Venting valve	■	■	■	■	■	■	■	■	■	■	■	■	■
Power failure venting valve	■	■	■	■	■	■	■	■	■	■	■	■	■
Purge gas and venting valve		■		■	■	■	■	■			■	■	■
Adsorption traps with aluminium oxide insert	■	■	■	■	■								
Exhaust filter	■	■	■	■	■								
Water cooling unit	■	▲	■	▲	▲	■	■	■	■	■	▲	▲	■

■ Possible
▲ Included in standard scope of delivery

Oil Sealed Pump Systems
PT 50 Turbomolecular Pump System

Example: PT 50 with options (switch box, gauge)

The turbomolecular pump system PT 50 is a fully assembled and ready-to-operate high vacuum pump system benchtop unit for producing a high and ultra-high vacuum.

Advantages to the User

- Low ultimate pressure (< 10^{-8} mbar (< 0.75 x 10^{-8} Torr))
- High pumping speed of the backing pump
- High effective pumping speed
- Compact, small, rugged unit
- Simple to operate
- High level of reliability
- Maintenance-friendly design
- Air cooling
- For use worldwide
- Installation of standard vacuum components in an open frame
- Rugged table top unit which may also carry heavy assemblies
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- The high vacuum pump can be removed from the pump system (any installation orientation)
- CE approval

The turbomolecular pump system consists of the following principal components:

- Grease lubricated turbomolecular pump TURBOVAC 50 with ceramic ball bearings, convection cooling and splinter guard
- Electronic frequency converter NT 10
- Dual-stage, oil sealed rotary vane vacuum pump TRIVAC D 2,5 E as backing pump
- All required connecting and sealing components are located within the pump system assembly

- **Either with or without switchbox**
  - *With switchbox*
    The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (one measuring instrument and one power failure venting valve) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)
  - *Without switchbox*
    The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

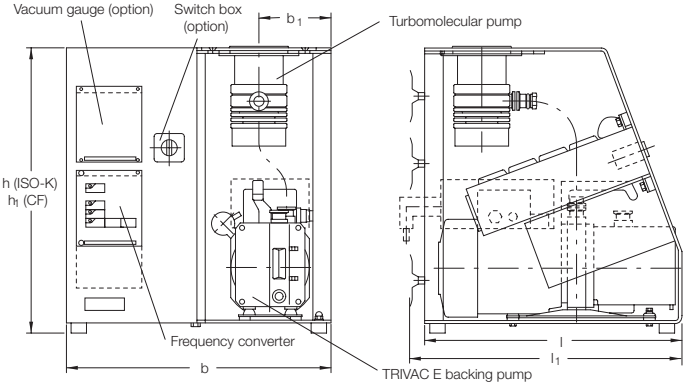
The pump system can be upgraded with further components, for example:

- Switchbox
- Vacuum gauge
- Power failure venting valve
- Air cooling unit
- Adsorption trap
- Exhaust filter
- Rotatable castors
- Venting valve
- Assembly on the intake side with manifold, valves, gauge heads etc.

Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems
- Production of gas Lasers

	h	h_1	b	b_1	l	l_1
mm	458	474	430	117.5	420	453
in.	18.03	18.66	16.93	4.63	16.54	17.84



Dimensional drawing for the PT 50 turbomolecular pump system

Technical Data

PT 50

Turbomolecular pump		TURBOVAC 50	TURBOVAC 50	TURBOVAC 50
High vacuum connection	DN	40 ISO-KF	63 ISO-K	63 CF
Pumping speed for N_2	l x s^{-1}	33	55	55
Compression for N_2 / H_2		2 x 10^7 / 10^2	2 x 10^7 / 10^2	2 x 10^7 / 10^2
Speed of the TURBOVAC	rpm	72 000	72 000	72 000
Dual-stage rotary vane vacuum pump		TRIVAC D 2,5 E	TRIVAC D 2,5 E	TRIVAC D 2,5 E
Nominal pumping speed acc. to PNEUROP	m^3 x h^{-1} (cfm)	2.7 (1.6)	2.7 (1.6)	2.7 (1.6)
Ultimate total pressure	mbar (Torr)	10^{-3} (0.75×10^{-3})	10^{-3} (0.75×10^{-3})	10^{-3} (0.75×10^{-3})
Attainable ultimate pressure with FPM (FKM) gasket	mbar (Torr)	10^{-7} (0.75×10^{-7})	10^{-7} (0.75×10^{-7})	10^{-7} (0.75×10^{-7})
CF version with aluminum or Cu gasket	mbar (Torr)	–	–	10^{-8} (0.75×10^{-8})
Main supply, 50/60 Hz	V	200-240 [1]	200-240 [1]	200-240 [1]
Power consumption, max.	VA	315	315	315
Dimensions (W x H x D)	mm (in.)	see dimensional drawing	see dimensional drawing	see dimensional drawing
Weight, approx.	kg (lbs)	27 (59.4)	27 (59.4)	27 (59.4)

Ordering Information

PT 50

	Part No.	Part No.	Part No.
PT 50 turbomolecular pump system, 230 V, 50 Hz [1]			
without switchbox, connection via 2 Schuko plugs			
DN 40 ISO-KF	**503265V001**	–	–
DN 63 ISO-K	–	**503266V001**	–
DN 63 CF	–	–	**503267V001**
with switchbox and mains cord with 1 Schuko plug			
DN 40 ISO-KF	**503265V002**	–	–
DN 63 ISO-K	–	**503266V002**	–
DN 63 CF	–	–	**503267V002**
Accessories			
Air cooling unit			
100 V	**800152V0015**	**800152V0015**	**800152V0015**
115 V	**854 06**	**854 06**	**854 06**
230 V	**854 05**	**854 05**	**854 05**
Water cooling unit (10 mm dia. hose nozzle)	**800135V003**	**800135V003**	**800135V003**
Flange heater			
DN 63 CF, 115 V	–	–	**854 07**
DN 63 CF, 230 V	–	–	**854 04**
Venting valve, DN 10 ISO-KF manually operated	**173 24**	**173 24**	**173 24**
Power failure venting valve, DN 10 ISO-KF 230 V, 50/60 Hz	**174 26** [2]	**174 26** [2]	**174 26** [2]
Adsorption trap, DN 16 ISO-KF	**854 14** [3]	**854 14** [3]	**854 14** [3]
Adsorbent 1.6 l	**854 10**	**854 10**	**854 10**
Exhaust filter AF 8	**190 50**	**190 50**	**190 50**
Mains cord for PT with switchbox			
US/Japan 230 V, 50/60 Hz	**200 81 141**	**200 81 141**	**200 81 141**
CH 230 V, 50/60 Hz	**200 81 099**	**200 81 099**	**200 81 099**
UK 230 V, 50/60 Hz	**200 81 097**	**200 81 097**	**200 81 097**
Connecting cable for operating the TURBOVAC outside the pump system			
3 m (7.0 ft)	**121 08**	**121 08**	**121 08**
5 m (17.5 ft)	**121 09**	**121 09**	**121 09**
10 m (35.0 ft)	**161 10**	**161 10**	**161 10**
20 m (70.0 ft)	**800150V2000**	**800150V2000**	**800150V2000**
Rotatable castors PT 50/80	**503227V901**	**503227V901**	**503227V901**

[1] Other voltages upon request

[2] Deliveries in the case of reorders are without connection cable

[3] Delivery without adsorbent, please order separately

PT 151/PT 361
Turbomolecular Pump Systems

Example: PT 151 with switch box

These turbomolecular pump systems are ready-to-operate vacuum units for generating a vacuum in the high and ultra-high vacuum range.

When pumping aggressive or abrasive process gases, a purge gas facility must be used for the pumps.

Advantages to the User

- Low ultimate pressure (< 10^{-10} mbar/Torr)
- High backing pump pumping speed
- High effective pumping speed
- Compact, mobile unit
- Simple to operate
- High level of reliability
- Venting port
- Purge gas port (only at C version)
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps (for barrier gas operation, for example)
- CE approval

The turbomolecular pump systems consists of the following principal components:

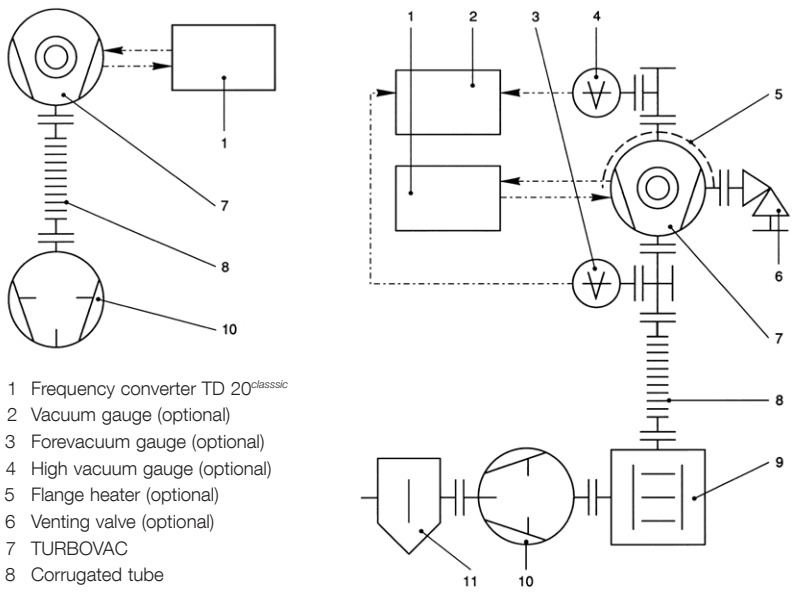
- Grease lubricated turbomolecular pump TURBOVAC 151 or 361 with splinter guard
- Electronic frequency converter TD 20*classic*
- Dual-stage, oil sealed TRIVAC D 4 B or D 16 B rotary vane vacuum pump as backing pump (further sizes upon request)
- All necessary connection and sealing components within the pump system
- **Either with or without switchbox**
  - *With switchbox*
    The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (Gauge, power failure venting valve, air cooler and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)
  - *Without switchbox*
    The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

Further components can be added to the pump systems, for example:

- Switch box
- Vacuum gauges (up to two)
- Adsorption trap
- Exhaust filter
- Air cooling unit
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve (only at C version)
- Intake arrangement with manifold, valves and vacuum gauges etc.

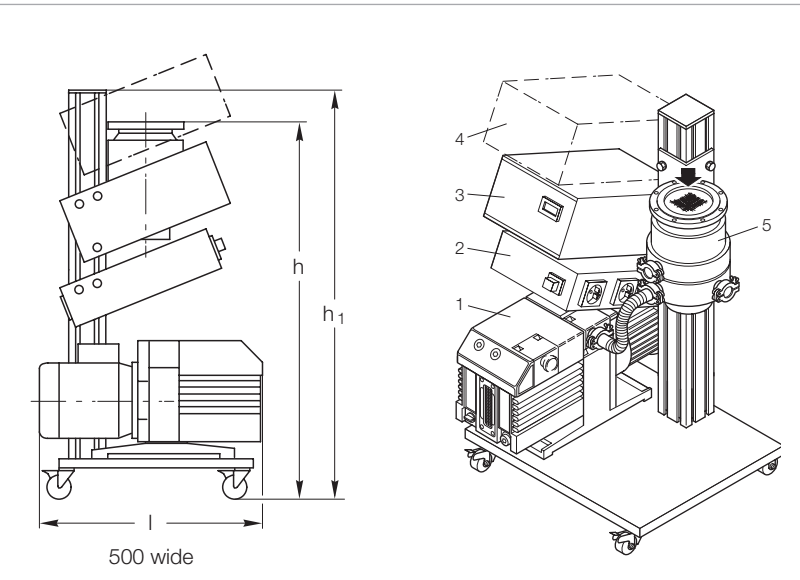
Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics



1 Frequency converter TD 20^{classsic}
2 Vacuum gauge (optional)
3 Forevacuum gauge (optional)
4 High vacuum gauge (optional)
5 Flange heater (optional)
6 Venting valve (optional)
7 TURBOVAC
8 Corrugated tube
9 Adsorption trap (optional)
10 TRIVAC backing pump
11 Exhaust filter (optional)

Vacuum diagram of the PT 151/PT 361 turbomolecular pump systems with rotary vane vacuum pump TRIVAC



1 TRIVAC backing pump
2 Switch box (option)
3 Frequency converter TD 20^{classsic}
4 Vacuum gauge (optional)
5 TURBOVAC

	h	h_1	l	wide
mm	800	890	506	500
in.	31.50	35.04	19.92	19.69

PT 151/PT 361 turbomolecular pump system with rotary vane vacuum pump TRIVAC

Technical Data

		PT 151		PT 361	
Turbomolecular pump		**TURBOVAC 151**	**TURBOVAC 151**	**TURBOVAC 361**	**TURBOVAC 361**
High vacuum connection	DN	100 ISO-K	100 CF	100 ISO-K	100 CF
Pumping speed for N_2	l x s^{-1}	145	145	345	345
Compression for N_2/H_2		1 x 10^9 / 8 x 10^2	1 x 10^9 / 8 x 10^2	1 x 10^9 / 3 x 10^3	1 x 10^9 / 3 x 10^3
Speed of the TURBOVAC	rpm	50 000	50 000	50 000	50 000
Dual-stage rotary vane vacuum pump		**TRIVAC D 4 B**	**TRIVAC D 4 B**	**TRIVAC D 16 B**	**TRIVAC D 16 B**
Nominal pumping speed (DIN 28 400)	m^3 x h^{-1} (cfm)	4.8 (2.83)	4.8 (2.83)	18.9 (11.13)	18.9 (11.13)
Exhaust connection	DN	16 ISO-KF	16 ISO-KF	25 ISO-KF	25 ISO-KF
Attainable ultimate pressure					
with FPM (FKM) gasket	mbar (Torr)	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})
with Cu seal	mbar (Torr)	–	10^{-10} (0.75×10^{-10})	–	10^{-10} (0.75×10^{-10})
Cooling water consumption	l/h	15-35	15-35	15-35	15-35
Cooling water connection, hose nozzle	mm (in.)	10 (0.39)	10 (0.39)	10 (0.39)	10 (0.39)
Power consumption, max.	VA	770	770	1150	1150
Mains supply 50/60 Hz	V	210-230 [1]	210-230 [1]	218-240 [1]	218-240 [1]
Dimensions (W x H x D)	mm (in.)	see dimensional drawing	see dimensional drawing	see dimensional drawing	see dimensional drawing
Weight, approx.	kg (lbs)	45 (99.2)	45 (99.2)	62 (136.7)	62 (136.7)

[1] Other voltages upon request

Ordering Information

PT 151

PT 361

	Part No.	Part No.	Part No.	Part No.
Turbomolecular pump system	100 ISO-K	100 CF	100 ISO-K	100 CF
230 V / 50 Hz [1], without switch box, Connection via 2 Schuko plugs				
with TRIVAC D 4 B	**503268V001**	**503269V001**	–	–
with TRIVAC D 16 B	–	–	**503270V001**	**503271V001**
230 V, 50 Hz [1], with switch box and mains cord with 1 Schuko plug				
with TRIVAC D 4 B	**503268V002**	**503269V002**	–	–
with TRIVAC D 16 B	–	–	**503270V002**	**503271V002**
Accessories				
Air cooling unit				
100 V	**800152V0016**	**800152V0016**	**800152V0016**	**800152V0016**
115 V	**894 08**	**894 08**	**894 08**	**894 08**
230 V	**855 31**	**855 31**	**855 31**	**855 31**
Flange heater, DN 100 CF				
115 V	–	**854 28**	–	**854 28**
230 V	–	**854 27**	–	**854 27**
Venting valve, DN 10 ISO-KF manually operated	**173 24**	**173 24**	**173 24**	**173 24**
Power failure venting valve normally open				
24 V DC, DN 16 ISO-KF	**800120V0021** [2]	**800120V0021** [2]	**800120V0021** [2]	**800120V0021** [2]
230 V, 50/60 Hz, DN 10 ISO-KF	**174 26** [2]	**174 26** [2]	**174 26** [2]	**174 26** [2]
Purge gas and venting valve, 100-230 V 0.4 mbar x l x s^{-1}	**800152V0014** [2]	**800152V0014** [2]	**800152V0014** [2]	**800152V0014** [2]
Filter adapter for gas connection G 1/4”	**800110V0012**	**800110V0012**	**800110V0012**	**800110V0012**
Replacement filter	**200 18 515**	**200 18 515**	**200 18 515**	**200 18 515**
Adsorption trap				
DN 16 ISO-KF	**854 14** [3]	**854 14** [3]	–	–
DN 25 ISO-KF	–	–	**854 15** [3]	**854 15** [3]
Adsorbent 1.6 l	**854 10**	**854 10**	**854 10**	**854 10**
Exhaust filter				
AF 4-8	**189 06**	**189 06**	–	–
AF 16-25	–	–	**189 11**	**189 11**
Mains cord for PT with switch box				
EURO 230 V, 50 Hz	**200 81 091**	**200 81 091**	**200 81 091**	**200 81 091**
CH 230 V, 50/60 Hz	**200 81 099**	**200 81 099**	**200 81 099**	**200 81 099**
UK 230 V, 50/60 Hz	**200 81 097**	**200 81 097**	**200 81 097**	**200 81 097**
US/Japan 230 V, 50/60 Hz	**200 81 141**	**200 81 141**	**200 81 141**	**200 81 141**
Control unit for turbomolecular pump systems (see Chapter “Accessories”)	**upon request**	**upon request**	**upon request**	**upon request**

[1] Other voltages upon request

[2] Deliveries in the case of reorders are without connection cable, purge gas only at C-versions

[3] Delivery without adsorbent, please order separately

Turbomolecular Pump Systems PT 50 KIT, PT 151 KIT, PT 361 KIT

Under the motto “Do-it-yourself and save money” you may assemble the turbomolecular pump systems PT 50 KIT, PT 151 KIT and PT 361 KIT yourself.

The turbomolecular pump systems PT 50 KIT, PT 151 KIT and PT 361 KIT are made of the same components as used for the turn-key systems:

- Base panel with column
- Turbomolecular pump TURBOVAC 50 (PT 50 KIT) or 151 or 361 (PT 151 KIT or PT 361 KIT)
- Rotary vane vacuum pump TRIVAC D 2,5 E (PT 50 KIT) or D 4 B or D 16 B (PT 151 KIT or PT 361 KIT)
- TURBOTRONIK NT 10 electronic frequency converter (PT 50 KIT) or NT 20 (PT 151 KIT and PT 361 KIT)
- All necessary mounting parts, connection parts and gaskets are supplied
- Switch box
- Simple and accurate assembly instructions
- Detailed exploded view
- Description which is easy to understand
- Additional detailed knowledge is gained about the product by assembling it yourself
- CE approval

The technical data, the areas of application and the design characteristics correspond to the turbomolecular pump systems PT 50, PT 151 and PT 361 described on the preceding pages.

Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems
- Production of gas lasers

PT 50 KIT

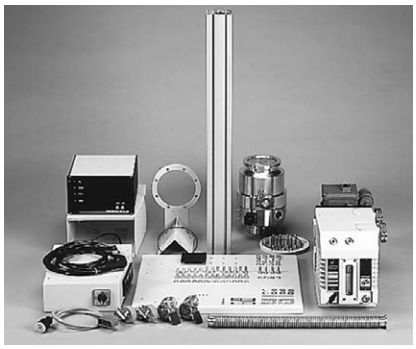
Unpacking, 15 minutes, approx.

After further 20 minutes

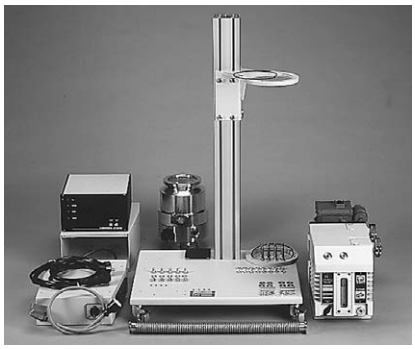
After further 20 minutes

After further 30 minutes

PT 151 KIT/PT 361 KIT



Unpacking, 15 minutes, approx.



