RUVAC WA/WAU 251/501/1001/2001

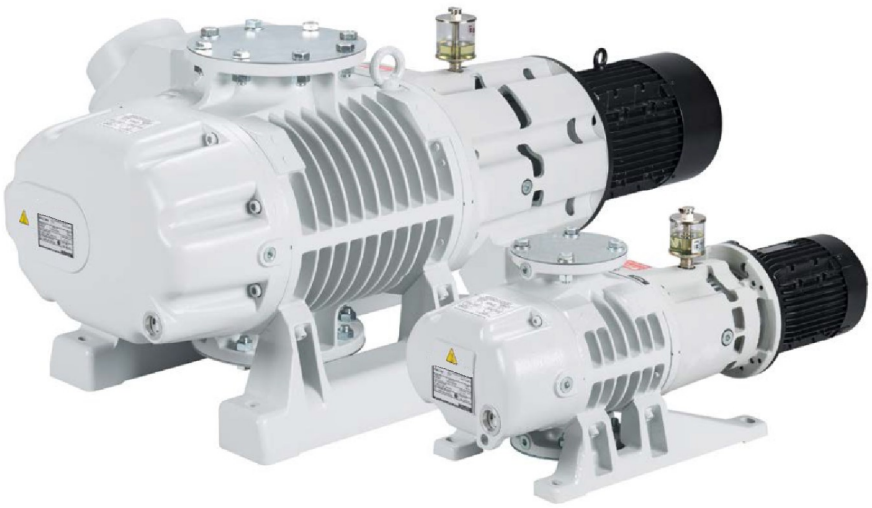
Roots vacuum pumps

Installation and Operating Instructions 300419381_002_C5

Part No:

112 54TE
113 22TE
117 20 TE
117 21/31/41/51 TE
117 34TE
118 31/41/51 TE
128 38TE
155 011VTE

with IE3 motors



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These Operating Instructions are a variants of translation of German Operating Instructions GA03107_001_C1.

Safety information

NOTICE

Obligation to Provide Information
Before installing and commissioning the pumps, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The Leybold **RUVAC WA/WAU** has been designed for safe and efficient operation when used properly and in accordance with these Operating Instructions. It is the responsibility of the user to carefully read and strictly observe all safety precautions described in this Section and throughout the Operating Instructions. **The pump must only be operated in the proper condition and under the conditions described in the Operating Instructions**. It must be operated and maintained by trained personnel only.
Consult local, state, and national agencies regarding specific requirements and regulations. Address any further safety, operation and/or maintenance questions to our nearest office.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to notify users of installation, operation, programming or maintenance information that is important, but not hazard related.

Figures
The references to diagrams, e.g. (4.1/2) consist of Section No., consecutive Fig. No. within the Section and the Item No. in the figure in that order.

We reserve the right to modify the design and the specified data. The illustrations are not binding.

Retain the Operating Instructions for further use.

0 Important Safety Information

0.1 Mechanical Hazards

WARNING

1 Avoid exposing any part of the human body to the vacuum.

2 Even during standstill of the RUVAC it is dangerous to grasp into the pump casing. Fingers can easily be squeezed between impellers due to the high inertia of the parts. Please use caution when grasping into the pump and make sure that the pump is secured against unwanted rotation due to differential pressures.

3 The crane eyes of the RUVAC pumps must not be used to lift any pump combinations (Roots + backing pump). Exceptions are allowed only with approval from Leybold. Secure the pump by the crane at the intended eyes until a firm connection has been established with the backing pump or a corresponding suspension has been installed.

4 Do not operate the pump with any of the covers removed. Serious injury may result.

5 Never operate the RUVAC without connected intake line or blank flange at the intake.

6 Make sure that the gas flow from the discharge port is not blocked or restricted in any way.

7 It is recommended to always only operate the RUVAC with a suitable discharge line which is properly connected.

8 If discharged gases must be collected or contained, do not allow the discharge line to become pressurized.

9 When moving the RUVAC always use the allowed means. Two crane eyes are provided on this pump as standard.

10 Do not allow the ingestion of any objects (screws, nuts, washers, pieces of wire, etc.) through the intake port of the pump. The use of the intake screen is strongly recommended. In case the pump is operated without intake screen the operator has to make sure that no objects can enter the pump through the intake port. Objects falling into the pump can cause severe damage including leaks to atmosphere.