After further 30 minutes

After further 30 minutes

After further 50 minutes

Ordering Information

	PT 50 KIT	PT 151 KIT	PT 361 KIT
	Part No.	**Part No.**	**Part No.**
PT 50 KIT turbomolecular pump system			
Air convection cooling			
200-240 V, 50/60 Hz			
DN 40 ISO-KF	**128 70**	–	–
DN 63 ISO-K	**128 71**	–	–
DN 63 CF	**128 73**	–	–
PT 151 KIT turbomolecular pump system, water-cooled			
210-230 V, 50/60 Hz			
DN 100 ISO-K	–	**128 74**	–
DN 100 CF	–	**128 75**	–
PT 361 KIT turbomolecular pump system, water-cooled			
218-240 V, 50/60 Hz			
DN 100 ISO-K	–	–	**128 76**
DN 100 CF	–	–	**128 78**
DN 160 ISO-K	–	–	**upon request**
DN 160 CF	–	–	**upon request**
Accessories			
Air cooling unit			
230 V	**854 05**	**855 31**	**855 31**
115 V	**854 06**	**894 08**	**894 08**
100 V	**800152V0015**	**800152V0016**	**800152V0016**
Water cooling unit for the TURBOVAC	**800135V0003**	–	–
Flange heater			
DN 63 CF, 230 V	**854 04**	–	–
DN 63 CF, 115 V	**854 07**	–	–
DN 100 CF, 230 V	–	**854 27**	**854 27**
DN 100 CF, 115 V	–	–	**854 28**
Adsorption trap			
DN 16 ISO-KF	**854 14**	**854 14**	–
DN 25 ISO-KF	–	–	**854 15**
Adsorbent 1.6 l	**854 10**	**854 10**	**854 10**
Exhaust filter			
AF 4-8	–	**189 06**	–
AF 8	**190 50**	–	–
AF 16-25	–	–	**189 11**
Venting valve, DN 10 ISO-KF			
manually operated	**173 24**	**173 24**	**173 24**
Purge gas and venting valve, 230 V			
0.2 mbar x l x s^{-1}	–	**855 19** [1]	**855 19** [1]
Power failure venting valve			
24 V DC, DN 16 ISO-KF	**800120V0021** [1]	**800120V0021** [1]	**800120V0021** [1]
230 V, 50/60 Hz, DN ISO 10 KF	**174 26** [1]	**174 26** [1]	**174 26** [1]
Mains cord			
US/Japan 230 V, 50/60 Hz	**200 81 141**	**200 81 141**	**200 81 141**
CH 230 V, 50/60 Hz	**200 81 099**	**200 81 099**	**200 81 099**
UK 230 V, 50/60 Hz	**200 81 097**	**200 81 097**	**200 81 097**
Connecting cable for operating the TURBOVAC outside the pump system			
3 m (7.0 ft)	**121 08**	–	–
5 m (17.5 ft)	**121 09**	**857 66**	**857 66**
10 m (35.0 ft)	–	**857 67**	**857 67**

[1] Delivery without connection cable, only with venting function

Dry Pump Systems

PT 80 DRY / PT 80 H DRY Turbomolecular Pump System

Example: PT 80 DRY with scroll pump and options (switchbox, measuring instrument, power failure venting valves and intake section)

The PT 80 DRY turbomolecular pump system is a fully assembled and ready-to-operate high vacuum system designed as a table top unit for producing a high and ultra-high vacuum free of hydrocarbons.

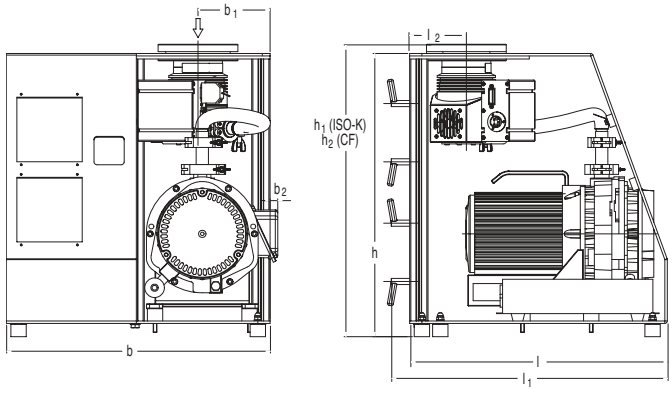
Advantages to the User

- Absolutely oil-free
- Low ultimate pressure free of hydrocarbons (10^{-8} mbar/Torr)
- High effective pumping speed
- Compact, small, rugged unit
- Simple operation
- High level of reliability
- Maintenance-friendly design
- Air cooling
- Installation of standard vacuum components in an open frame
- Service-friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- The high vacuum pump can be removed (installation in any orientation)

The turbomolecular pump system consists of the following principal components:

- SL 80/SL 80 H wide range turbomolecular pump system featuring
  - Integrated air cooling
  - Ceramic ball bearings
  - Grease lubrication
  - High vacuum connection: DN 63 ISO-K or DN 63 CF
  - Splinter guard at the intake flange
- Fequency converter with start/stop switch
- TURBO.POWER 300 power supply. The power supply supplies the frequency converter with 24 V DC
- Three-stage, absolutely oil-free DIVAC 1.4 HV3 diaphragm vacuum pump used as the backing pump respectively scroll pump SCROLLVAC SC 5D as the backing pump
- All required connection and sealing components are located within the pump system assembly

	b	b_1	b_2	h	h_1	h_2	l	l_1	l_2
mm	430	117.5	12.5	462	458	474	420	453	92.5
in.	16.93	4.63	0.49	18.19	18.03	18.66	16.54	17.84	3.64



Dimensional drawing for the PT 80 DRY/ PT 80 H DRY turbomolecular pump system

- **Either with or without switchbox**
  - *With switchbox*
    The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (one measuring instrument and one power failure venting valve) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting (see Ordering Information)
  - *Without switchbox*
    The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump system can be upgraded with further components, for example:

- Switchbox
- Vacuum gauge
- Power failure venting valve
- Rotatable castors
- Venting valve
- Seal gas valve
- Intake assembly with pipe manifold, valves, vacuum gauges etc.

Typical Applications

- Spectroscopy
- Valve manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems

Technical Data

Wide range turbomolecular pump		PT 80 H DRY TURBOVAC SL 80 H	PT 80 H DRY TURBOVAC SL 80 H	PT 80 DRY TURBOVAC SL 80	PT 80 DRY TURBOVAC SL 80
High vacuum connection	DN	63 ISO-K	63 CF	63 ISO-K	63 CF
Pumping speed for N_2	l x s^{-1}	65	65	65	65
Diaphragm pump		DIVAC 1.4 HV3	DIVAC 1.4 HV3	–	–
Pumping speed, approx.	m^3 x h^{-1} (cfm)	1.3 (0.77)	1.3 (0.77)	–	–
Ultimate pressure	mbar (Torr)	< 1.5 (1.13)	< 1.5 (1.13)	–	–
Scroll vacuum pump		–	–	SCROLLVAC SC 5 D	SCROLLVAC SC 5 D
Pumping speed, approx.	m^3 x h^{-1} (cfm)	–	–	5.4 (3.18)	5.4 (3.18)
Ultimate pressure	mbar (Torr)	–	–	< 0.05 (0.03)	< 0.05 (0.03)
Attainable ultimate pressure of the system	mbar (Torr)	10^{-7} (0.75×10^{-7})	10^{-8} (0.75×10^{-8})	10^{-7} (0.75×10^{-7})	10^{-8} (0.75×10^{-8})
Main supply, 50/60 Hz	V	100 - 230	100 - 230	200 - 230 [1]	200 - 230 [1]
Power consumption, max.					
with diaphragm vacuum pump	VA	420	420	–	–
with scroll vacuum pump	VA	–	–	450	450
Dimensions (W x H x D)	mm (in.)	see dimensional drawing	see dimensional drawing	see dimensional drawing	see dimensional drawing
Weight, approx.					
with diaphragm vacuum pump	kg (lbs)	20 (44.15)	20 (44.15)	–	–
with scroll vacuum pump	kg (lbs)	–	–	28 (61.6)	28 (61.6)

Ordering Information

	PT 80 H DRY Part No.	PT 80 H DRY Part No.	PT 80 DRY Part No.	PT 80 DRY Part No.
PT 80 (H) DRY turbomolecular pump system 230 V, 50 Hz, without switch box, Connection via 2 Schuko plugs				
with diaphragm vacuum pump	503272V001	503273V001	–	–
with scroll pump	–	–	503225V001	503226V001
with switch box and mains cord with 1 Schuko plug				
with diaphragm vacuum pump	503272V002	503273V002	–	–
with scroll vacuum pump	–	–	503225V002	503226V002
Accessories				
Mains adapter Schuko/US	200 11 119	200 11 119	–	–
Mains cord for PT with switch box				
EURO 230 V, 50 Hz	200 81 091	200 81 091	200 81 091	200 81 091
CH 230 V, 50/60 Hz	200 81 099	200 81 099	200 81 099	200 81 099
UK 230 V, 50/60 Hz	200 81 097	200 81 097	200 81 097	200 81 097
US/Japan 230 V, 50/60 Hz	200 81 141	200 81 141	200 81 141	200 81 141
US/Japan 115 V, 60 Hz	200 81 090	200 81 090	– [1]	– [1]
Connection adapter M8 / DN 10 ISO-KF	800110V0011	800110V0011	800110V0011	800110V0011
Power failure venting valve DN 10 ISO-KF 230 V, 50/60 Hz	174 26 [2]	174 26 [2]	174 26 [2]	174 26 [2]
Venting valve DN 10 ISO-KF manually operated	173 24	173 24	173 24	173 24
Purge gas and venting valve 100-230 V	800152V0014 [2]	800152V0014 [2]	800152V0014 [2]	800152V0014 [2]
Connecting cable for operating the TURBOVAC outside the pump system				
2.5 m (8.75 ft)	864 49	864 49	864 49	864 49
3.0 m (10.50 ft)	864 40	864 40	864 40	864 40
5.0 m (17.50 ft)	864 50	864 50	864 50	864 50
Rotatable castors PT 50/80	503227V901	503227V901	503227V901	503227V901

[1] Other voltages upon request

[2] Deliveries in the case of reorders are without connection cable

Turbomolecular Pump Systems TURBOLAB 80, 350, 450

Turbomolecular pump system TURBOLAB 350 (top left), TURBOLAB 80 (down left) and TURBOLAB 350 Cart (right)

This new smart TURBOLAB generation is built on one basic design platform with the opportunity to create three different variants.
Each version can be customized to individual needs regarding add-ons like vacuum measurement devices, a choice of accessories, e.g. valves and heaters.

Basic Equipment

Turbomolecular pump

TURBOVAC i models from 80 l/s to 450 l/s including frequency converter

Backing pump

Dry or oil-sealed, 1 m^3/h - 30 m^3/h, 24 V DC/110-230 V

Backlight display

Every TURBOLAB comes with the Turbo Pressure Unit TPU for control, configuration and monitoring of the pump system

Built-in support for accessories

- Purge
- Vent
- Air or water cooling unit
- Flange heaters
- Two pressure gauges (1000 mbar to 1 x 10^{-9} mbar)
- Foreline safety valve

Built-in webserver

- Condition monitoring
- Data analysis
- Software updates
- Control, monitor and configure your TURBOLAB system

Easily relocate pump

away from the frame and on your chamber

Remote control

via the X1 Interface

- Configurable X1 Digital/Analog I/O
- Start/Stop
- Error
- Warning
- Analog Output

Advantage to the User

- Enhanced pump performance
- Compact mobile design
- Small foot print
- Easy to relocate pumps out and away from the frame
- Backlight display (control/monitoring/configuration)
- Monitored data like frequency, temperature, current, pressure are automatically stored to a data log file in the TURBOLAB. Users easily view the log file with the TURBOLAB data viewer software tool which can be downloaded for free from the Leybold website or the last 512 data points can be viewed from the TURBOLAB data viewer in the web server
- Covering more applications with a full range of high vacuum and dry or wet forevacuum pumps to cover more high vacuum applications
- Benchmark turbostation offering dedicated ports for the connection of
  - six different accessories
  - two gauges
- Benchmark functionality, reliability and design
- Prepared for worldwide voltage coverage
- Price-to-performance ratio

Typical Applications

- Analytical Instruments
- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems

Options

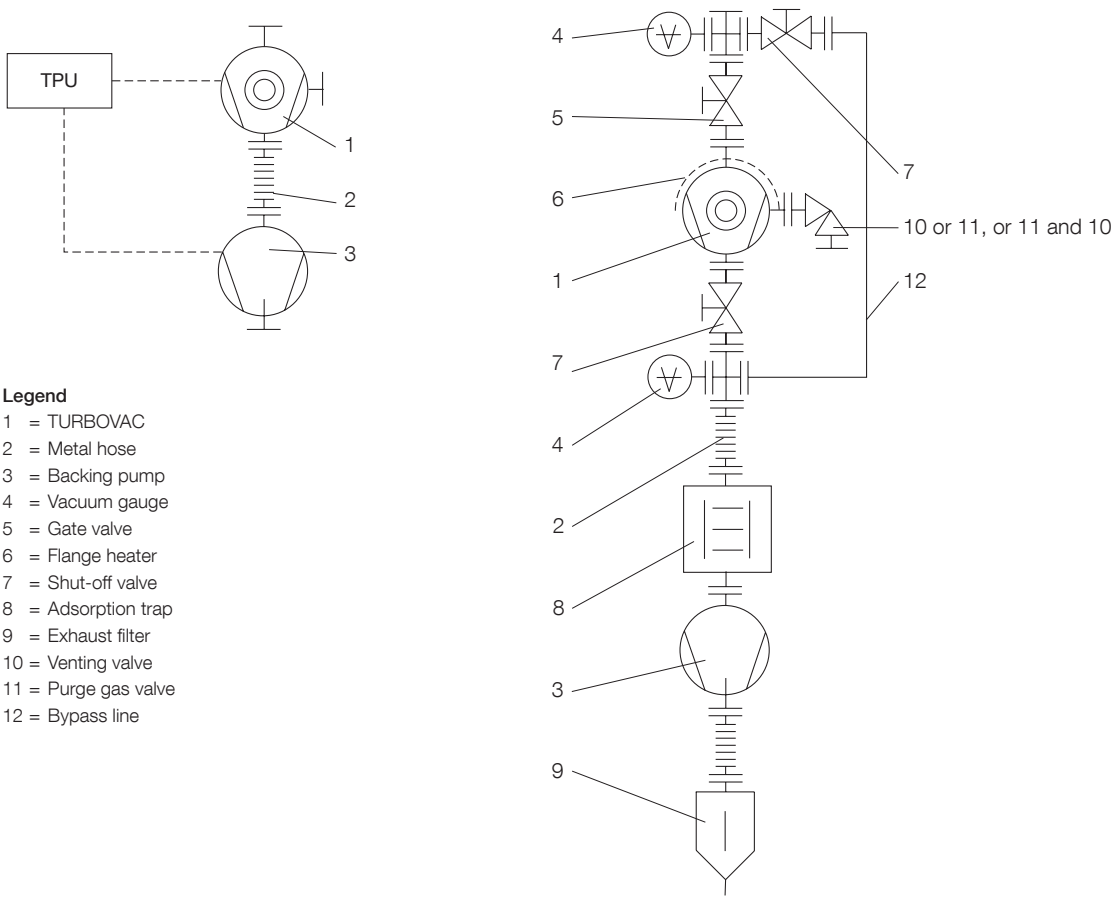
- Alternatively ISO-K or CF connection
- The Cart version comprises a base-plate, mounting column, castors or a benchtop frame with rubber feet
- Relocation kits available to relocate the pumps away from the frame and onto your chamber

The pump system can be upgraded with further components:

- Vacuum gauges: TTR 91 (N), TTR 101 (N), PTR 91 (N). Simultaneous operation of two gauges is possible
- Adsorption trap
- Exhaust filter
- Air cooling unit
- Water cooling unit
- Flange heater
- Venting valve
- Purge gas valve
- Foreline venting valve
- Vacuum safety valve SECUVAC DN 15/25/40 ISO-KF

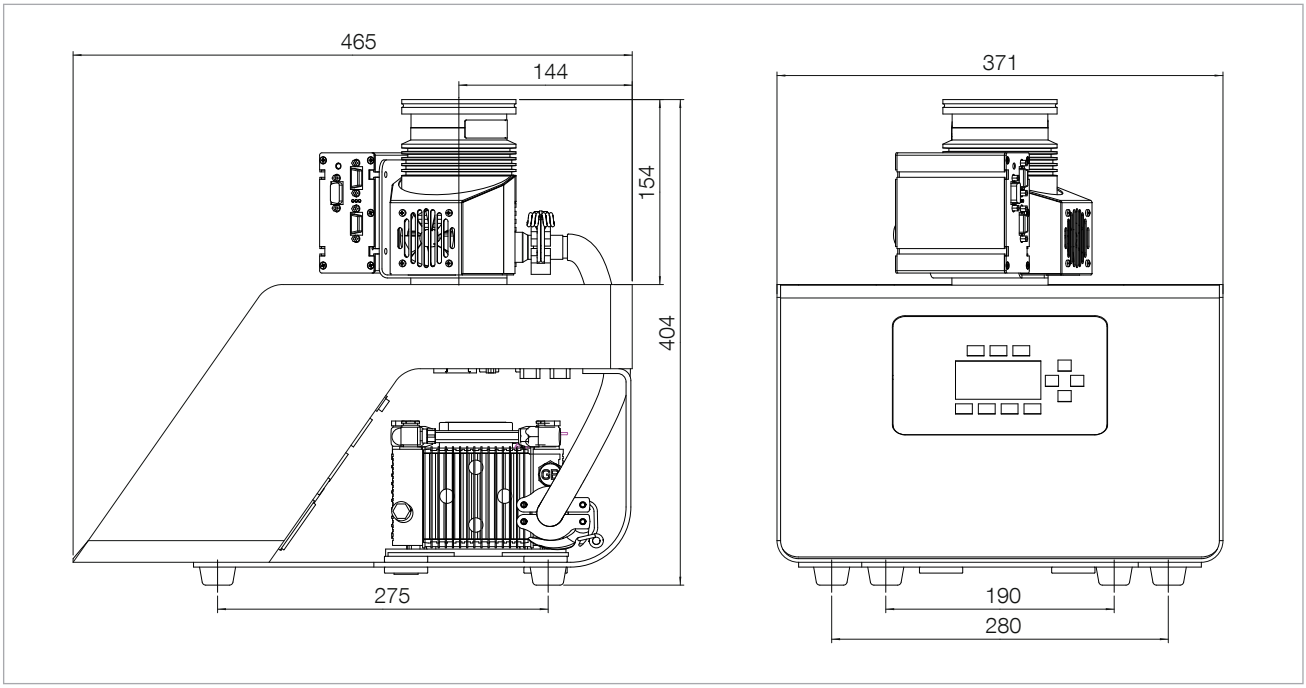
Scope of delivery

- Transport lock at the high vacuum flange by way of a Plexiglas disc
- Covering caps for the threads of the transport lock
- Exhaust side: centering ring and clamping ring
- Documentation
- The TRIVAC and SOGEVAC are filled with LVO oil