11 Should malfunctions affect the pump, seized impellers in particular owing to hard deposits or foreign objects, the occurrence of leaks affecting the housing cannot be ruled out. When pumping hazardous gases the operator must ensure that the possibility of such an incident is excluded, respectively that leaks at the pump casing will not pose a hazard.

12 In order to prevent the destruction of equipment and injuries to the operating personnel, we urgently recommend to follow the installation instructions given in these Operating Instructions.

13 The pumps must only be operated at the permitted speeds. Especially when using frequency converters which have not been specifically approved by Leybold, you need to ensure an effective protection against over-speeding.

WARNING

0.2 Electrical Hazards

1 Potentially lethal voltages are present at the mains connections. Before beginning with any maintenance or service work on the RUVAC, disconnect the pump from all power supplies (lockout/tagout).

2 The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1. Note the national regulations of the country in which the equipment is in being operated.

3 Before initial commissioning install a suitable motor protection switch for the electric motor. Please note the information given in these Operating Instructions and on the electric motor (terminal diagram).

4 Before commissioning, check the junction box to ensure that it is undamaged, perform a visual inspection on the seals.

5 Install add-on parts (pressure switches, for example) without any tensions and protect these against damage by impacts, for example.

6 Lay the connecting lines so that they cannot be damaged. Protect the lines against humidity and contact with water. Avoid thermally stressing the lines due to unfavorable laying. Observe the required standards when designing and laying the electrical connections.

7 Provide strain relief for the connecting lines so that the plugs and the line connectors are not exposed to excessively high mechanical stresses.

8 Lay the electric lines so that there is no risk of tripping over these.

9 The RUVAC must be integrated in the system control arrangement so that the pump can not run-up automatically after it has been shut down due to overtemperature of the motor. This applies equally to emergency shut-down arrangements. After having determined the fault cause, the pump should be switched on manually again.

10 The following applies to pumps being operated with a frequency converter: after a mains power failure the pump will automatically start up again once the power returns.

0.3 Thermal Hazards

CAUTION

1 Hot surfaces, risk of suffering burns.
Under certain ambient conditions the pump may attain temperatures over 80° C. There then exists the risk of suffering burns. Note the danger symbols on the pump and in the case of a hot pump wear the required protection equipment.
If there is the risk of touching hot surface inadvertently, install corresponding protection. When working on a pump which is still warm from operation, always wear protective gloves.

2 The pump must only be operated at ambient temperatures between 12 and 40 °C. It needs to be ensured that the thermal radiation produced by the pump can be dissipated sufficiently. If the pump has to be operated at higher ambient temperatures than 40 °C for any reason, reduced max. differential pressures apply (derating). Please consult Leybold for further details.

3 Before any servicing and maintenance work always let the pump cool down first.

4 Note the warning information on the housing surface. If these warning notices have been removed, covered or obstructed, include corresponding additional warning information.

0.4 Hazards Caused by Materials and Substances

DANGER

1 The vacuum line must be leak tight. Hazardous process gases may escape or the pumped gases can react with air or atmospheric humidity. After installation of the pump and after servicing work on the vacuum system, a leak test will always be necessary.

When pumping hazardous gases we recommend a leak test on a regular basis. Leaks in the pump cannot be ruled out under all circumstances. When pumping hazardous gases, the operator must ensure that leaks at the pump will not be a hazard.

2 Since not all application related hazards for vacuum systems can be described in detail in these Operating Instructions, Leybold has available a separate document (Safety Booklet) in which the hazards and general safety concepts for design, operation and maintenance of vacuum systems are explained.

When planning to pump hazardous substances with this pump, read the related chapters in the Safety Booklet and in these Operating Instructions first. You can download the Safety Booklet from our homepage.

3 Contaminated parts can be detrimental to health and environment. Before beginning with any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

4 The user has to ensure that all appropriate safety codes and all safety procedures are applied in case of pumping toxic, chemically reactive, corrosive gases and/or pyrophoric substances. Before using the RUVAC pumps with toxic and/or aggressive gases, it is imperative that you consult your local Leybold office.