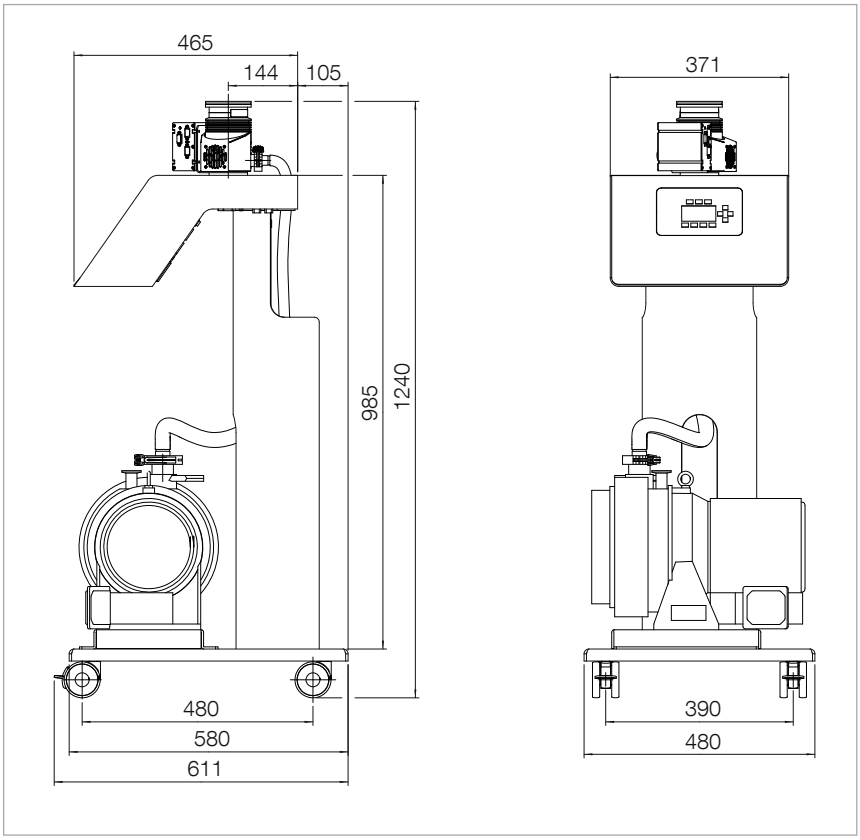


Legend
1 = TURBOVAC
2 = Metal hose
3 = Backing pump
4 = Vacuum gauge
5 = Gate valve
6 = Flange heater
7 = Shut-off valve
8 = Adsorption trap
9 = Exhaust filter
10 = Venting valve
11 = Purge gas valve
12 = Bypass line

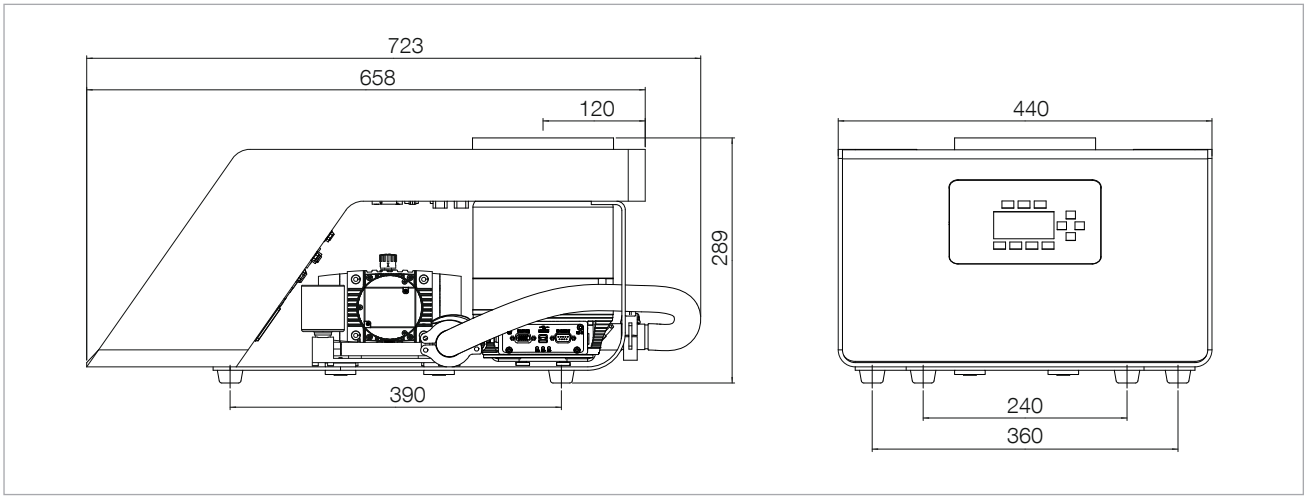
Schematic diagram of the turbomolecular pump systems TURBOLAB (left basic version, right equipment with accessories (TPU not shown)



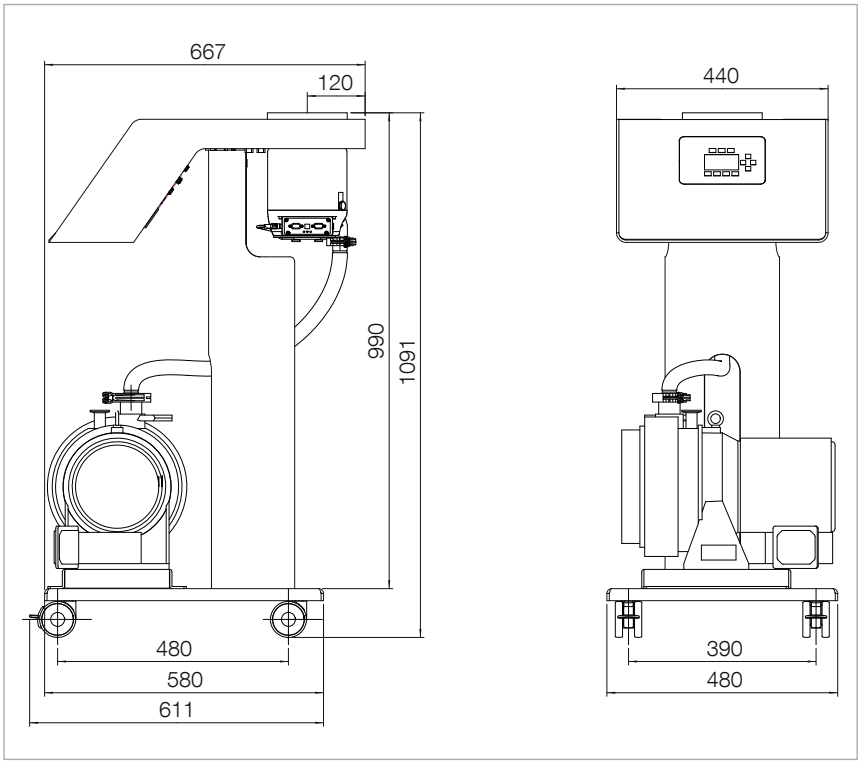
Dimensional drawing TURBOLAB 80, dimensions in mm



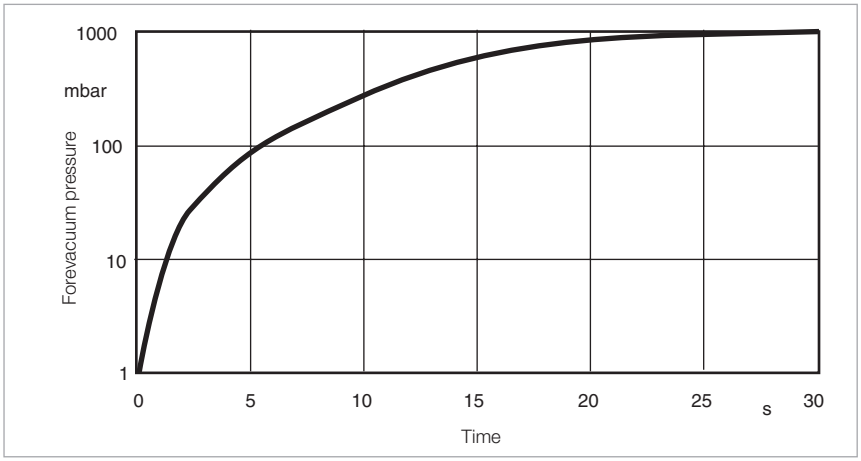
Dimensional drawing TURBOLAB 80 Cart, dimensions in mm



Dimensional drawing TURBOLAB 350/450, dimensions in mm



Dimensional drawing TURBOLAB 350/450 Cart, dimensions in mm



Maximum rise in pressure

Technical Data
Pump system

		TURBOLAB 80		TURBOLAB 350		TURBOLAB 450	
Inlet flange	DN	63 ISO-K	63 CF	100 ISO-K	100 CF	160 ISO-K	160 CF
Forevacuum connection	DN	16 ISO-KF		25 ISO-KF		25 ISO-KF	
Pumping speed	$l \cdot s^{-1}$	65		290		430	
Ultimate pressure	mbar	10^{-7}	10^{-7}	10^{-8}	10^{-10}	10^{-8}	10^{-10}
Mains Supply 50/60 Hz	V AC	110 ± 10%	230 ± 10%	110 ± 10%	230 ± 10%	110 ± 10%	230 ± 10%
Power consumption, max.	VA	1760	3680	1760	3680	1760	3680
Weight (ISO-KF / CF) Table top unit Cart	kg	 20 100		 35 110		 35 110	
Number of accessories, max.		6		6		6	
Number of gauges, max.		2		2		2	
CBM		Internal condition monitoring		Internal condition monitoring		Internal condition monitoring	
Software		Internal webserver (no software to install)		Internal webserver (no software to install)		Internal webserver (no software to install)	

Technical Data
Backing pumps

Diaphragm vacuum pump	DIVAC	0.8 T		3.0
Pumping speed	$m^3 \cdot s^{-1}$	0.7		3.0
Exhaust connection	DN	Silencer		Silencer
Noise level	dB(A)	49		54
Scroll vacuum pump	SCROLLVAC	SC 5 D	SC 15 D	SC 30 D
Pumping speed	$m^3 \cdot s^{-1}$	5.4	15.0	30.0
Exhaust connection	DN	16 ISO-KF	16 ISO-KF	25 ISO-KF
Noise level	dB(A)	52	58	62
Rotary vane vacuum pump	TRIVAC	D 4 B		D 8 B
Pumping speed	$m^3 \cdot s^{-1}$	4.8		9.7
Exhaust connection	DN	16 ISO-KF		16 ISO-KF
Noise level	dB(A)	52		52
Rotary vane vacuum pump	SOGEVAC	SV 16 D		
Pumping speed	$m^3 \cdot s^{-1}$	16.0		
Exhaust connection	G	1/2"		
Noise level	dB(A)	59		

Ordering Information

TURBOLAB 80

	Part. No.	Part. No.
Pump system with TURBOVAC SL 80 H and frequency converter TD 400	230 V, 50/60 Hz	110 V, 50/60 Hz
Table top unit with		
DIVAC 0.8 T		
DN 63 ISO-K	**501592V02000000**	
DN 63 CF	**501592V03000000**	
DIVAC 3.0		
DN 63 ISO-K	**501592V02001000**	
DN 63 CF	**501592V03001000**	
SCROLLVAC SV 5 D		
DN 63 ISO-K	**501592V02020000**	**501592V02030000**
DN 63 CF	**501592V03020000**	**501592V03030000**
SCROLLVAC SV 15 D		
DN 63 ISO-K	**501592V02040000**	**501592V02050000**
DN 63 CF	**501592V03040000**	**501592V03050000**
SCROLLVAC SV 30 D		
DN 63 ISO-K	**501592V02060000**	**501592V02070000**
DN 63 CF	**501592V03060000**	**501592V03070000**
TRIVAC D 4 B		
DN 63 ISO-K	**501592V02120000**	**501592V02080000**
DN 63 CF	**501592V03120000**	**501592V03080000**
TRIVAC D 8 B		
DN 63 ISO-K	**501592V02130000**	**501592V02090000**
DN 63 CF	**501592V03130000**	**501592V03090000**
SOGEVAC SV 16 D		
DN 63 ISO-K	**501592V02100000**	
DN 63 CF	**501592V03100000**	

Ordering Information

TURBOLAB 350

	Part. No.	Part. No.
Pump system with TURBOVAC 350 i	230 V, 50/60 Hz	110 V, 50/60 Hz
Table top unit with		
DIVAC 3.0		
DN 100 ISO-K	**501592V04001000**	
DN 100 CF	**501592V05001000**	
SCROLLVAC SV 5 D		
DN 100 ISO-K	**501592V04020000**	**501592V04030000**
DN 100 CF	**501592V05020000**	**501592V05030000**
SCROLLVAC SV 15 D		
DN 100 ISO-K	**501592V04040000**	**501592V04050000**
DN 100 CF	**501592V05040000**	**501592V05050000**
SCROLLVAC SV 30 D		
DN 100 ISO-K	**501592V04060000**	**501592V04070000**
DN 100 CF	**501592V05060000**	**501592V05070000**
TRIVAC D 4 B		
DN 100 ISO-K	**501592V04120000**	**501592V04080000**
DN 100 CF	**501592V05120000**	**501592V05080000**
TRIVAC D 8 B		
DN 100 ISO-K	**501592V04130000**	**501592V04090000**
DN 100 CF	**501592V05130000**	**501592V05090000**
SOGEVAC SV 16 D		
DN 100 ISO-K	**501592V04100000**	
DN 100 CF	**501592V05100000**	

Ordering Information

TURBOLAB 450

	Part. No.	Part. No.
Pump system with TURBOVAC 450 i	230 V, 50/60 Hz	110 V, 50/60 Hz
Table top unit with		
DIVAC 3.0		
DN 160 ISO-K	**501592V06001000**	
DN 160 CF	**501592V07001000**	
SCROLLVAC SV 5 D		
DN 160 ISO-K	**501592V06020000**	**501592V06030000**
DN 106 CF	**501592V07020000**	**501592V07030000**
SCROLLVAC SV 15 D		
DN 160 ISO-K	**501592V06040000**	**501592V06050000**
DN 160 CF	**501592V07040000**	**501592V07050000**
SCROLLVAC SV 30 D		
DN 160 ISO-K	**501592V06060000**	**501592V06070000**
DN 160 CF	**501592V07060000**	**501592V07070000**
TRIVAC D 4 B		
DN 160 ISO-K	**501592V06120000**	**501592V06080000**
DN 160 CF	**501592V07120000**	**501592V07080000**
TRIVAC D 8 B		
DN 160 ISO-K	**501592V06130000**	**501592V06090000**
DN 160 CF	**501592V07130000**	**501592V07090000**
SOGEVAC SV 16 D		
DN 160 ISO-K	**501592V06100000**	
DN 160 CF	**501592V07100000**	

Ordering Information

	TURBOLAB 80	TURBOLAB 350 / 450
	Part. No.	**Part. No.**
Accessories		
Mains cable TURBOLAB		
230 V, 5.0 m	**800103V0030**	**800103V0030**
110 V, 5.0 m	**800103V0031**	**800103V0031**
230 V, UK, 5,0 m	**800103V0037**	**800103V0037**
Accessory cable TURBOVAC i (air cooling & valve connection)		
M 8 - M 8, 0.3 m	**800103V0001**	**800103V0001**
M 8 - M 8, 2.0 m	**800110V0016**	**800110V0016**
Y cable TURBOVAC i, M 8	**800110V0020**	**800110V0020**
Start stop switch for connection to X1 Remote	**800110V0021**	**800110V0021**
USB cable 2.0, Type A/B, 1.8 m	**800110V0108**	**800110V0108**
Accessory cable TURBOLAB		
M 8 - M 8, 0.3 m (air cooling & valve connection)	**800103V0001**	**800103V0001**
M 8 - M 8, 5.0 m (air cooling & valve connection)	**800103V0003**	**800103V0003**
M 12 - M 12, 5.0 m (DIVAC 0.8, 3.0)	**800103V0005**	**800103V0005**
C13 - C14, 5.0 m (SOGEVAC)	**800103V0017**	**800103V0017**
C14 - NEMA, 5.0 m (SCROLLVAC 110 V)	**800103V0008**	**800103V0008**
C14 - Schuko, 5.0 m (SCROLLVAC 230 V)	**800103V0011**	**800103V0011**
C14 - C16-1 (230 V), 5.0 m (TRIVAC 230 V)	**800103V0014**	**800103V0014**
C14 - C16-1 (110 V), 5.0 m (TRIVAC 110 V)	**800103V0016**	**800103V0016**
Accessory cable TURBOLAB		
TURBOVAC i, 5.0 m (24 V DC voltage supply)	**–**	**800103V0020**
TD 400, 5.0 m (24 V DC voltage supply)	**800103V0023**	**–**
Communication TURBOLAB - TMP		
5.0 m	**800103V0029**	**800103V0029**
1.0 m	**800103V0027**	**800103V0027**
Mains cable backing pump TURBOLAB		
C13 - C14, 1.8 m	**800103V0015**	**800103V0015**
C14 - NEMA, 0.5 m	**800103V0006**	**800103V0006**
C14 - Schuko, 0.5 m	**800103V0009**	**800103V0009**
C14 - C16-1 (230 V), 1.8 m	**800103V0012**	**800103V0012**
C14 - C16-1 (110 V), 5.0 m	**800103V0013**	**800103V0013**
Mains cable		
TURBOLAB - TURBOVAC 350 i, 0.55 m	**–**	**800103V0018**
TURBOLAB - TD 400, 0.55 m	**800103V0021**	**–**
Connection cable Typ A		
1.5 m	**800103V0032**	**800103V0032**
5.0 m	**12426**	**12426**
Connection cable C14 - valve plug, 1,8 m (Control 110/230 V AC SECUVAC valve)	**800103V0033**	**800103V0033**
Connection cable C14 - valve plug, 5 m (Control 110/230 V AC SECUVAC valve)	**800103V0035**	**800103V0035**
Connection cable C14 - valve plug, 1,8 m (Control 24 V DC SECUVAC valve)	**800103V0034**	**800103V0034**
Connection cable C14 - valve plug, 5 m (Control 24 V DC SECUVAC valve)	**800103V0036**	**800103V0036**
LEYASSIST software for TMPs	**230439V01**	**230439V01**
Air cooling (incl. 4 screws M4x10, DIN 912)	**800136V0001**	**–**
Air cooling TURBOVAC 350/450 i radial	**–**	**800136V0005**
Water cooling TURBOVAC 350/450	**–**	**800135V0005**
Water cooling with G 1/8"connections (incl. 2 hose nipples G 1/8", outer Ø 8 mm for water hose, 2 sealing rings approx. 10x4x1, screws)	**800135V0001**	**–**

[1] For space reasons, when the frequency converter is installed at the side, only either the air-cooler or a purge gas valve can be connected

Ordering Information

TURBOLAB 80

TURBOLAB 350 / 450

	Part. No.	Part. No.
Accessories		
Venting valve 24 V DC, G 1/8"	–	800120V0012
Power failure venting valve 24 V DC, G 1/8"	–	800120V0022
Purge gas valve 24 V DC, G 1/8", 24 sccm	–	800120V0013
Purge gas throttle G 1/8", 24 sccm	–	800120V0014
Air filter for TMP G 1/8"	–	800110V0022
Purge gas and venting valve 0.4 mbar·l/s at 1 bar, 24 V DC DN 10 KF – G1/4"	800152V0013	–
Pump connection: Adapter M8 – DN-16-KF incl. O-Ring 9.25 x 1.78 and adapter centering ring DN 10/16 KF with sinter filter	800110V0011	–
Gas side connection: G1/4-in. adapter with filter Including O-ring and gasket	800110V0012	–
Connection cable: Accessory cable M8 – bare wire ends	800110V0017	–
Venting valve 24 V DC	800120V0011	–
Power failure venting valve 24 V DC	800120V0021	–
Spare filter	E 200 18 517	–
Flange heater		
DN 63 CF, 230 V	85404	–
DN 63 CF, 110 V	85407	–
DN 100 CF, 230 V	–	800137V0005
DN 100 CF, 115 V	–	800137V0006
DN 160 CF, 230 V	–	800137V0007
DN 160 CF, 115 V	–	800137V0008
Vibration absorber		
DN 100 ISO-K	–	800131V1100
other flange sizes	on request	on request
Centering ring		
with protection screen		
DN 100 ISO-K	–	800133V0021
DN 160 ISO-K	–	800133V0031
with splinter guard		
DN 100 ISO-K	–	800133V0022
DN 160 ISO-K	–	800133V0032
Splinter guard		
DN 63 ISO-K	E20017170	–
DN 63 CF	E20017171	–
DN 100 ISO-K (coarse)	–	800132V0101
DN 100 ISO-K (fine)	–	800132V0102
DN 100 CF (0.8 mm)	–	800132V0022
DN 160 CF (0.8 mm)	–	800132V0032
Protection screen		
DN 100 CF (3.2 mm)	–	800132V0021
DN 160 CF (3.2 mm)	–	800132V0031

[1] For space reasons, when the frequency converter is installed at the side, only either the air-cooler or a purge gas valve can be connected

PT 151 DRY / PT 361 DRY Turbomolecular Pump Systems

Example: PT 361 DRY with scroll pump and options (measuring instrument, forevacuum valve)

These turbomolecular pump systems are ready-to-operate vacuum units for generating a vacuum in the high and ultra-high vacuum range which is free of hydrocarbons.