5 Leybold is not in a position to perform servicing (repairs) and waste disposal of radioactively contaminated pumps. Both needs to be ensured from the side of the user.

6 When pumping hazardous gases you must assume the presence of corresponding residues in the pump.

7 When changing the oil, remove any escaped oil as otherwise there exists the risk of slipping.

8 After having completed the installation work we recommend running of a leak test on the complete installation at an absolute pressure of 1100 mbar. Otherwise the possibility of escaping of process gases cannot be completely ruled out.

CAUTION

0.5 Ignition Risk

1 Basically the RUVAC pumps must not be used with flammable or explosive gases and vapors. In particular cases the composition of the substances may not be critical. In any case the user is obliged to analyse the situation carefully and to take appropriate precautions introduced by competent experts.

2 Before pumping oxygen (or other highly reactive gases) at concentrations exceeding the concentration in the atmosphere (> 21 % for oxygen) it will be necessary to use a special pump. Such a pump will have to be modified and degreased, and an inert special lubricant (like PFPE) must be used.

3 Before commissioning the RUVAC, make sure that the media which are to be pumped are compatible with each other so as to avoid hazardous situations. All relevant safety standards and regulations must be observed.

4 The standard version of the RUVAC is not suited for operation in explosion hazard areas. Contact us before planning to use the pump under such circumstances. Check based on the nameplates for which zone the pump is suited. Motor and accessories when installed within an explosion hazard zone must also be approved for this zone.

CAUTION

0.6 Noise Hazard

1 The noise level produced by the RUVAC is between 64 and 80 dB(A). When operating the pump temporarily at pressures above 100 mbar the noise level can be much higher. Make sure that suitable protection measures are taken to protect your hearing.

2 When the pump is being started with open flanges, a noise level which is detrimental to health will be produced. If such operation is unavoidable, then it is mandatory to wear hearing protectors (ear muffs).

0.7 Danger of Pump Damage

NOTICE

1 Do **not** use the pump for applications that produce abrasive or adhesive powders or condensable vapors that can leave adhesive or high viscosity deposits. Please contact Leybold Sales for selecting the right separator.

2 Vapors which condense upon being compressed within the pump to liquids must be avoided when their vapor pressure exceeds the vapor tolerance of the pump.

3 Before pumping vapors, the RUVAC should have attained its operating temperature. The pump will have attained its operating temperature about 1 hour after starting the pump. During this time the pump should be separated from the process by a valve in the intake line, for example.

4 In order to prevent the transfer of vibrations from the RUVAC to other parts of the system we recommend the use of corrugated hoses or compensators on both the intake and the discharge sides.

5 Do not use the RUVAC pumps in combination with backing pumps that have an ultimate pressure above 10 mbar. This prevents excessively high temperatures of the RUVAC in idle mode operation.

6 In the case of wet processes we recommend the installation of liquid separators upstream and downstream of the pump so as to avoid a massive influx of liquid into the pump.

7 The discharge line should be laid so that it slopes down and away from the pump so as to prevent condensate from backstreaming into the pump.

8 The ingress of particles and liquids must be avoided under all circumstances.

9 Before installing, all flange covers must be removed.

10 The location where the RUVAC is installed must be selected such that all controls are easily accessible.

11 In order to ensure an adequate supply of oil, the location at which the RUVAC (including its accessories) is operated should be such that angles over > 1° from the vertical are avoided.