When pumping aggressive or abrasive process gases, a purge gas facility must be used for the pumps.

Advantages to the User

- Low ultimate pressure free of hydrocarbons (< 10^{-10} mbar/Torr)
- High backing pump pumping speed
- High effective pumping speed
- Compact, mobile unit
- Simple to operate
- High level of reliability
- Venting port
- Purge gas port (only at C version)
- Service friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps (for barrier gas operation, for example)
- CE approval

The turbomolecular pump systems consists of the following principal components:

- Grease lubricated turbomolecular pump TURBOVAC 151 or 361 with splinter guard
- Electronic frequency converter TD 20*classic*
- Dry compressing scroll pump SCROLLVAC SC 15 D or SC 30 D (further sizes upon request)
- All necessary connection and sealing components within the pump system
- **Either with or without switchbox**
  - *With switchbox*
    The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (Gauge, power failure venting valve, air cooler and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting
  - *Without switchbox*
    The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump systems can be upgraded with further components,- for example:

- Switch box
- Vacuum gauges (up to two)
- Exhaust filter
- Air cooling unit
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve (only at C version)
- Intake arrangement with manifold, valves, vacuum gauges etc.

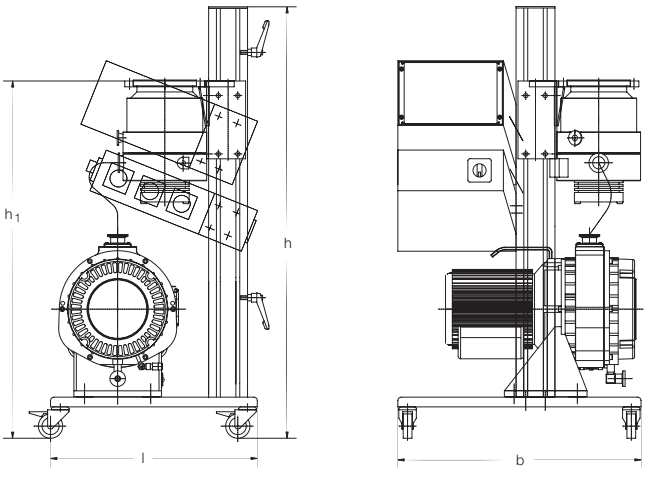
Typical Applications

- Spectroscopy
- Tube manufacturing
- Beam guidance systems
- Microbalances
- Sputtering and evaporation systems
- Surface physics

Technical Data

		PT 151 DRY		PT 361 DRY	
Turbomolecular pump	**TURBOVAC**	**151**	**151**	**361**	**361**
High vacuum connection	DN	100 ISO-K	100 CF	100 ISO-K	100 CF
Pumping speed for N_2	l x s^{-1}	145	145	345	345
Compression for N_2/H_2		> 10^9	8.5 x 10^2	> 10^9	3.5 x 10^3
Speed of the TURBOVAC	rpm	50 000	50 000	50 000	50 000
Scroll vacuum pump	**SCROLLVAC**	**SC 5 D**	**SC 5 D**	**SC 15 D**	**SC 15 D**
Nominal pumping speed (DIN 28 400)	m^3 x h^{-1} (cfm)	5.4 (3.18)	5.4 (3.18)	15.0 (8.83)	15.0 (8.83)
Exhaust connection	DN	16 ISO-KF	16 ISO-KF	25 ISO-KF	25 ISO-KF
Attainable ultimate pressure					
with FPM (FKM) gasket	mbar (Torr)	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})
with Cu seal	mbar (Torr)	–	10^{-10} (0.75×10^{-10})	–	10^{-10} (0.75×10^{-10})
Cooling water consumption	l/h	15-35	15-35	15-35	15-35
Cooling water connection, hose nozzle, outside dia.	mm (in.)	10 (0.39)	10 (0.39)	10 (0.39)	10 (0.39)
Power consumption, max.	VA	550	550	800	800
Mains supply 50/60 Hz	V	200-230 [1]	200-230 [1]	200-230 [1]	200-230 [1]
Dimensions (W x H x D)	mm (in.)	see dimensional drawing	see dimensional drawing	see dimensional drawing	see dimensional drawing
Weight, approx.	kg (lbs)	51 (112.6)	51 (112.6)	80 (176.6)	80 (176.6)

[1] Other voltages upon request



	h	h_1	b	l
mm	890	735	500	425
in.	35.04	28.94	19.69	16.73

Dimensional drawing for the PT 151 DRY / PT 361 DRY turbomolecular pump systems with scroll vacuum pump SCROLLVAC and optional switch box

Technical Data PT 151 DRY PT 361 DRY

	Part No.	Part No.	Part No.	Part No.
Turbomolecular pump system	100 ISO-K	100 CF	100 ISO-K	100 CF
230 V, 50 Hz [1], without switch box, connection via 2 Schuko plugs				
with SC 5 D	**503274V001**	**503275V001**	–	–
230 V, 50 Hz [1], with switch box and mains cord with 1 Schuko plug				
with SC 5 D	**503274V002**	**503275V002**	–	–
with SC 15 D	–	–	**503276V001**	**503277V001**
Accessories				
Air cooling unit				
100 V	**800152V0016**	**800152V0016**	**800152V0016**	**800152V0016**
115 V	**894 08**	**894 08**	**894 08**	**894 08**
230 V	**855 31**	**855 31**	**855 31**	**855 31**
Flange heater, DN 100 CF				
115 V	–	**854 28**	–	**854 28**
230 V	–	**854 27**	–	**854 27**
Venting valve, DN 10 ISO-KF				
manually operated	**173 24**	**173 24**	**173 24**	**173 24**
Power failure venting valve				
normally open				
24 V DC, DN 16 ISO-KF	**800120V0021** [2]	**800120V0021** [2]	**800120V0021** [2]	**800120V0021** [2]
230 V, 50/60 Hz, DN 10 ISO-KF	**174 26** [2]	**174 26** [2]	**174 26** [2]	**174 26** [2]
Purge gas and venting valve, 100-230 V				
0.4 mbar x l x s^{-1}	**800152V0014** [2]	**800152V0014** [2]	**800152V0014** [2]	**800152V0014** [2]
Filter adapter for gas connection G 1/4"	**800110V0012**	**800110V0012**	**800110V0012**	**800110V0012**
Replacement filter	**200 18 515**	**200 18 515**	**200 18 515**	**200 18 515**
Mains cord for PT with switch box				
EURO 230 V, 50 Hz	**200 81 091**	**200 81 091**	**200 81 091**	**200 81 091**
CH 230 V, 50/60 Hz	**200 81 099**	**200 81 099**	**200 81 099**	**200 81 099**
UK 230 V, 50/60 Hz	**200 81 097**	**200 81 097**	**200 81 097**	**200 81 097**
US/Japan 230 V, 50/60 Hz	**200 81 141**	**200 81 141**	**200 81 141**	**200 81 141**
Control unit for turbomolecular pump systems (see Chapter “Accessories”)	**upon request**	**upon request**	**upon request**	**upon request**

[1] Other voltages upon request

[2] Deliveries in the case of reorders are without connection cable, purge gas only at C-versions

Notes

PT 300 DRY Turbomolecular Pump System

Example: PT 300 DRY with switch box

The PT 300 DRY turbomolecular pump system is a fully assembled, ready-to-operate and mobile vacuum pump system which is based on a column design for processes which require hydrocarbon-free high and ultra-high vacuum.

Advantages to the User

- Absolutely oil-free
- Low ultimate pressure free of hydrocarbons (10^{-9} mbar/Torr)
- High effective pumping speed
- Compact, mobile unit
- Simple operation
- High level of reliability
- Maintenance-friendly design
- Installation in any orientation for SL 300
- Air cooling
- Installation of standard vacuum components in an open frame with installation column and castors
- Service-friendly assembly for maintenance without the need to disassemble backing or high vacuum pump
- Pump systems prepared for installation of larger backing pumps

The turbomolecular pump system consists of the following principal components:

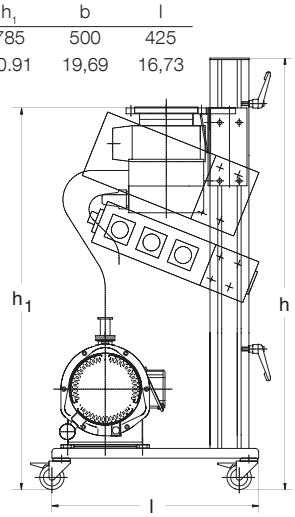
- SL 300 wide range turbomolecular pump
- Air cooling unit
- Frequency converter TD 400 with Start/Stop switch
- TURBO.POWER 300 power supply unit
- Absolutely oil-free scroll pump SCROLLVAC SC 5D as the backing pump
  (other sizes upon request)
- Mobile base plate with column
- All required connection and sealing components are located within the pump system assembly

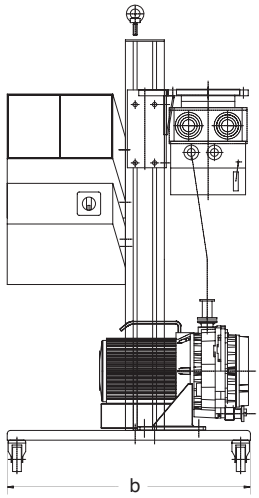
- **Either with or without switchbox**
  - *With switchbox*
    The pumps are switched on and off via a rotary switch on the front. Power sockets for accessories (measuring instrument, power failure venting valve and flange heater) are provided. These are connected by means of a power cord with Schuko plug. Other connection lines can be specified also for retrofitting
  - *Without switchbox*
    The pumps are switched on and off via switches at the pump, respectively at the frequency converter. For each component a separate earthed mains power outlet is required.

The pump system can be upgraded with further components, for example:

- Switch box
- Vacuum gauges (up to two)
- Exhaust filter
- Flange heater
- Power failure venting valve
- Venting valve
- Purge gas valve

	h	h_1	b	l
mm	890	785	500	425
in.	35.04	30.91	19,69	16,73





Dimensional drawing for the PT 300 DRY turbo molecular pump system with switch box

Typical Applications

- Spectroscopy
- Valve manufacturing
- Beam guidance systems
- Micro balances
- Sputtering and evaporation systems
- Surface physics
- Laboratory pump systems

Technical Data

PT 300 DRY

Wide range turbomolecular pump		TURBOVAC SL 300	TURBOVAC SL 300
High vacuum connection	DN	100 ISO-K	100 CF
Pumping speed for N_2	l x s^{-1}	270	270
Scroll vacuum pump		SCROLLVAC SC 5 D	SCROLLVAC SC 5 D
Pumping speed, approx.	m^3 x h^{-1} (cfm)	5.4 (3.18)	5.4 (3.18)
Ultimate pressure, approx.	mbar (Torr)	< 0.05 (0.03)	< 0.05 (0.03)
Attainable ultimate pressure			
with FPM (FKM) gasket	mbar (Torr)	10^{-8} (0.75×10^{-8})	10^{-8} (0.75×10^{-8})
with Cu seal	mbar (Torr)	–	10^{-9} (0.75×10^{-9})
Main supply, 50/60 Hz	V	230 / 115	230 / 115
Power consumption, max.	VA	450	450
Dimensions (W x H x D)	mm (in.)	see dimensional drawing	see dimensional drawing
Weight, approx.	kg (lbs)	45 (99.21)	45 (99.21)

Ordering Information

PT 300 DRY

	Part No.	Part No.
PT 300 DRY turbomolecular pump system 230 V, 50/60 Hz [1], without switch box, connection via 2 Schuko plugs		
DN 100 ISO-K	**503278V001**	–
DN 100 CF	–	**503279V001**
230 V, 50/60 Hz [1], with switch box and mains cord with 1 Schuko plug		
DN 100 ISO-K	**503278V002**	–
DN 100 CF	–	**503279V002**
Accessories		
Water cooling unit	**800135V0002**	**800135V0002**
Flange heater for flange DN 100 CF		
115 V	–	**854 28**
230 V	–	**854 27**
Power failure venting valve		
24 V DC, DN 16 ISO-KF	**800120V0021** [2]	**800120V0021** [2]
230 V, 50/60 Hz, DN 10 ISO-KF	**174 26** [2]	**174 26** [2]
Connection adapter M8 / DN 10 ISO-KF	**800110V0011**	**800110V0011**
Purge gas and venting valve, 0.2 mbar x l x s^{-1} at 1 bar		
24 V DC	**113 50** [2]	**113 50** [2]
100-230 VAC	**800152V0019** [2]	**800152V0019** [2]
Copper sealing rings for CF flanges (set of 10 pieces)	–	**839 45**
Mains cord for PT with switch box		
EURO 230 V, 50 Hz	**200 81 091**	**200 81 091**
CH 230 V, 50/60 Hz	**200 81 099**	**200 81 099**
UK 230 V, 50/60 Hz	**200 81 097**	**200 81 097**
US/Japan 230 V, 50/60 Hz	**200 81 141**	**200 81 141**
24 V DC mains cord		
3 m (7.0 ft)	**800094V0300**	**800094V0300**
5 m (17.5 ft)	**800094V0500**	**800094V0500**
10 m (35.0 ft)	**800094V1000**	**800094V1000**
20 m (70.0 ft)	**800094V2000**	**800094V2000**
Control unit for turbomolecular pump systems (see Chapter "Accessories")	**upon request**	**upon request**

[1] Other voltages upon request

[2] Deliveries in the case of reorders are without connection cable

Only available for purchase in North and South America

PT-FLEX DRY Turbomolecular Pump System

PT-FLEX pumping systems provide unique flexibility, allowing the user to define the optimum combination of performance and price.

PT-FLEX pump systems are offered with three sizes Compound Turbo-molecular pumps, three sizes dry scroll backing pumps, a basic or full-featured system controller and the ability to incorporate and control multiple valves, vacuum gauges, flange heaters and other peripheral equipment.

PT-FLEX systems can be specially configured with classic turbo pumps and rotary vane forevacuum pumps. Please consult Leybold for details.

Advantages to the User

- Oil-free high vacuum
- Compact, mobile
- Air-cooled
- Adjustable height
- Fully assembled and tested

Configuration and Capabilities

- Three sizes turbo pump
- Three sizes dry scroll forevacuum pump
- Manual or powered height adjust-ment
- Ability to power and control multiple peripheral devices (sold separately)
- Basic or full-featured TSC system controller
- Allows mounting of one or two rack gauge controllers

PT-FLEX with BASIC Controller

- Mains ON/OFF
- Mains switch activated 115 V AC output for use with vent valve or gauge controller
- Start / Stop switch for both pumps
- Manual control and power for
  - Pumps
  - Vent valves
  - Vacuum isolation valves
  - Flange heater
- Provides additional 115 V AC and 24 V DC outputs to power additional peripheral devices
- Vacuum Ion Gauge degas function for gauge model ITR 90
- Turbo operation indicator

PT-FLEX with TSC Controller

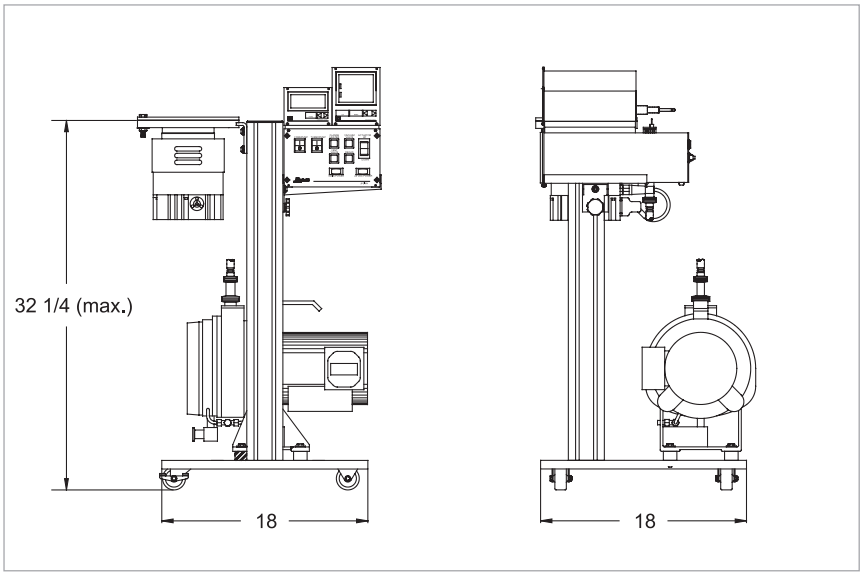
(see separate catalog page for in-depth description of features and capabilities)

- One button auto system control
- Monitors and displays all turbo pump operating and diagnostic parameters
- Acts as display for up to 3 “smart” vacuum gauge sensors
- All features of PT-Flex BASIC controller
- Additional power and control capa-bilities for peripheral equipment

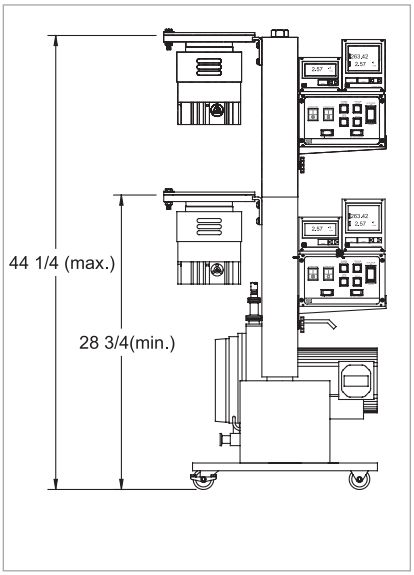
Technical Data

PT-FLEX

Turbomolecular pump		**TURBOVAC SL 80**	**TURBOVAC SL 300**
High vacuum connection	**DN**	63 ISO-K 63 CF	100 ISO-K 100 CF
Backing pumps		**SCROLLVAC SC 5 D**	**SCROLLVAC SC 5 D** **SCROLLVAC SC 15 D**
Cooling		Air	Air (water option)
Max. current requirements	**V AC**	115	115
(dependent on forepump)	**Phase**	1	1
	Hz	50/60	50/60
	A	15	15
Controller		**TSC Turbo System Controller** AUTO operation with gauge selection or Manual TW monitoring status Gauge sensor display with smart gauge selection **Accessory Control** Inlet, foreline and roughing valve Vent/purge valve Flange heater (CF flange only) Ion sensor degas **Basic System Controller** Manual Start/Stop operation **Accessory Control** Vacuum valve Vent valve Flange heater (CF flange only) Ion sensor degas Column height adjustment (option)	



Dimensional drawing for the PT-Flex (manual post)

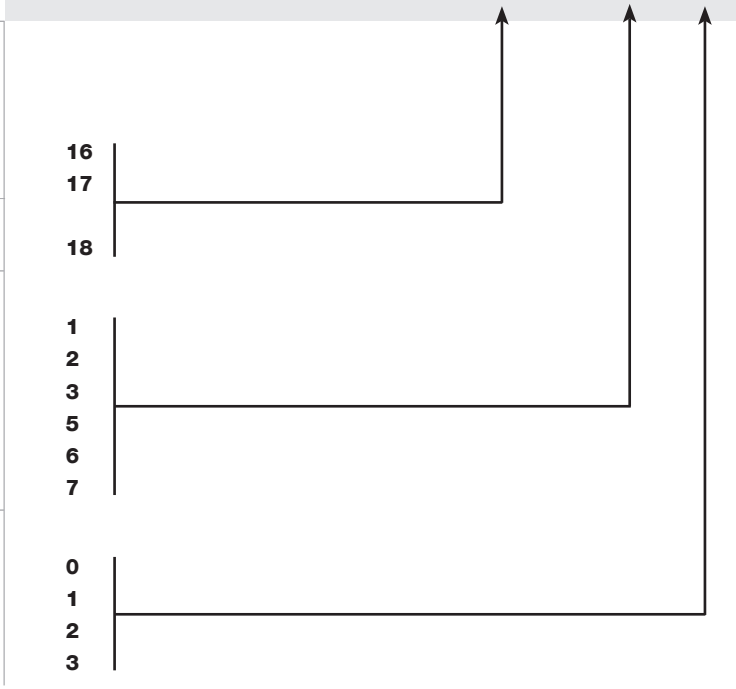


Dimensional drawing (front view) for the PT-Flex (powered support)

Ordering Information

Part No. 1800 __ __ V ____ ____ 01

PT-Flex	
Base number	
Manual controls	
- manual height adjustment	**16**
- electric height adjustment	**17**
Automated controls	
- manual height adjustment	**18**
Turbomolecular pump	
SL 80 with DN 63 ISO-K inlet	**1**
SL 80 with DN 63 CF inlet	**2**
SL 300 with DN 100 ISO-K inlet	**3**
SL 300 with DN 100 CF inlet	**5**
TW 250S with DN 100 ISO-K inlet	**6**
TW 250S with DN 100 CF inlet	**7**
DRY scroll pump	
Not used	**0**
SC 5 D	**1**
Reserved for future use	**2**
SC 15 D (SL 300 only)	**3**



Notes

Accessories
for High Vacuum Pump Systems TMP

Control Unit for Turbomolecular Pump Systems

Control unit for turbomolecular pump systems

The control unit is suited for operation in connection with turbomolecular pump systems PT 50, PT 80 DRY, PT 151/361, PT 151/361 DRY, PT 300 DRY; as well as custom pump systems.