Description

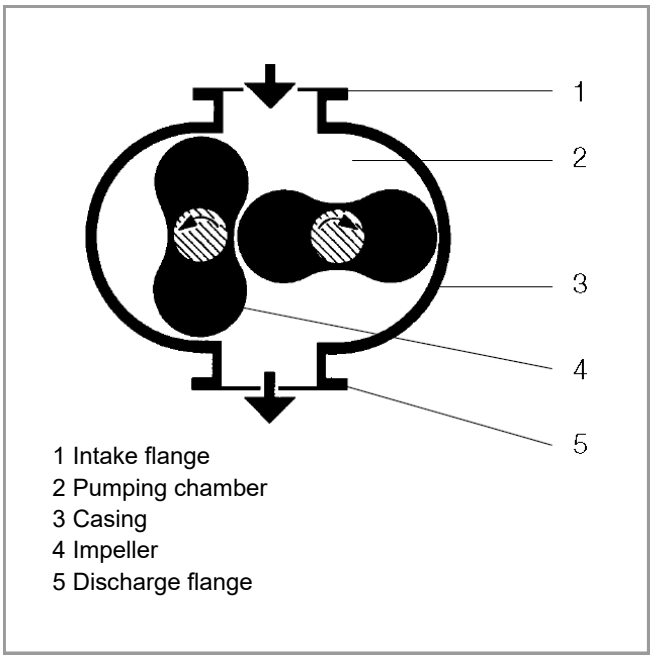


Fig. 1.1 Schematic cross-section of a Roots pump (vertical flow)

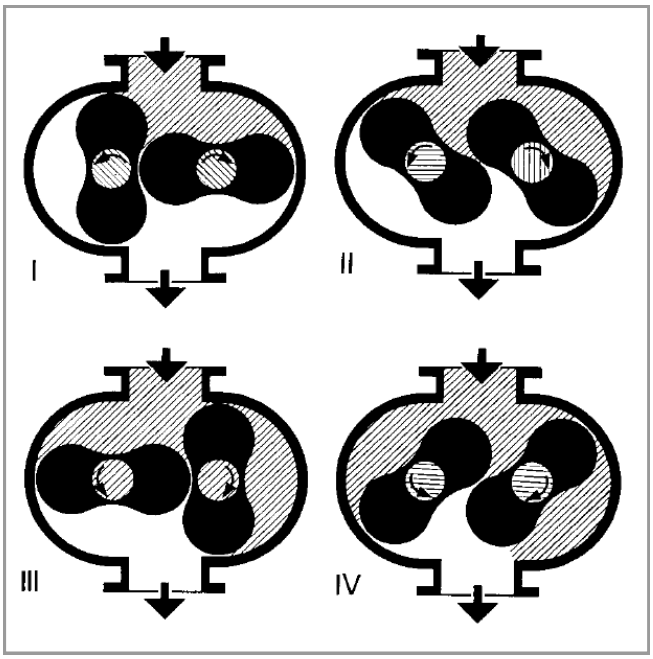


Fig. 1.2 Functional diagram of a Roots pump (vertical flow)

1 Description

1.1 Design and Function

The RUVAC WA and RUVAC WAU are Roots vacuum pumps which are driven directly by an electric motor.

The WAU types have a pressure balance line between the discharge and intake flange.

Standard RUVAC pumps are not suited for pumping of oxygen when the oxygen concentration exceeds that in the atmosphere.

Before planning to use RUVAC pumps for pumping of highly aggressive gases, contact us.