The graphic monochrome display with its blue LED backlight offers excellent visibility also under difficult conditions.

Control unit installed in the PT 80 DRY pump system

Advantages to the User

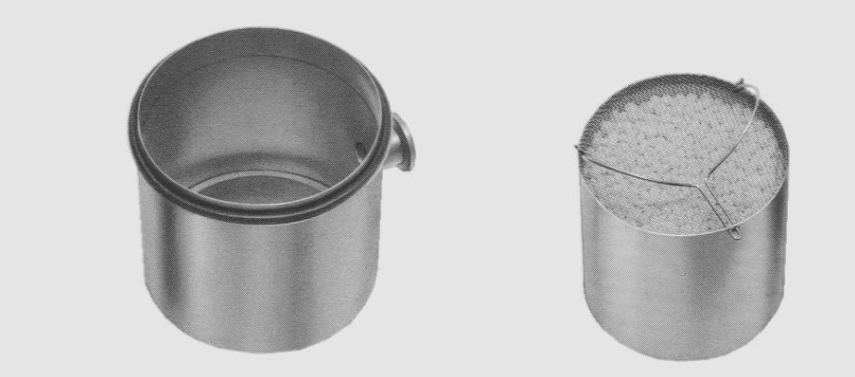
- Either automatic/manual operation
- Pressure readout for forevacuum and high vacuum is possible
- Selectable pressure units: mbar, torr, Pa
- Graphic display of the pressure curve
- Connectable high vacuum sensors: PTR and ITR
- Setting up the cut-in pressure for the turbomolecular pump is possible
- Venting of the pump system through a delayed venting function
- Memory card for recording data is connectable
- Data recording through a PC is possible
- Menu navigation in different languages

Ordering Information

Control Unit for Turbomolecular Pump Systems

	Part No.
Control unit for turbomolecular pump systems	**upon request**

Adsorption Traps with Aluminium Oxide Insert



Adsorption trap (left) and insert (right)

Adsorption traps are installed in all those cases where an oil-free vacuum is to be produced with oil-sealed vacuum pumps.

Advantages to the User

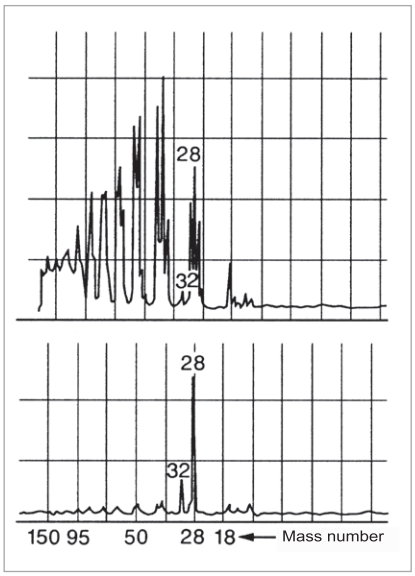
- Backstreaming of oil is reduced by 99%
- Long service life
- High conductance
- Filling can be easily exchanged
- Improvement in the ultimate pressure attained by backing pumps by one order of magnitude
- Stainless steel housing and insert
- NBR gasket

Typical Applications

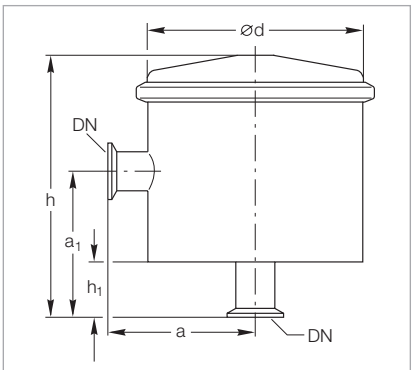
- Product of an oil-free vacuum

Supplied Equipment

- Complete with insert
- Without adsorbent



Residual gas spectrum; top ahead of a rotary vacuum pump, bottom ahead of a rotary vacuum pump with adsorption trap



DN		a	a_1	Ø d	h	h_1
16 ISO-KF	mm	82	82	135	147	32
	in.	3.23	3.23	5.31	5.79	1.25
25 ISO-KF	mm	102	102	175	155	33
	in.	4.02	4.02	6.89	6.10	1.26
40 ISO-KF	mm	132	65	235	160	20
	in.	5.19	2.56	9.25	6.3	0.79

Dimensional drawing for the adsorption traps

Technical Data

		Adsorption Traps		
		16 ISO-KF	25 ISO-KF	40 ISO-KF
Conductance at 10^{-2} mbar (Torr)	l x s $^{-1}$	4.0	6.0	12.0
Service live with Al oxide	Months	3	3	3
Al oxide filling	l (qts)	0.5 (0.53)	1.0 (1.06)	2.0 (2.1)
Weight, approx.	kg (lbs)	1.3 (2.9)	1.3 (2.9)	4.0 (8.8)

Ordering Information

	Adsorption Traps		
	16 ISO-KF	25 ISO-KF	40 ISO-KF
	Part No.	Part No.	Part No.
Adsorption trap	854 14	854 15	854 16
Activated aluminum oxide in tin 1.6 l (approx. 1.2 kg (2.65 lbs))	854 10	854 10	854 10

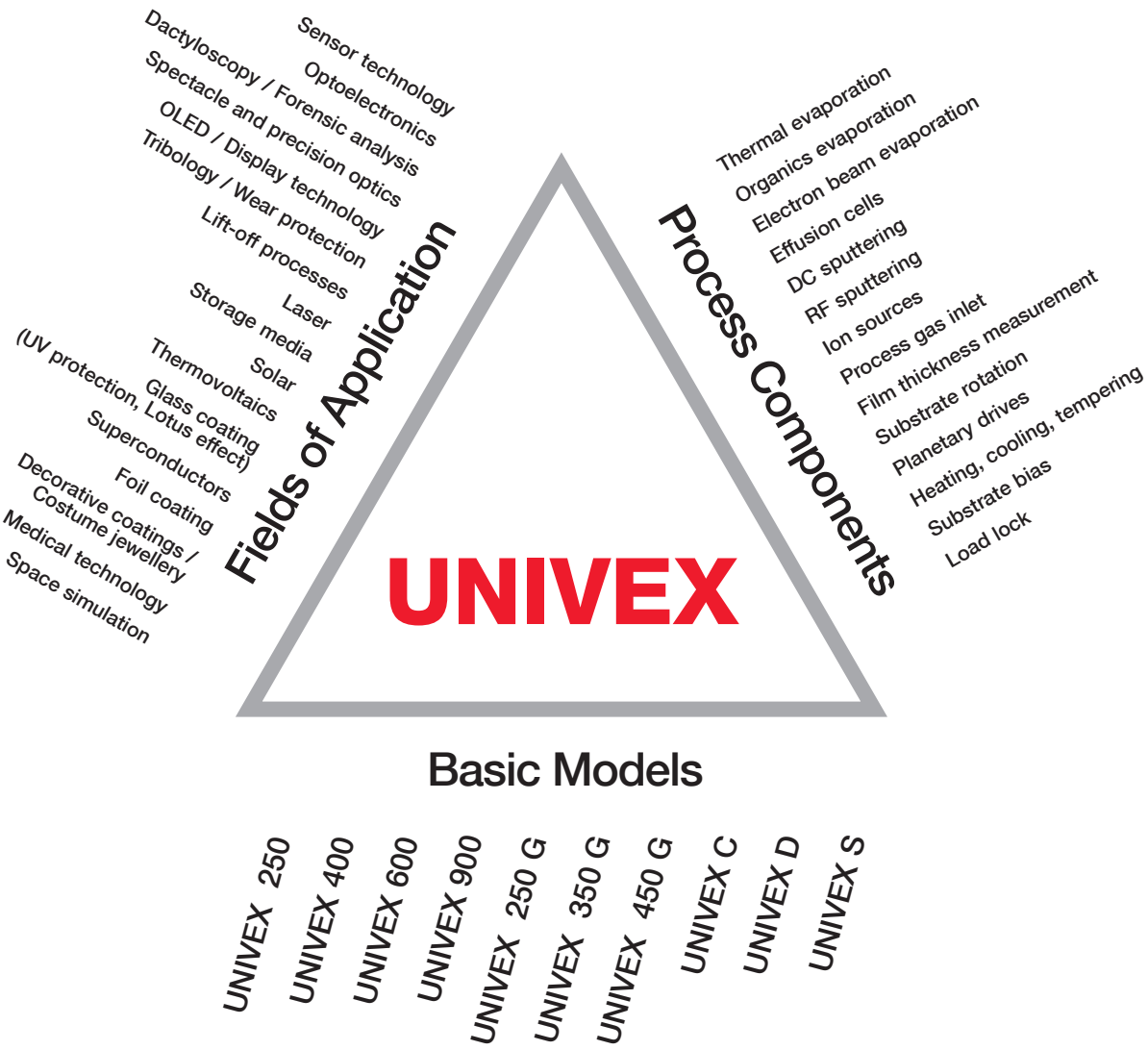
Notes

UNIVEX High Vacuum Experimentation Systems

General

The UNIVEX system family was developed by Leybold for applications in research and development as well as for setting up pilot production units.

Their range of applications focuses chiefly on vacuum coating technology as well as vacuum process engineering experiments.
The multi-purpose experimentation systems from Leybold are modular and can be specified according to specific customer requirements. For this purpose, a corresponding questionnaire is provided on the last pages of this chapter.



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Box Coating Systems

Multi-purpose Vacuum Coating System for the Laboratory

Design

- Compact unit with direct access to the process chamber
- The UNIVEX box coaters systems consist of a process and a control module
- The process module includes the vacuum chamber, the coating components and the pump system
- The control module includes the PLC, respectively PC controller including the visualisation as well as the power supplies for the process components

Vacuum Chamber

- Box-shaped stainless steel vacuum chambers UNIVEX 250-600
- Octagonal stainless steel vacuum chamber UNIVEX 900
- Swivelling front door for simple chamber access
- Viewing window with coating protection
- Removable stainless steel coating protection panels
- Flexible connections for chamber bottom and chamber top
- Connecting flanges for pump system and process components
- Coolable and heatable chamber walls optional

Vacuum System

- Mechanical forevacuum pump (dry compressing or oil sealed)
- High vacuum pump (turbomolecular or cryo pump)
- Vacuum valves
- Pressure measurement devices

Advantages to the User

- Modular system design
- Application-wise optimised pump system
- Multi-purpose vacuum chamber
- Convenient access to the chamber installations
- Very simple to operate and use via programmable control
- Suited for retrofitting of process components (configuration dependent)
- For installation into clean-room walls

Basic Models

UNIVEX 250

UNIVEX 400

UNIVEX 600

UNIVEX 900

UNIVEX 250

Design example UNIVEX 250

The UNIVEX 250 is a cost-effective and compact entry-level coating system for the laboratory.
Owing to its low height of only approximately 1.2 meters it is ideally placed on a benchtop or installed in a frame.
In the vacuum chamber which is 250 mm wide, substrates up to an overall diameter of 220 mm max. can be rotated and coated.
The integrated PLC controller allows you to run manual, respectively semi-automatic coating processes.

Examples of Equipped Vacuum Chambers

Chamber bottom:
double thermal evaporator with source shutter
Chamber top:
rotating substrate table with substrate shutter

Electron beam evaporator with fourfold rotating crucible as well as additional double thermal evaporator, each with source shutter

Effusion cell as well as spare blank flanges for subsequent retrofits

Technical Data

UNIVEX 250

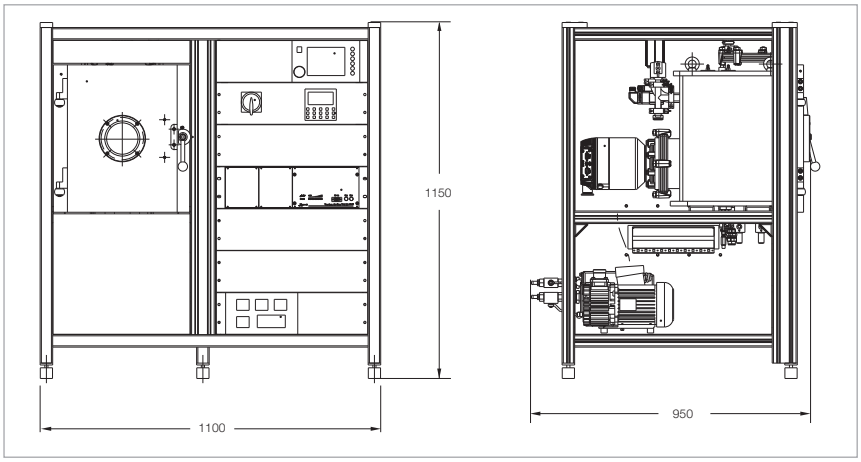
Vacuum chamber		
Material		
Chamber body		Stainless steel
Chamber door		Aluminum
Dimensions		
Inside width	**mm**	270
Inside depth	**mm**	370
Inside height	**mm**	400
Connections [1]		
Front side		Door with window
Rear side	**DN**	1x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF, 2 x 40 ISO-KF
Bottom plate		Variable connections
Cover plate		1 x 200 ISO-K, 4x installation bore ø 34,5 mm
High vacuum pump		TURBOVAC 350 i
Nominal pumping speed for N_2	**l x· s^{-1}**	290
Backing pump		SOGEVAC SV 10 B
Nominal pumping speed	**m^3 x h^{-1}**	11
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / 50 Hz [2]
Cooling water		
Inlet pressure	**bar (abs.)**	4 to 6
Consumption, approx.	**l x min^{-1}**	Dependent on chamber installations
Feed temperature	**°C**	+18 to +25
Compressed air	**bar (abs.)**	4 to 6
Weight, approx.	**kg**	300 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

UNIVEX 250

	Part No.
UNIVEX 250	**upon request**



Dimensional drawing for the UNIVEX 250

UNIVEX 400

Design example UNIVEX 400

The UNIVEX 400 is a compact coating system for laboratory tasks, respectively pilot production runs.
Due to its chamber dimensions, it is ideal for coating of small to medium-sized substrates.
In the vacuum chamber which is 420 mm wide, substrates respectively substrate holders up to an overall diameter of 350 mm max. can be rotated and coated.
The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes.

Examples of Equipped Vacuum Chambers

Two magnetron sputter sources, confocal aligned to the substrate holder rotating at the chamber top. Spare flanges for two further sputter sources

At the foreground: two double thermal evaporators with source shutters
In the background: two organics evaporators with source shutters and two film thickness gauge heads

Rotating, resistively heated substrate table with shutters and thin film gauge head

Technical Data

UNIVEX 400

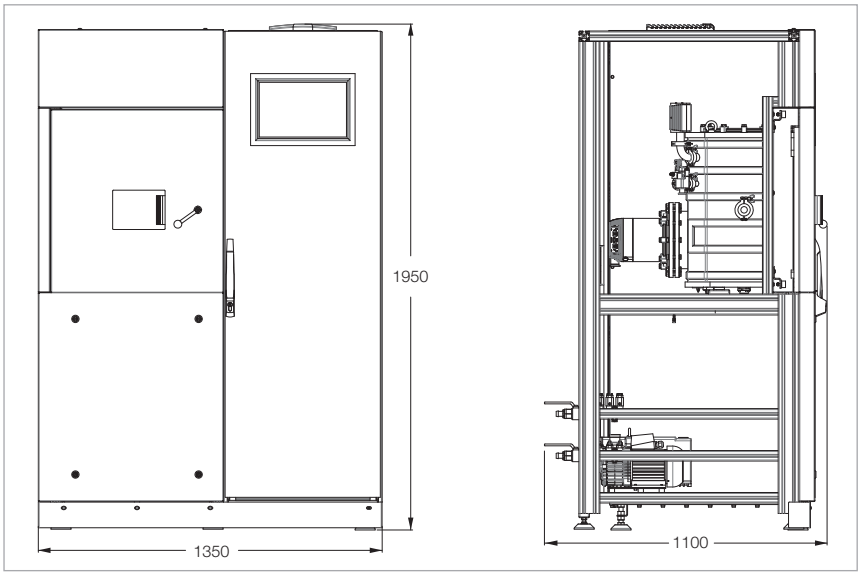
Vacuum chamber		Water-cooled
Material		
Chamber body		Stainless steel
Chamber door		Stainless steel
Dimensions		
Inside width	mm	420
Inside depth	mm	420
Inside height	mm	550
Connections [1]		
Front side		Door with window
Rear side	DN	1x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 40 ISO-KF, 2 x 40 ISO-KF
Bottom plate		Variable connections
Cover plate		1 x 250 ISO-K, 4x installation bore ø 34,5 mm
High vacuum pump		TURBOVAC 450 i
Nominal pumping speed for N_2	l x· s^{-1}	430
Backing pump		SOGEVAC SV 25 B
Nominal pumping speed	m^3 x h^{-1}	26
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50 Hz [2]
Cooling water		
Inlet pressure	bar (abs.)	4 to 6
Consumption, approx.	l x min^{-1}	Dependent on chamber installations
Feed temperature	°C	+18 to +25
Compressed air	bar (abs.)	4 to 6
Weight, approx.	kg	500 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

UNIVEX 400

	Part No.
UNIVEX 400	**upon request**



Dimensional drawing for the UNIVEX 400

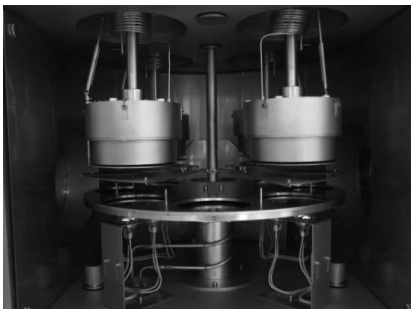
UNIVEX 600

Design example UNIVEX 600

The UNIVEX 600 is a compact coating system for the laboratory, respectively pilot production runs.
Because of its chamber size it is suited for medium to large substrate sizes.
The attainable substrate throughput meets the general requirements for small series production runs.
In the vacuum chamber which is 600 mm wide, substrates respectively substrate holders up to an overall diameter of 550 mm max. can be rotated and coated.
The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes.

Examples of Equipped Vacuum Chambers

Chamber bottom: electron beam evaporator with sixfold rotating crucible
Chamber top: planetary drive for substrate rotation



Chamber bottom: rotating substrate table with four heating stations
Chamber top: four magnetron sputter sources

Multiple targets for ion sputtering

Technical Data

UNIVEX 600

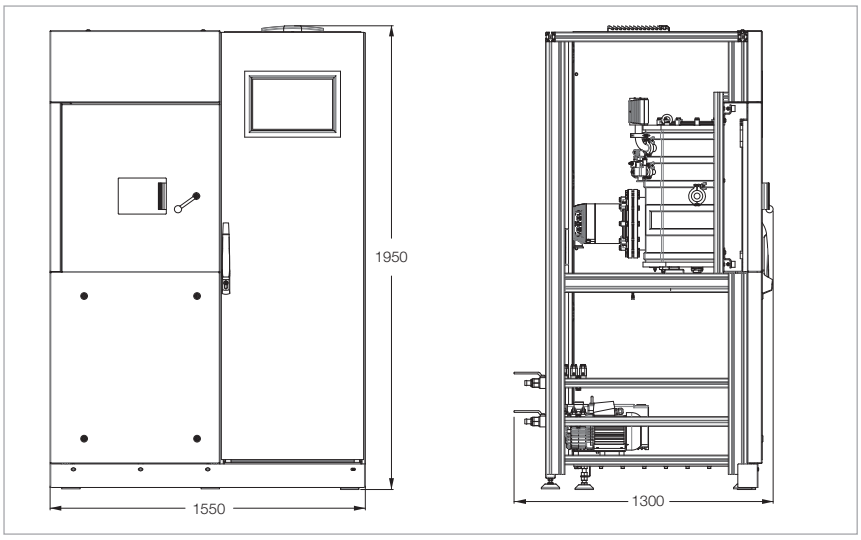
Vacuum chamber		Water-cooled
Material		
Chamber body		Stainless steel
Chamber door		Stainless steel
Dimensions		
Inside width	mm	600
Inside depth	mm	600
Inside height	mm	800
Connections [1]		
Front side		Door with window
Rear side	DN	1x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 25 ISO-KF, 2 x 40 ISO-KF
Bottom plate		Variable connections
Cover plate		1 x 250 ISO-K, 4x installation bore ø 34,5 mm
High vacuum pump		TURBOVAC MAG W 1300 iP
Nominal pumping speed for N_2	l x· s^{-1}	1100
Backing pump		SOGEVAC SV 65 B
Nominal pumping speed	m^3 x h^{-1}	59
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50 Hz [2]
Cooling water		
Inlet pressure	bar (abs.)	4 to 6
Consumption, approx.	l x min^{-1}	Dependent on chamber installations
Feed temperature	°C	+18 to +25
Compressed air	bar (abs.)	4 to 6
Weight, approx.	kg	1000 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

UNIVEX 600

	Part No.
UNIVEX 600	**upon request**



Dimensional drawing for the UNIVEX 600

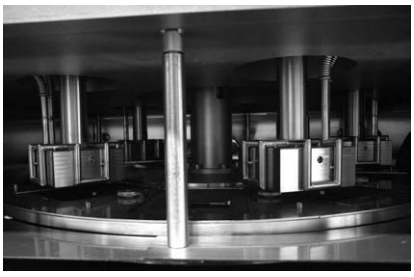
UNIVEX 900

Design example UNIVEX 900

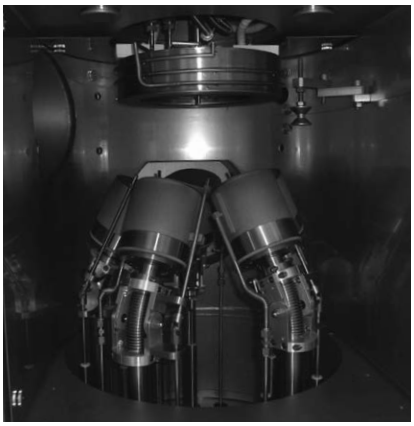
The UNIVEX 900 is the sophisticated solution for medium to large substrate sizes, respectively for higher substrate throughputs.
In the octagonal vacuum chamber which is 900 mm wide, substrates respectively substrate holders up to an overall diameter of 800 mm max. can be rotated and coated.
The integrated PC/PLC controller allows you to run manual, semiautomatic and fully automatic coating processes

Examples of Equipped Vacuum Chambers

Chamber bottom: electron beam evaporator, thermal evaporator, ion source
Chamber top: rotating substrate dome with turnover device



Rotating substrate table at the chamber top for 10 substrates (in situ combinable with five masks) + 4 high-temperature thermal radiation heaters on the rear



Confocal sputter-up arrangement with rotating high-temperature substrate heater

Technical Data

UNIVEX 900

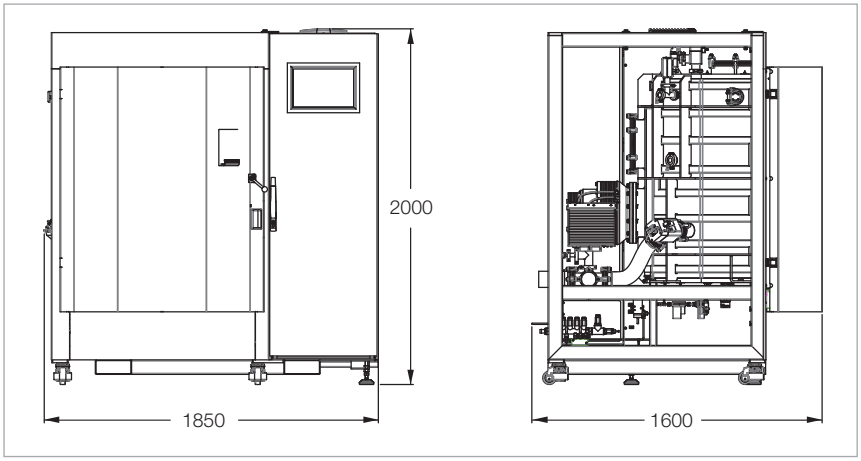
Vacuum chamber		Water-cooled
Material		
Chamber body		Stainless steel
Chamber door		Stainless steel
Dimensions		
Inside width	mm	900 (octagonal)
Inside depth	mm	900 (octagonal)
Inside height	mm	1100
Connections [1]		
Front side		Door with window
Rear side	DN	2x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 2 x 25 ISO-KF, 2 x 40 ISO-KF
Bottom plate		Variable connections
Cover plate		1 x 250 ISO-K, 4x installation bore ø 34,5 mm
High vacuum pump		TURBOVAC W 2200 iP
Nominal pumping speed for N_2	l x· s^{-1}	2100
Backing pump		SOGEVAC SV 100 B
Nominal pumping speed	m^3 x h^{-1}	97.5
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50 Hz [2]
Cooling water		
Inlet pressure	bar (abs.)	4 to 6
Consumption, approx.	l x min^{-1}	Dependent on chamber installations
Feed temperature	°C	+18 to +25
Compressed air	bar (abs.)	4 to 6
Weight, approx.	kg	1500 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

UNIVEX 900

	Part No.
UNIVEX 900	**upon request**



Dimensional drawing for the UNIVEX 900

Glove Box Systems

Multi-purpose Vacuum Coating System for Fitting to a Glove Box

The UNIVEX glove box systems were developed to coat materials which are sensitive with respect to the environmental conditions like oxygen or humidity, for example

Design

- The UNIVEX glove box systems consist of a process module and a separate electrical cabinet
- The process module includes the vacuum chamber, the coating components and the pump system
- The control module includes the PLC, respectively PC controller including the visualisation as well as the power supplies for the process components

Vacuum Chamber

- Box-shaped stainless steel vacuum chambers UNIVEX 250 G - 450 G
- Sliding front door for easy chamber access through the glove box
- Swivelling front door for simple chamber access
- Viewing window with coating protection
- Removable stainless steel coating protection panels
- Flexible connections for chamber bottom and chamber top
- Connecting flanges for pump system and process components

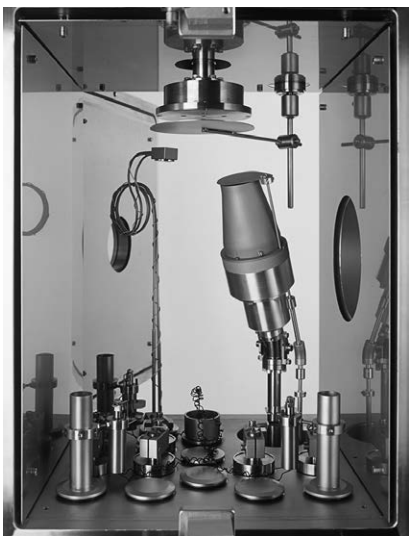
Vacuum System

- Mechanical forevacuum pump (dry compressing or oil sealed)
- High vacuum pump (turbomolecular or cryo pump)
- Vacuum valves
- Pressure measurement devices

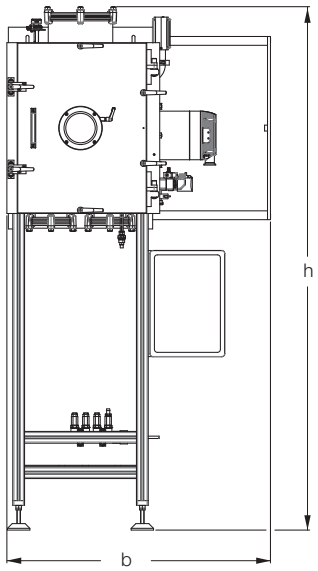
Advantages to the User

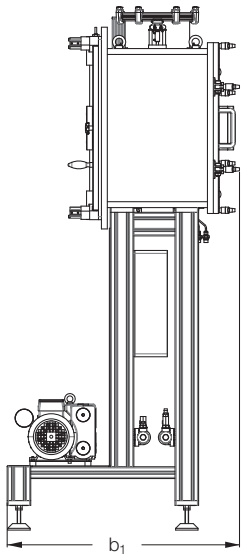
- Modular system design
- Application-wise optimised system
- Flexible utilisation of the vacuum chamber
- Space saving installation to the rear of the glove box
- Convenient process access through the glove box by means of a front sliding door
- Easy access to the chamber unit through the rear service door
- Very simple to operate and use
- Suited for retrofitting of process components (configuration dependent)
- All system components with exception of the sliding door are accessible from outside the glove box

Design example
UNIVEX 350 G, consisting of electrical cabinet (left) and coating module (right)



View through the vacuum chamber: front sliding door and rear swivelling door open
Design example with sputter source (right) and heated substrate table (top)





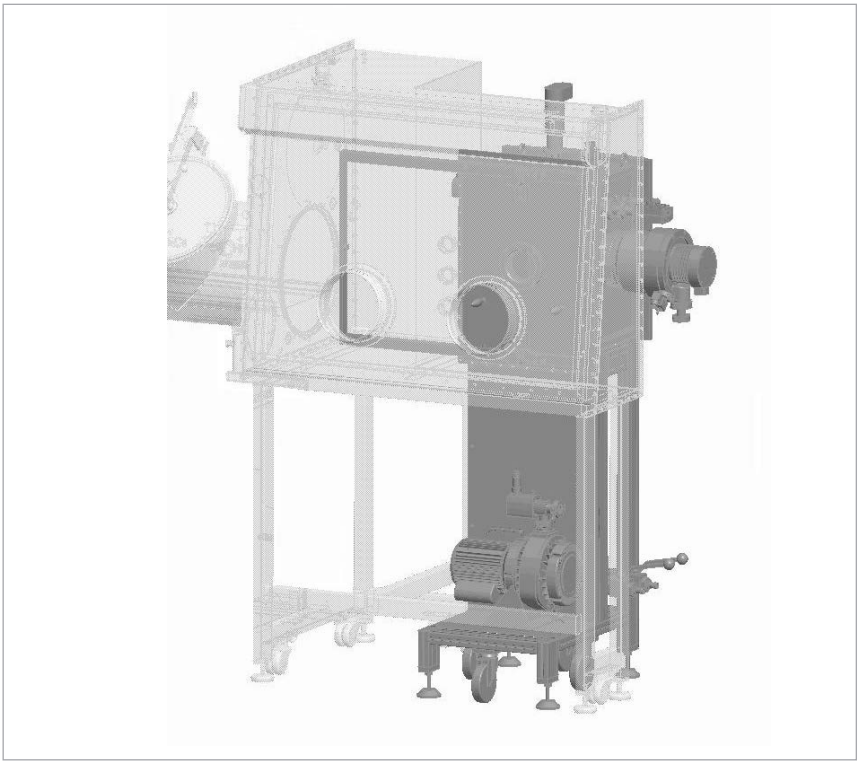
Type	h	b	b_1
UNIVEX 250 G	1700	700	800
UNIVEX 350 G	1800	900	800
UNIVEX 450 G	1950	1150	1000

Dimensional drawing of the glove box units, shown without process installations

Complete Solutions, including Glove Box

Upon request Leybold will also arrange the delivery of turnkey solutions consisting of the UNIVEX 350 G coating system and a glove box from a single source.

For this, please ask us for a quotation.



3D view of a glove box with the UNIVEX 350 G coating module fitted to the rear

UNIVEX 250 G

The UNIVEX 250 G is a convenient and cost-effective solution for coating tasks requiring not much space.

Substrates, respectively substrate holders up to an overall diameter of approximately 220 mm can be processed.

Technical Data

		UNIVEX 250 G
Vacuum chamber		
Material		
Chamber body		Stainless steel
Front sliding door		Stainless steel
Rear swivelling door		Aluminum
Dimensions		
Inside width	mm	270
Inside depth	mm	370
Inside height	mm	400
Connections [1]		
Front side		Sliding door for glove box access; manually operated and pneumatically closing
rear side		turning door for service access; manually locked
Bottom plate		Variable connections
Cover plate		1x 200 ISO-K, 2x installation bore ø 34,5 mm
Left side	DN	1x 160 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF
High vacuum pump		TURBOVAC 350 i
Nominal pumping speed for N_2	l x s^{-1}	290
Backing pump		SOGEVAC SV 10 B
Nominal pumping speed	m^3 x h^{-1}	11
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50 Hz [2]
Cooling water		
Inlet pressure	bar (abs.)	4 to 6
Consumption, approx.	l x min^{-1}	Dependent on chamber installations
Feed temperature	°C	+18 to +25
Compressed air	bar (abs.)	4 to 6
Weight, approx.	kg	350 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

	UNIVEX 250 G
	Part No.
UNIVEX 250 G	**upon request**

UNIVEX 350 G

The UNIVEX 350 G combines a compact design with plenty of chamber space.
For many coating tasks the UNIVEX 350 G offers optimum space conditions and operator convenience as to process components and substrate processing.
Substrates, respectively substrate holders up to an overall diameter of approximately 300 mm can be processed.

Technical Data — UNIVEX 350 G

Vacuum chamber		
Material		
Chamber body		Stainless steel
Front sliding door		Stainless steel
Rear swivelling door		Aluminum
Dimensions		
Inside width	mm	370
Inside depth	mm	380
Inside height	mm	500
Connections [1]		
Front side		Sliding door for glove box access; manually operated and pneumatically closing
rear side		turning door for service access; manually locked
Bottom plate		Variable connections
Cover plate		1x 200 ISO-K, 4 x installation bore ø 34,5 mm
Left side	DN	1 x 200 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25/50 ISO-KF, 1 x 40 ISO-KF
High vacuum pump		TURBOVAC 450 i
Nominal pumping speed for N_2	l x s^{-1}	430
Backing pump		SOGEVAC SV 25 B
Nominal pumping speed	m^3 x h^{-1}	26
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50/60 Hz [2]
Cooling water		
Inlet pressure	bar (abs.)	4 to 6
Consumption, approx.	l x min^{-1}	Dependent on chamber installations
Feed temperature	°C	+18 to +25
Compressed air	bar (abs.)	4 to 6
Weight, approx.	kg	400 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information — UNIVEX 350 G

	Part No.
UNIVEX 350 G	**upon request**

UNIVEX 450 G

Owing to its chamber dimensions, the UNIVEX 450 G is suited for all coating tasks requiring much space

Substrates, respectively substrate holders up to an overall diameter of over 400 mm can be processed.

With a height of 650 mm, the vacuum chamber is also suited for lift-off applications.

Technical Data

UNIVEX 450 G

Vacuum chamber		
Material		
Chamber body		Stainless steel
Front sliding door		Stainless steel
Rear swivelling door		Aluminum
Dimensions		
Inside width	**mm**	500
Inside depth	**mm**	500
Inside height	**mm**	650
Connections [1]		
Front side		Sliding door for glove box access; manually operated and pneumatically closing
rear side		turning door for service access; manually locked
Bottom plate		Variable connections
Cover plate		1x 250 ISO-K, 4 x installation bore ø 34,5 mm
Left side	**DN**	1 x 250 ISO-K (pump system connection), 2 x 16 ISO-KF, 1 x 25 ISO-KF, 1 x 40 ISO-KF
High vacuum pump		TURBOVAC MAG W 700 iP
Nominal pumping speed for N_2	**l x s^{-1}**	590
Backing pump		SOGEVAC SV 40 B
Nominal pumping speed	**m^3 x h^{-1}**	44
Controller		PLC with graphic touchscreen
Required supplies		
Voltage		400 V, 3 phases / N / PE / 50/60 Hz [2]
Cooling water		
Inlet pressure	**bar (abs.)**	4 to 6
Consumption, approx.	**l x min^{-1}**	Dependent on chamber installations
Feed temperature	**°C**	+18 to +25
Compressed air	**bar (abs.)**	4 to 6
Weight, approx.	**kg**	500 [3]

[1] Standard configuration, other hole patterns / flanges / viewing windows upon request
[2] Other voltages and frequencies upon request
[3] Total weight without chamber installations/process components

Ordering Information

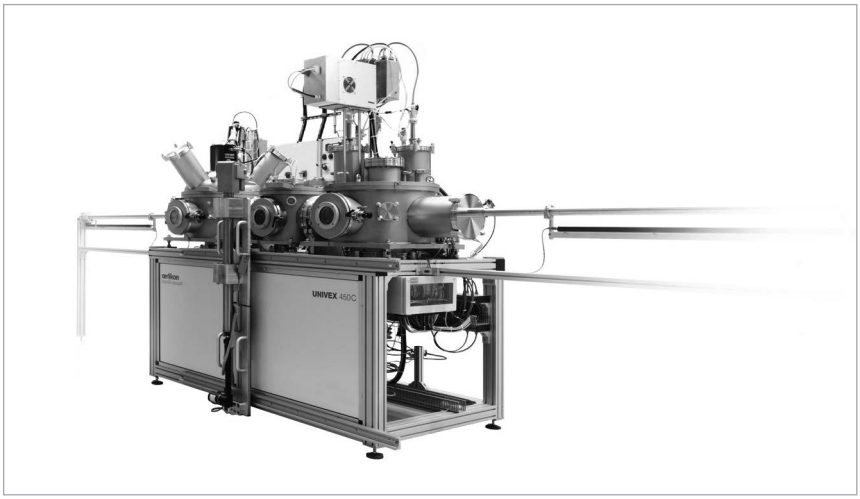
UNIVEX 450 G

	Part No.
UNIVEX 450 G	**upon request**

Notes

Cluster-Tool Systems UNIVEX C

Design example:
UNIVEX 450 C with coating module and electrical cabinet (example photograph).
The coating module consists of two process chambers (left and right) as well as the loadlock and transfer chamber in between
The substrate transfer between the chambers is effected with the aid of a vacuum robot

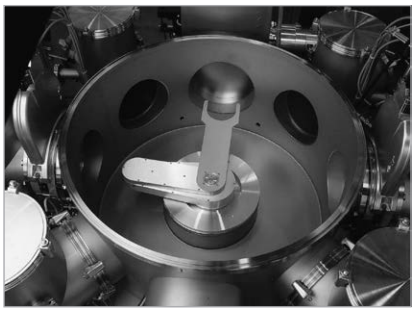


Design example:
UNIVEX 450 C with two process chambers as well as load lock chamber arranged at the centre. The substrates are moved using linear transfer rods (left and right)

For special applications we can also supply cluster systems based on the UNIVEX concept. These clusters are equipped according to customer requirements and incorporate separate processing, load lock and transfer chambers.

Frequently sputter applications are involved since sputter targets remain in place for a long time and because of this, the process chambers need to be vented rarely.
Generally, each vacuum chamber will have its own high vacuum system. The load lock chamber is in the simplest case loaded manually with individual substrates. In addition, magazine processing of several substrates per batch is possible.