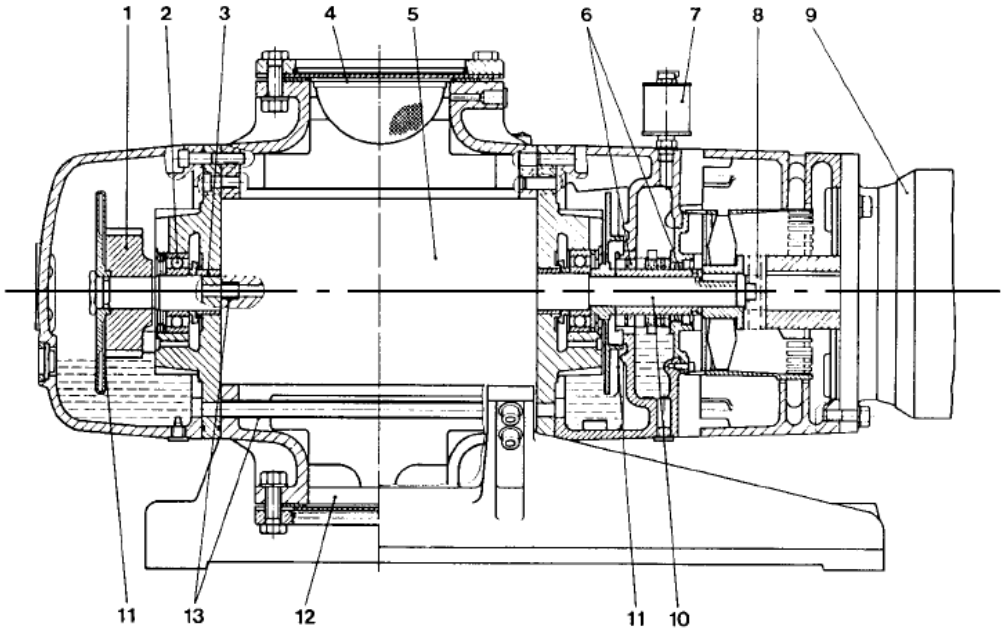
1.1.1 Principle of Operation

Roots pumps - also known as Roots blowers - contain in their pump casing two symmetrical impellers rotating in opposite directions (see fig. 1.1). The impellers have roughly the cross section of a figure “8” and are synchronized by a toothed gear so that they move past each other and the casing without contact but with a small clearance.

The principle of operation is explained in fig. 1.2.

In impeller positions I and II, the volume in the intake flange is increased. When the impellers rotate further to position III, part of the volume is sealed off from the intake side.

In position IV, this volume is opened to the discharge side, and gas at backing pressure (higher than the intake pressure) flows in. The inflowing gas compresses the gas volume pumped from the intake side. As the impellers rotate further, the compressed gas is ejected via the discharge flange. This process occurs twice per complete revolution of each of the two impellers.



1	Gearwheels	8	Coupling
2	Bearings	9	Motor
3	Impeller seals	10	Drive shaft
4	Intake port	11	Centrifugal disc lubricator
5	Impellers	12	Discharge port
6	Shaft seals	13	Connecting pipes
7	Oiler		

Fig. 1.3 Longitudinal section of a RUVAC WAU 2001 (vertical flow)

Due to the non-contacting rotation in the pumping chamber, Roots pumps can be operated at high speeds (standard n = 3,000 rpm at a mains frequency of 50 Hz). Thus a relatively high pumping speed is attained with small pumps.

The pressure differential and compression ratio between the intake and discharge sides are limited on Roots pumps. If the allowable pressure differential is exceeded, the pump overheats.

In practice, the maximum attainable pressure differential is significant only in the rough vacuum range ($p > 10$ mbar), whereas for pressures in the fine vacuum range ($p < 1$ mbar) the attainable compression ratio is decisive.

RUVAC WA/WAU pumps have been specifically designed for operation in the rough and fine vacuum ranges. They are thus either used in connection with backing pumps or in closed gas cycles.

Power consumption of the pump depends on
- the volume of the pump chamber
- the speed of the pump
- the existing pressure range
- the pressure difference between the inlet and the discharge flange (see fig. 1.7)
- and the type of gas to be pumped.