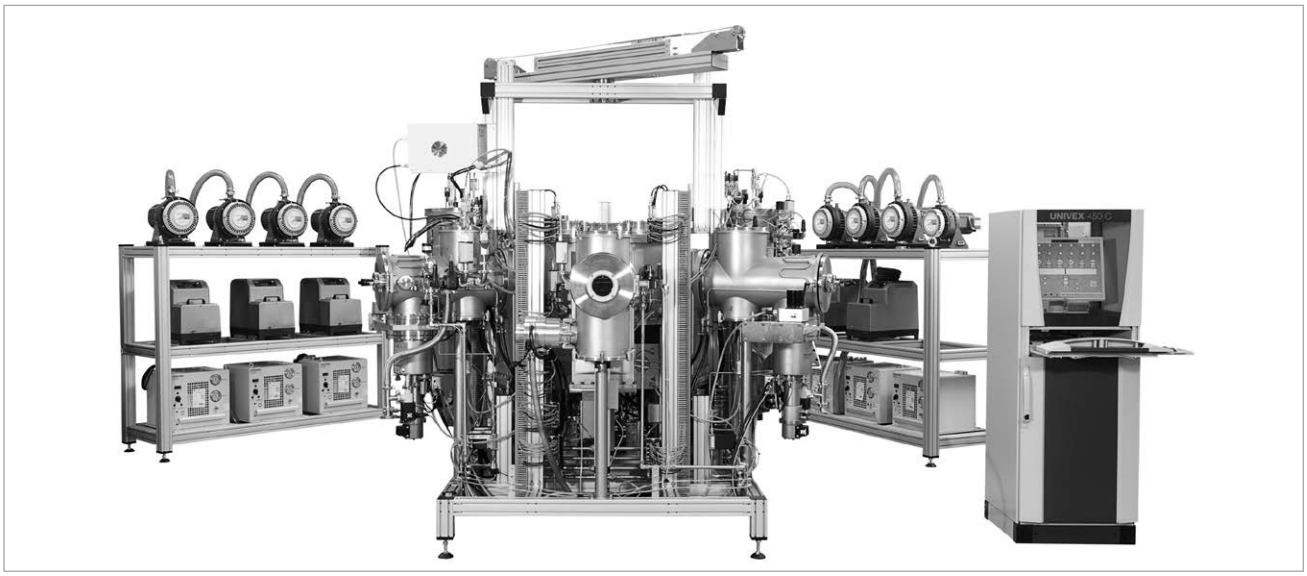
Design example:
Automatically controlled substrate magazine with robot arm access



Design example:
Load lock chamber with central vacuum robot for substrate transportation into radially arranged process chambers

For transporting the substrates between the individual vacuum chambers, commonly motor driven robot arms or linear transfer drive units are used.

The UNIVEX control software is customised according to the specific application requirements and will generally allow fully automatic running of the process including recipe processing. Additional features like data logging, password protected and priority dependent user access as well as remote access for servicing can be optionally integrated.



Design example:
Coating module (centre) with decentralised pump systems (left and right) and control console

Dactyloscopy Systems UNIVEX D

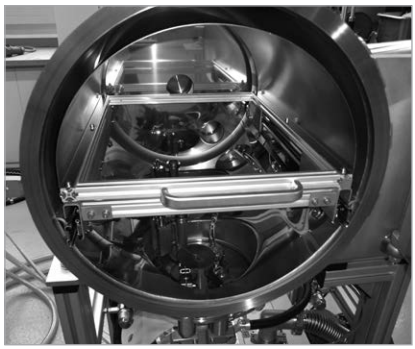
Leybold has developed a coating system, which relies on a recognized metal evaporation process to reveal fingerprints on items containing fingerprint evidence.

Benefits of this method

- Easily controllable thermal coating process
- Coating of large areas is possible up to 800 x 400 mm
- Short cycle times are possible (depending on the material with the fingerprint evidence)
- Good contrast on multicolour surfaces
- The material containing the fingerprint evidence remains undamaged

Design example:
UNIVEX 450 D, consisting of vacuum coating module (right) and separate electrical cabinet (left)

Opened coating chamber with retracted substrate receiver



View into the chamber with thermal evaporator and positioned substrate receiver

Space Simulation Systems UNIVEX S

We are offering the UNIVEX S line for simulation of space conditions as well as other thermal vacuum experiments. It generally consists of a cylindrical vacuum chamber with high vacuum system and supply module with process controller.
The simulation chamber is typically equipped with temperature controllable trays and shrouds, which may be both heated and cooled, in a vacuum.
The process module is moved manually along rails so that the simulation chamber can be opened for loading

Design example:
UNIVEX 1000 S with closed simulation chamber

Opened chamber of the UNIVEX 1000 S with temperature controllable shrouds and substrate tray

Design example:
UNIVEX 700 S

Thermal Evaporation of High Melting Point Materials (metals)

Single Thermal Evaporator

Consisting of two water-cooled high voltage feedthroughs with terminal blocks for 34.5 mm dia. holes.

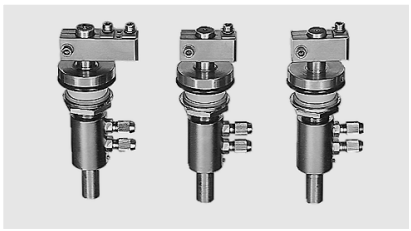
Single thermal evaporator

Technical Data		Single Thermal Evaporator
Rating per conductor	V A	max. 100 500
Seals		FPM (FKM)
Water connection	mm	Hose 4/6 dia.
Weight	kg	2.5

Ordering Information	Single Thermal Evaporator
	Part No.
Single thermal evaporator	**upon request**

Dual Thermal Evaporator

Consisting of three water-cooled high voltage feedthroughs with terminal blocks for 34.5 mm dia. holes.



Dual thermal evaporator

Technical Data		Dual Thermal Evaporator
Rating per conductor	V A	max. 100 500
Seals		FPM (FKM)
Water connection	mm	Hose 4/6 dia.
Weight	kg	3.9

Ordering Information	Dual Thermal Evaporator
	Part No.
Dual thermal evaporator	**upon request**

High Current Cable

For single and dual thermal evaporators, equipped with terminals and clamping pieces.

Technical Data		High Current Cable
Length	m	2 [1]
Rating	V A	max. 100 500
Cross section	mm^2	120
Weight	kg	3.5

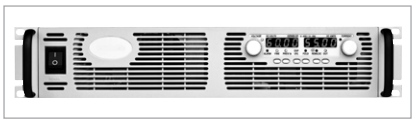
Ordering Information	High Current Cable
	Part No.
Power supply cable	**upon request** [2]

[1] Standard length. Other lengths can be specified

[2] For the single thermal evaporator, two high current cables are required
For the dual thermal evaporator, three high current cables are required

AS 153 High current power supply unit

For supplying thermal evaporators.



AS 153 high current power supply unit

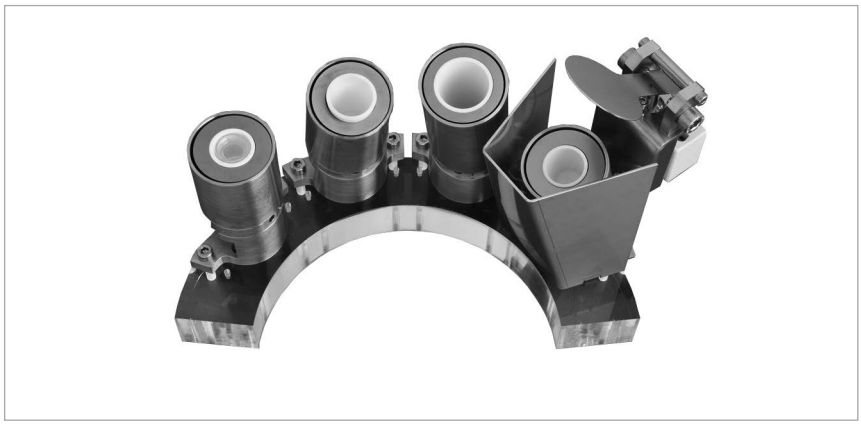
Technical Data		Power Supply Unit
Cabinet		19" rack module, 2 HU Installation depth 520 mm
Output voltage/current, max.		8 V, 400 A
Inputs		Remote control unit for controlling the evaporation power (0 to 10 V)
Main power supply		230 V, 50/60 Hz, 10 A
Weight, approx.	kg	10

Ordering Information	Power Supply Unit
	Part No.
AS 153 high current power supply unit	**upon request**

Thermal Evaporation of Low Melting Point Materials (organics)

Organic material evaporators are special instruments based on the thermal principle developed to evaporate mostly temperature sensitive organic materials.
Such instrumentation ensures a coating process at precisely controlled heating temperatures in the range between 50 °C and 600 °C.

For installation within the UNIVEX systems, Leybold supplies organic material evaporators as a complete package, consisting of evaporator source, automatic evaporator shutter and 19" rack mount controller.



Four organic material evaporators, arranged in a semicircle

Single organic material evaporator with shutter, fitted to a DN 40 CF flange

Power supply unit for two organic material evaporators

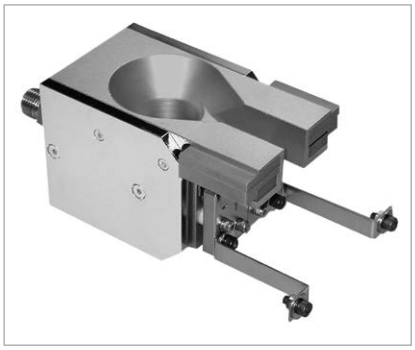
Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.

Electron Beam Evaporation

Various models of electron beam evaporators and power supplies are available for installation in the UNIVEX systems.

Electron Beam Evaporator

The selection of a suitable electron beam evaporator will primarily depend on the amount of available space, the desired evaporation rate and the film thickness as well as the number and type of materials which need to be evaporated. Single crucible as well as rotatable multi-crucible evaporators are available.



Electron beam evaporator with single crucible

Electron beam evaporator with rotatable six-pocket crucible

Power Supplies

The power supply unit for the individual electron beam evaporators is selected depending on the maximum evaporation power which is required, as well as the demanded properties for X/Y beam deflection. Models with output power ratings ranging from 3 kW to 10 kW are available.

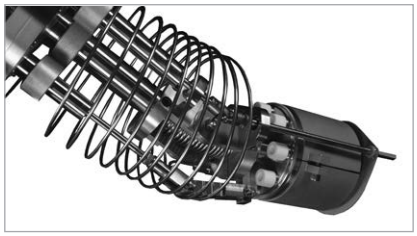
Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.

Sputtering

Magnetron Sputter Sources

The magnetron sputter sources, which can be built into the UNIVEX systems, are DC/RF compatible. This means, they may be operated either with a DC or also with a RF power supply.
In addition, pulsed DC power supplies are possible.
Here as standard round planar sputter sources with target diameters ranging from 2-in. to 6-in. are available. Selection and equipping here depends on the substrate size to be coated, the specified sputtering process and the target material as well as the available installation space.
Other target sizes and magnetron types (rectangular sources, for example) are available upon request.

2-in. magnetron with in-situ tiltable sputter head, pneumatically actuated target shutter and gas feed



4-in. magnetron with in-situ tiltable sputter head, pneumatically actuated target shutter and gas feed

Confocal arrangement of 3-in. sputter sources, aligned for sputter-up

DC Power Supplies

For DC sputtering, power supply units with a rated output power ranging between 500 W and 3 kW are available. These are 19-in. rack mount units which can be installed in the UNIVEX cabinets.

RF Power Supplies

For RF sputtering, power supply units with a rated output power ranging between 300 W and 2 kW are available. These are 19-in. rack mount units which can be installed in the UNIVEX cabinets.

Moreover, automatically controlled RF matchboxes are supplied for impedance matching between the RF power supply and the magnetron.

Gas Inlet

Sputtering sources can only be operated with a process gas present. For this, manually operated variable leak valves or automatically controlled mass flow controllers are available options.

Throttling the Pumping Speed and Process Pressure Control

In order to protect the high vacuum pump against the high pressures present during plasma operation and to control the process pressure, the UNIVEX systems are fitted with suitable components for throttling the high vacuum pumping speed. These may be butterfly valves, control gate valves or also speed controlled turbomolecular pumps

Upon request we shall be pleased to provide an offer which specifically matches the requirements of your application.

Ion Sources

Ion sources are frequently used to either clean or etch the substrates before running the actual coating process, or to optimise the thin film properties during deposition. In the case of the latter process, the ion source serves to support the coating process (IBAD – Ion Beam Assisted Deposition). However, there are also some PVD processes, during which the ion source is directly needed to produce the thin films, for example during ion beam sputtering

As to design and operating principle, different types of ion sources are available, for example

- Gridded and gridless ion sources
- DC ion sources and RF ion sources
- Flange mounted ion sources and ion sources built in/aligned in the vacuum

Gridless DC ion source with filament for plasma neutralisation

Filamentless RF grid type ion source

We shall be pleased to assist you in connection with your UNIVEX application. For this, please ask us for a quotation.

Process Gas Inlet

In plasma supported processes (sputtering, etching, glow discharge, bias) or reactive deposition methods, generally a gas supply from the outside is necessary. The gas may be supplied either manually with a gas-dosing valve or program-controlled by way of a gas flow controller (MFC - Mass Flow Controller). The MFC control range is depending on the requirements between approximately 0 to 10 sccm and 0 to 500 sccm.

The available MFC models are equipped either with a 0 to 5 V analogue interface or a EtherCAT interface. The possible gases respectively gas mixtures within a UNIVEX system depend on the type of required application and the installed system hardware (in particular the pump system).

Mass Flow Controller (MFC)

For controlled inlet of gas in connection with automated plasma processes (sputtering, etching, glow discharge). The MFC is controlled by a PC or a PLC provided from the side of the customer.

Technical Data — Mass Flow Controller (MFC)

Gas flow, max.	**sccm**	selectable between 10 and 500
Supply voltage	**V DC**	24
Control interface		analog 0 - 5 V or EtherCAT

Ordering Information — Mass Flow Controller (MFC)

	Part No.
Mass flow controller	**upon request**

Variable Leak Valve with Isolation Valve

For manually controlled inlet of gas in connection with plasma processes (sputtering, etching and glow discharge).

Technical Data — Variable Leak Valve with Isolation Valve

Gas inlet rate q_L	**mbar x l x s^{-1}**	5 x 10^{-6} to 1 x 10^{3}
Connection flange	**DN**	16 ISO-KF

Ordering Information — Variable Leak Valve with Isolation Valve

	Part No.
Variable leak valve with isolation valve	**215 010**

see also Catalog Part “Valves”

Please ask us for detailed information.

Film Thickness Measurement

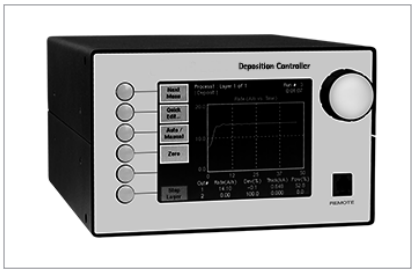
Various thin film thickness measuring instruments may be installed in the UNIVEX units.

The selection depends on the measurements needed and the required degree of automation.

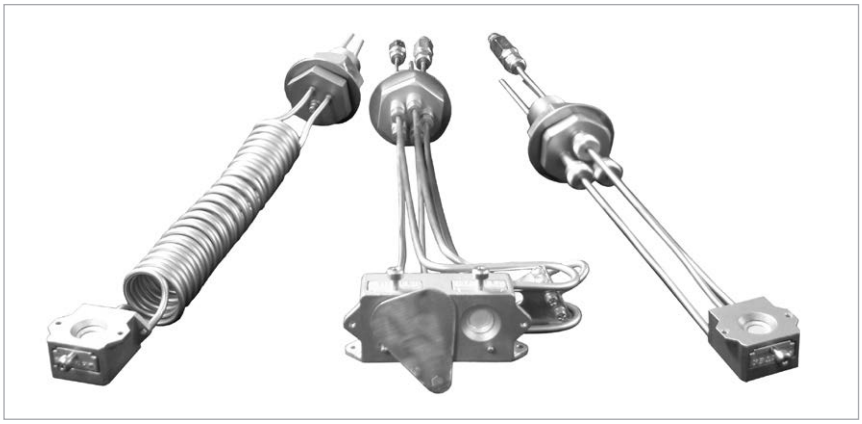
As standard, oscillating crystal systems are used. These may consist of one or several sensing heads with or without shutter, and upon request are available for UHV operation (i.e. are suitable for degassing).

The sensor head is driven either by a monitor (allowing only the measurement of deposition rate and film thickness) or by a controller (allowing measurement of the film parameters and control of the deposition rate).

Upon request we can provide an offer which specifically matches the requirements of your application.



Example of a thin film controller

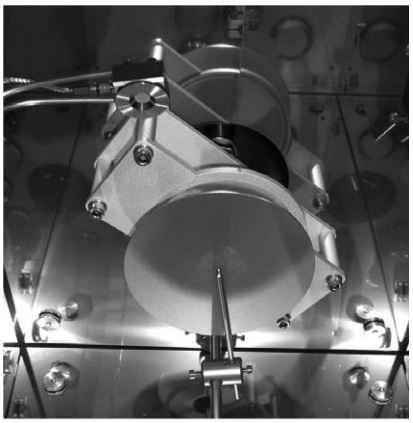


Examples of thin film measurement gauge heads

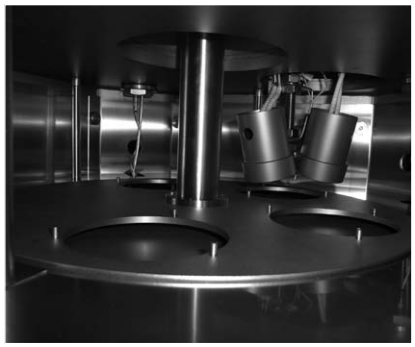
Substrate Rotation

To attain the desired film properties, a rotary movement of the substrates is very often necessary in deposition processes.

The Leybold UNIVEX system is available with a wide range of substrate rotation accessories.
A simple, manually operated rotation axis can be implemented just as a continuously revolving motor shaft or an angle positionable solution (for placement or transfer tasks).
In addition, coaxial drives with two independently operated rotating tables can be offered.



Motor driven rotary drive with a detachable substrate holder (bayonet coupling).
View from the bottom onto the closed substrate shutter

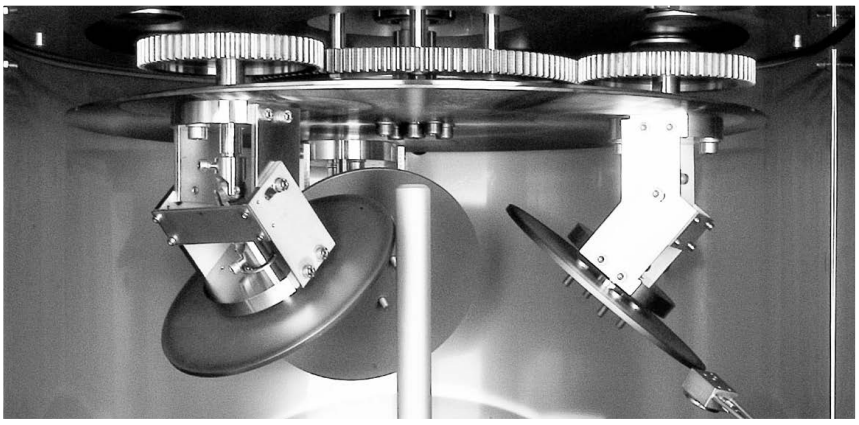


Coaxial hollow shaft drive for eccentric rotation and positioning of several substrates, with separate shutter table

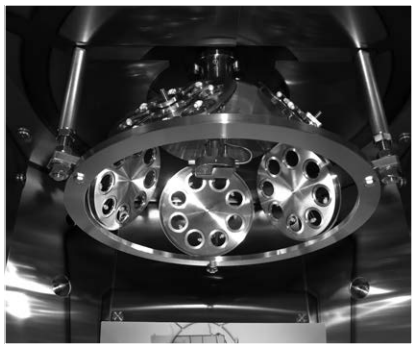
Planetary Drives

For high demands regarding thickness uniformity of the deposited film, planetary drives are suitable. Here the substrates, which are to be coated, are placed on so-called planets. The planets revolve eccentrically about a central axis but they additionally rotate about their own centre point.

Different types of planetary drives are possible depending on the specific kind of task (size and number of substrates, angle of inclination, throughput times).



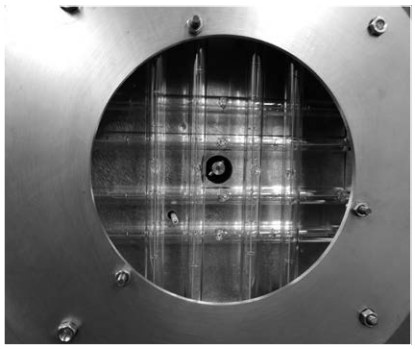
Planetary drive with gear drive and three planets, firmly installed, but where the angle is adjustable



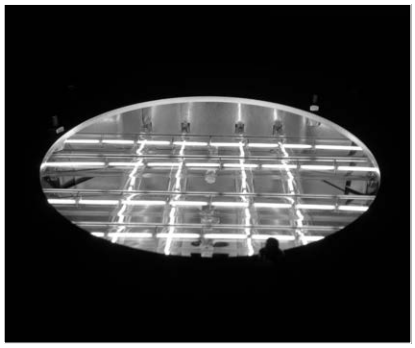
Planetary drive with central friction disc and five free-running planets

Our consulting experts are available to inform you about substrate movement options.
For these please ask us for a quotation.

Heating, Cooling, Tempering, Bias



Rotatable thermal radiation heater with quartz lamps

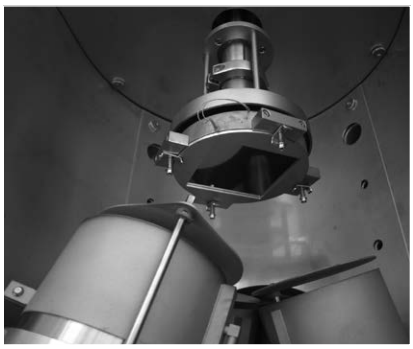


Rotatable thermal radiation heater with quartz lamps during heating operation

The thermal manipulation of substrates is an important method to optimise coating results. For this, Leybold Vacuum offers within the scope of its UNIVEX systems numerous solutions. Depending on requirements and technical feasibility, thermal solutions may also be combined with other properties for example rotation or substrate bias.

Substrate Heating

For temperature-controlled heating, different contact and thermal radiation heaters are available. The selection of the optimal solution depends above all on the desired temperature range, the substrate size and the substrate material.



Rotating contact heater based on the resistance heating principle

Rotating high temperature thermal radiation heater with SIC heating element

Substrate Cooling

Heat sensitive substrates or substrate coatings necessitate during the deposition process some kind of cooling. Leybold offers both inactively as well as actively cooled substrate holders. As cooling media, water, liquid nitrogen (LN_2) or special cooling liquids can be used.

Rotating and water-cooled substrate table

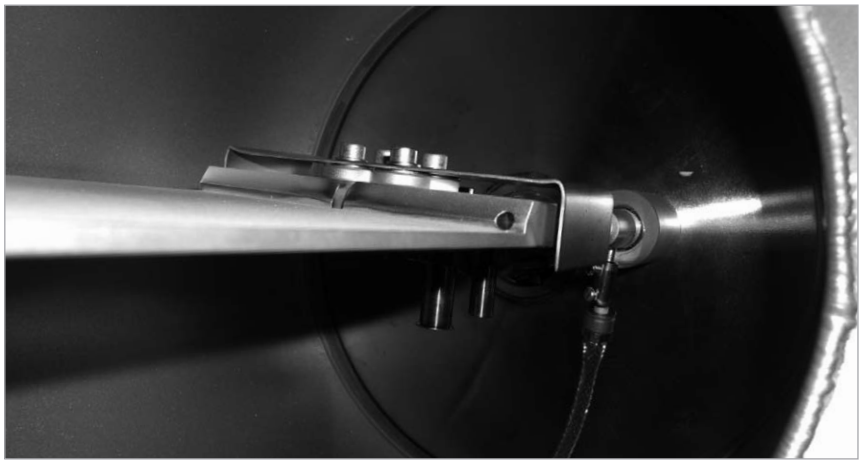
Substrate Tempering

Through the utilisation of a special temperature control liquid, it is possible to heat or also cool a substrate. The possible temperature range lies between approximately -50 °C and +150 °C for static substrate holders, respectively -20 °C and +100 °C for rotating substrate holders.

Rotatable and temperature controllable substrate holder with substrate shutter

Substrate Bias

Pre-cleaning of the substrate with RF or DC biasing prior to deposition can improve the adhesive properties of the film. Leybold offers insulated substrate holders and upon request matching power supplies.

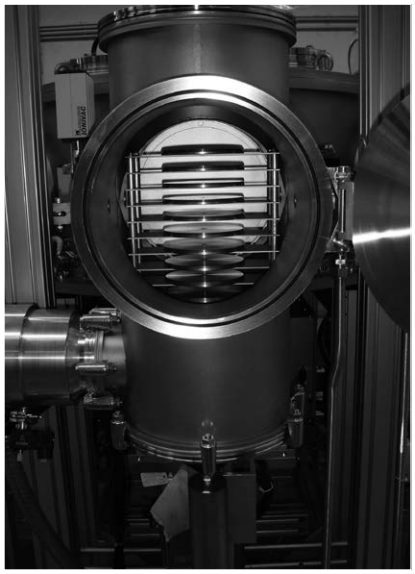


Insulated substrate fork with RF bias connection

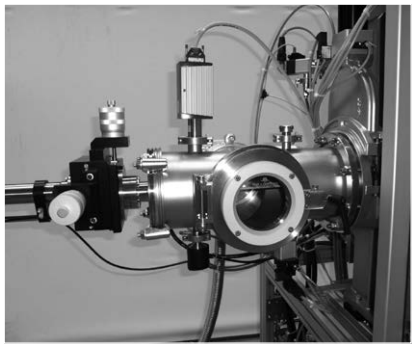
Load Lock Systems

To improve the process conditions and to increase coating throughput, frequently additional load lock chambers are used. These are connected to the process chamber and are vacuum-wise separated by a gate valve. By means of a transport facility (linear transfer rod, vacuum robot or alike) the substrate is transported between the chambers. The load lock system offers the advantage to save time during pumpdown and the ability to attain significantly better vacuum pressures in the process chamber, since it will not have to be vented when changing the substrates. Usually the load lock chamber will be significantly smaller compared to the process chamber.
Selection of the load lock chamber and the pump system as well as the design for the substrate transport facility depend on the specific kind of application.

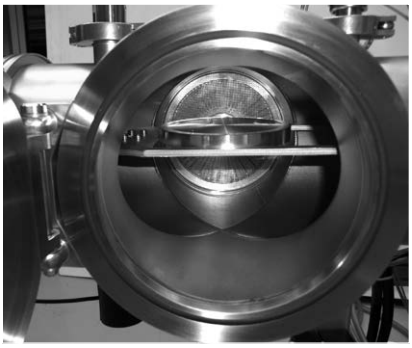
We shall be pleased to assist you as to the possibilities offered by a load lock system in your UNIVEX application.



Manually operated load lock chamber with substrate magazine



Load lock chamber for a single substrate with automatically operated linear transfer unit



View into the opened load lock chamber onto the substrate end effector

General Accessories

Blank-Off Screw Fitting

For 34.5 mm dia. hole.

Blank-off screw fitting

Technical Data — Blank-Off Screw Fitting

Material		Stainless steel
Seal		FPM (FKM)
Weight	kg	0.1

Ordering Information — Blank-Off Screw Fitting

	Part No.
Blank-off screw fitting	**030 40**

PS 113 A
Low Pressure Safety Switch

Safety interlock arrangements in connection with the UNIVEX system controller, respectively optionally connected power supply equipment (for sputtering or electron beam evaporation, for example).

PS 113 A Safety Switch

Technical Data — Low Pressure Safety Switch

Switching pressure	mbar	approx. 6 below atmospheric pressure
Return switching pressure	mbar	3 below atmospheric pressure
Switching inaccuracy	mbar	2
Switching contact		Changeover contacts, gold-plated, for prog. controls
Switching capacity	mA / V AC mA / V AC	100 / 24 30 / 24
Vacuum connection	DN	16 ISO-KF

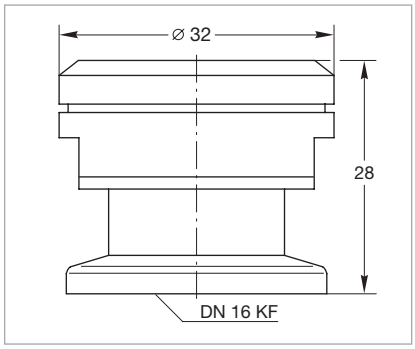
Ordering Information — Low Pressure Safety Switch

	Part No.
Low pressure safety switch PS 113 A, DN 16 ISO-KF; complete with 3 m long cable	**230 011**

see also Catalog Part “Measuring, controlling”

Overpressure Safety Valve

For protecting the vacuum chamber against atmospheric overpressure during gas inlet



Dimensional drawing for overpressure safety valve

Technical Data — Overpressure Safety Valve

Responding pressure	mbar	1150 ± 40, over-pressure
Flow at 140 mbar	l x h^{-1}	500
Valve disk		Spring loaded, with O-ring seal
Leak rate in the closed state	mbar x l x s^{-1} (Torr x l x s^{-1})	< 1 x 10^{-8} (< 0.75 x 10^{-8})
Connection	DN	16 KF

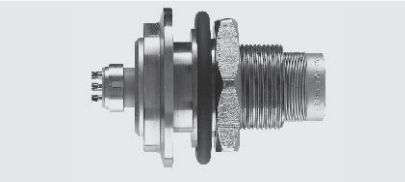
Ordering Information — Overpressure Safety Valve

	Part No.
Overpressure Safety Valve	**890 39**

see also Catalog Part “High Vacuum Pumps”

Vacuum Feedthrough for the Transfer of Electrical Signals

For installation in a 34.5 mm diameter installation bore.
Connection on the side of the atmosphere through a six-way plug (included in the delivery).
Connection on the vacuum side through a plug with soldered contacts (included in the delivery).



Vacuum feedthrough

Technical Data

		Vacuum Feedthrough
Rating per conductor	V A	max. 700 16
Seal		FPM (FKM)
Weight	kg	0.3

Ordering Information

	Vacuum Feedthrough Part No.
Vacuum feedthrough	**upon request**

Pneumatically Actuated Swivelling Shutter

For covering substrates or coating sources like thermal, respectively electron beam evaporators.
With pneumatic drive unit and shutter panel; for installation within installation bores having a diameter of 34.5 mm.

Technical Data

		Pneumatically Actuated Swivelling Shutter
Control voltage	V DC	24
Dimensions of the shutter panel	mm	upon consultation

Ordering Information

	Pneumatically Actuated Swivelling Shutter Part No.
Pneumatically actuated swivelling shutter	**upon request**

UNIVEX - Experimental vacuum coaters

Questionnaire

Customer _____

Substrate

Max. substrate dimensions _____
Substrate material(s) _____
Substrate per batch _____ pcs.

Substrate heating ☐ yes, max. temp. _____ °C at Substrate ☐ or at heater ☐
Substrate cooling ☐ yes, min. temp. _____ °C at Substrate ☐ or at cooler ☐
Substrate rotation ☐ yes
Substrate shutter ☐ yes

Substrate pre-treatment (cleaning)
Substrate bias ☐ RF ☐ DC
Ion beam ☐ yes
Sputter etching ☐ yes

Deposited film

Coating material(s) _____
Layers per substrate _____ pcs.

Any materials incompatible with your coating process (i.e. aluminum, copper, viton, etc.)

☐ yes, these materials are _____

Deposition process

Thermal evaporation ☐ **yes**
Number of sources ☐ pcs.
Number of power supplies ☐ pcs.
Source shutter(s) ☐ yes

Electron beam evaporation ☐ **yes**
Number of guns ☐ pcs.
Number and size of pockets _____ (e.g. 1 x 8cc, 4 x 8cc, 6 x 20cc ...)
Evaporating power ☐ 3 kW ☐ 5 kW ☐ 6 kW ☐ 10 kW
Source shutter(s) ☐ yes

Thickness measurement ☐ monitor ☐ controller

Magnetron sputtering ☐ **yes**
Target to substrate alignment ☐ confocal ☐ face to face
Source shutter(s) ☐ yes

Number of DC sputter sources ☐ pcs.
Target diameter ☐ 2" ☐ 3" ☐ 4" ☐ 6"
Targets with special size _____
Number of DC power supplies ☐ pcs.

Number of RF sputter sources ☐ pcs.
Target diameter ☐ 2" ☐ 3" ☐ 4" ☐ 6"
Targets with special size _____
Number of RF power supplies ☐ pcs.

Ion assisted deposition ☐ **yes**

Leybold Köln, HV System, 2016

Questionnaire

Gas inlet (required for all plasma processes)

Required gases
Gas inlet system ☐ MFC ☐ manual leak valve

Vacuum chamber

Best suited standard size ☐ yes
If not, then special size

Chamber wall tempering ☐ cooling ☐ heating (by water, max. 65 °C)

Additional load lock system ☐ manual ☐ automatic ☐ with magazine for ☐ substrates

Pump system

Fore-vacuum pump ☐ dry ☐ oil-sealed
High vacuum pump ☐ cryo ☐ turbomolecular

Process pressure mbar/ Torr
Ultimate pressure mbar/ Torr

System control

(Standard is PLC with automatic pump system control and manual deposition control)

Manual process control ☐ yes (i.e. manual deposition steps)
Semi-automatic proc. control ☐ yes (i.e. automatic single deposition steps)
Automatic process control ☐ yes (i.e. automatic coating batches, recipe-processing)

Installation

Location

in a clean room completely ☐ yes
in the clean room wall ☐ yes

Main power supply

Voltage V
Number of phases
Frequency Hz

Description of other process or system issues, if required

Commercial aspects

Estimated budget currency ☐ EUR ☐ USD ☐ CHF
Planned delivery date

Leybold Köln, HV System, 2016

Calibration Systems

General

CS Calibration Systems

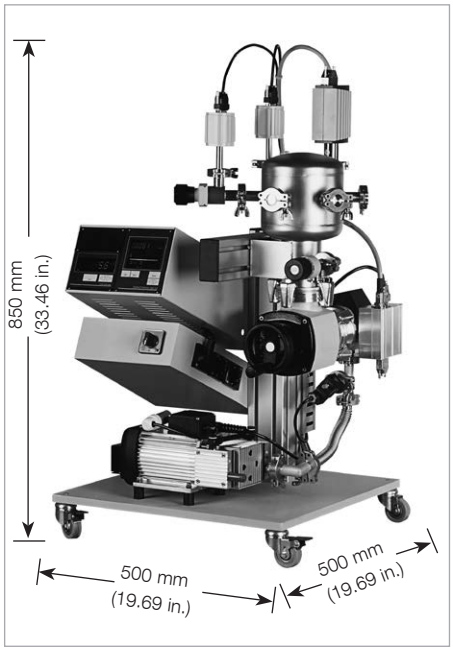
The requirements imposed on vacuum engineering with regard to accuracy of the measurements, reproducibility and unambiguity of the determined vacuum pressures have increased steadily over the last years

Routine calibrations of vacuum gauges are an important component of quality assurance schemes. The calibration systems from Leybold put the customer in a position to check and recalibrate on his own the specified and necessary accuracy of his vacuum gauges. Calibration systems are available for this purpose which cover a calibration range from 1000 mbar to 1 x 10^{-7} mbar (750 to 0.75 x 10^{-7} Torr).

Each system is equipped with several certified reference pressure sensors (transmitter standards), which each cover a part of the specified range of calibration pressures. In the pump system, turbomolecular pumps TURBOVAC with DIVAC diaphragm pumps are used. A variable leak valve is used to let the gas into the calibration chamber. In the case of the calibration system CS7, the gas inlet line is, moreover, equipped with it's own pump system.

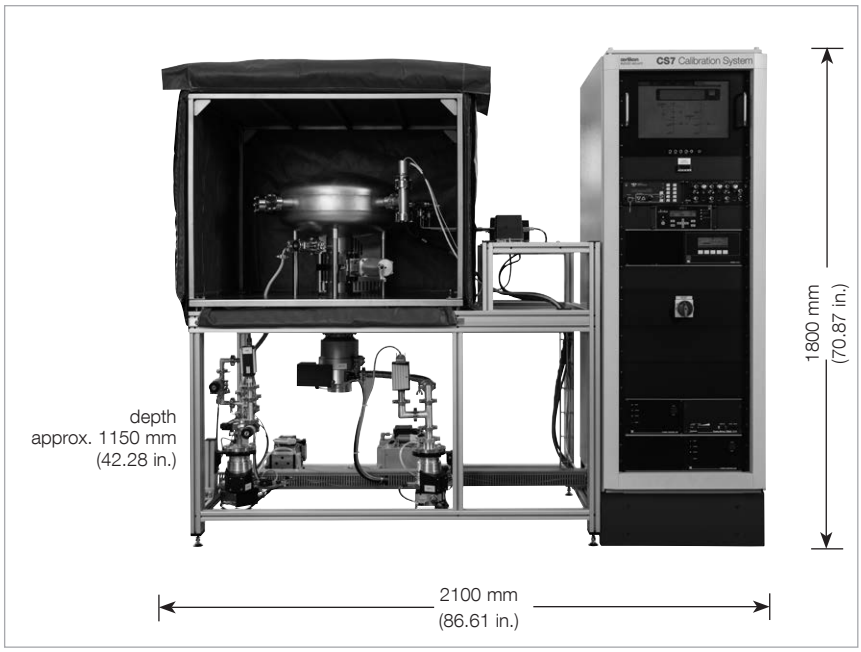
The CS 3 mobile is an implementation which may be easily transported in a space saving manner. To this end it may be disassembled in to 2 parts for subsequent on-site reassembly.

The CS7 is equipped with a heater for the vacuum chamber, for the purpose of attaining lower chamber pressures more rapidly. The temperature of the heating collars can be controlled whereby the maximum degassing temperature will depend on the components installed (flanges, pressure sensors, valves).



CS3 calibration system

Calibration system CS3 mobile



CS7 calibration system

Advantages to the User

- Vacuum gauges and measurement systems of any make may be calibrated
- Designed in accordance with DIN 28 418 resp. ISO/DIS 3567
- Transfer standards with PTB-, DAkkS- or factory certificate
- Easier DIN/ISO 9000 approval
- Reliable and reproducible measurements
- Quick start-up
- Measurement system free of hydrocarbons through the utilisation of dry compressing vacuum pumps
- Simple operation
- CE approval

Products

Technical Data		Calibration System	
		CS3 / CS3 mobile	CS7
Calibration range	mbar (Torr)	1000 to 1 x 10^{-3} (750 to 0.75 x 10^{-3})	1000 to 1 x 10^{-7} (750 to 0.75 x 10^{-7})
Pressure measurement range	mbar (Torr)	1000 to 2 x 10^{-6} (750 to 1.5 x 10^{-6})	1000 to 2 x 10^{-9} (750 to 1.5 x 10^{-9})
Vacuum chamber connections (in brackets: quantity available on the side of the customer's system)		5 (3) x DN 16 ISO-KF 1 (0) x DN 25 ISO-KF	6 (3) x DN 16 CF 6 (4) x DN 40 CF
Gas inlet		via variable leak valve	via variable leak valve
Extra pump system for admitting gas		no	yes
Heater for the vacuum chamber		no	yes

Application examples:
Which pressure sensors may be calibrated with which system?

Type of Sensor	Calibration System	
	CS3 / CS3 mobile	CS7
Diaphragm sensors		
BOURDONVAC	■	■
Capsule vacuum gauges	■	■
DIAVAC DV 1000	■	■
DI/DU 200/201/2000/2001	■	■
CTR 90, CTR 91, CTR 100 (1000 - 1 Torr full scale)	■	■
CTR 91 (0.1 Torr full scale) / CTR 101		■
THERMOVAC sensors		
TR 301, TR 306	■	■
TR 211, TR 216, TTR 211, TTR 216, TTR 90, TTR 91, TTR 96, TTR 100, TTR 101	■	■
SRG/VISCOVAC sensor (spinning rotor gauge)		
VK 201, SRG		■
PENNINGVAC sensors		
PR 25, PR 26, PR 27, PR 35, PR 36, PR 37, PTR 90, PTR 225		■
IONIVAC sensors		
ITR 90, ITR 100, ITR 200		■
IE 414, IE 514		■

Ordering Information	Calibration System	
	CS3 / CS3 mobile	CS7
	Part No.	Part No.
Ordering information and options	**upon request**	**upon request**

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