Description

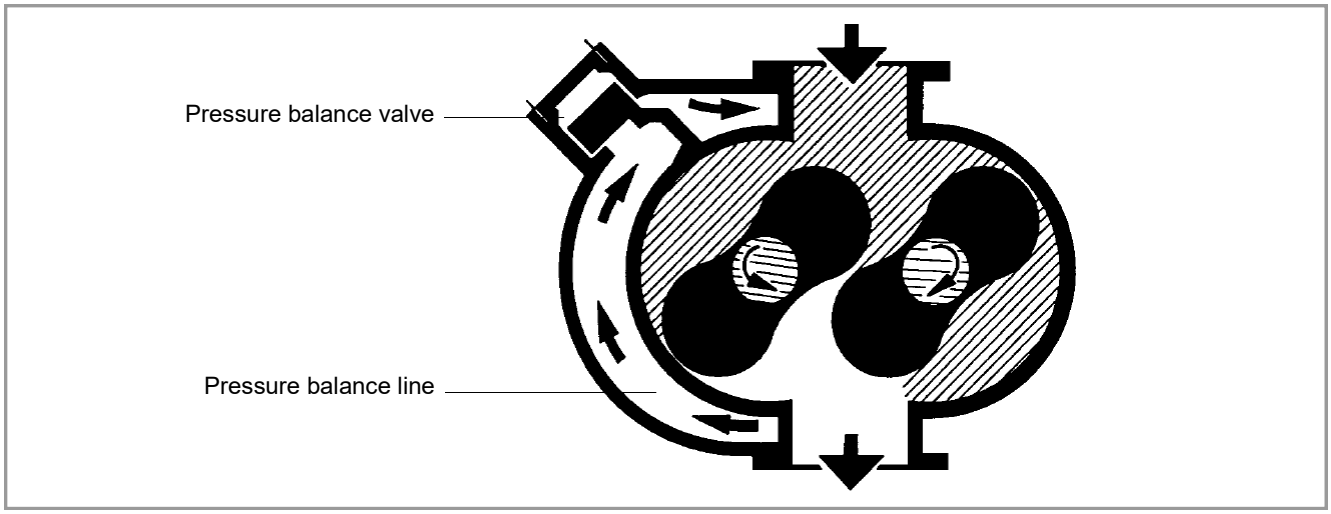


Fig. 1.4 Schematic diagram of a Roots pump with pressure balance line

1.1.2 Design

RUVAC Roots pumps can pump gas in the vertical or horizontal direction.

Although the pumping chamber of Roots pumps is free of sealing agents and lubricants, the two gearwheels of the synchromesh gearing and the bearings are lubricated with mineral oil (see fig. 1.3). The gearwheels and bearings of the RUVAC are located in two side chambers which also contain the oil supply.

These two side chambers are separated from the pumping chamber by the impeller seals. During operation of the pump, the side chambers are evacuated via the impeller seals.

The side chambers are linked to each other by two passages. These passages are arranged so that for either horizontal or vertical flow the pressure will be equalised between the oil supplies.

In both side chambers there are integrated oil pumps to ensure that the bearings and gearwheels receive sufficient lubricant at all recommended speeds.

The motor of the RUVAC WA/WAU is directly flanged to the coupling housing. One shaft of the pump is linked to the shaft of the motor by an elastic coupling. The shaft of the other impeller is driven via the synchromesh gear.

With the standard motors, the RUVAC WA/WAU can run on either 50 Hz or 60 Hz power supplies.

The speed is then increased to 3,600 rpm and the pumping speed increases correspondingly.

The feedthrough of the impeller’s shaft between the evacuated bearing space and the atmosphere is sealed by means of shaft seals. The shaft seals are immersed in oil. They are located in a seal housing with a separate oil reservoir. The oil level in the shaft seal housing can be checked at oiler.

RUVAC WA/WAUs are air-cooled. The airflow for cooling the motor and pump is produced by a fan which sits on the motor.

An additional blade wheel is located on the coupling for additional cooling.
The pumps are lubricated with our vacuum pump oil LVO 130.

1.1.3 Pressure Balance Line

The RUVAC WA/WAU has an integrated pressure balance line. It links the discharge and intake flanges via a pressure balance valve.

If the pressure differential between the flanges is too large, the valve opens. Some of the gas which has already been pumped then flows back through the line to the intake flange.

The valve is weight- and spring-loaded so that it works with both vertical and horizontal flow of the pump.

In the case of 50/60 Hz operation and due to the pressure balance line, no additional controlling equipment will be needed to protect the pump against pressure differences which are too high (see section 4.1). The RUVAC can then be switched on together with a backing pump at atmospheric pressure. Thus the pumping speed of the pump combination is increased also at high intake pressures.

Some models are equipped with an ACE shock absorber in the pressure balance line. In the case of pressure bursts this prevents the valve from making contact at the cover. This reduces valve noise and increases its durability.

In the case of short cycle operation we recommend the use of a gear chamber evacuation facility so as to avoid oil spreading, see Section 1.5.

NOTICE

The pressure balance valve will not protect the pump from thermal over-load if opened continuously.

1.1.4 Lubricants

The standard RUVAC WA/WAU pumps are ready for operation with mineral oil.

In case of operation with mineral oil we recommend our vacuum pump oil LVO 130.

WA/WAU pumps running with a filling of PFPE today no longer meet the world-wide requirements for semiconductor processes. For such applications the WS/WSU models should be preferred.

1.2 Standard Specification

RUVAC WA/WAUs are supplied for vertical flow as standard. The shaft seal housing is supplied with a filling of oil.

Before the pump is shipped the oil has been drained out. The quantity of oil needed for running the pump is supplied in a separate container.
The intake flanges of all pumps contain an inlet screen and have been vented with nitrogen for protection against corrosion. The flanges are sealed with galvanized sheets equipped with sealing lips.

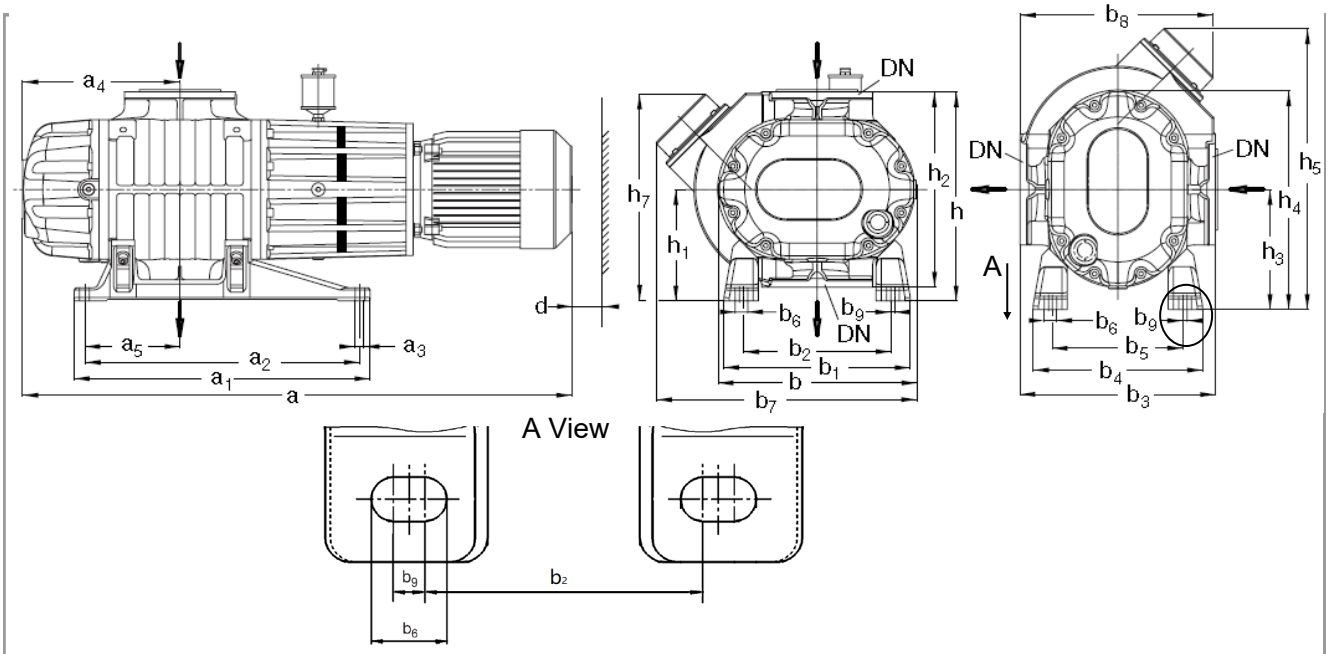
The WA/WAU models without a motor have been prepared for operation in connection with a motor which complies with the IEC standard. The motor flange is sealed with a iron disc. The coupling is included with the pump.

Description

1.3 Technical Data

RUVAC WA/WAU		251	501	1001	2001
Nominal pumping speed at 50 Hz [1]	$m^3 . h^{-1}$	253	505	1000	2050
Max. pumping speed at 50 Hz	$m^3 . h^{-1}$	210	410	800	1850
Nominal pumping speed at 60 Hz [1]	$m^3 . h^{-1}$	304	606	1200	2460
Max. pumping speed at 60 Hz	$m^3 . h^{-1}$	251	530	1000	2100
■ with backing pump TRIVAC ■ with backing pump SOGEVAC		D 65 B -	- SV 200	- SV 300	- SV 630 F
Ultimate partial pressure [2]	mbar	$< 2 . 10^{-5}$	$< 8 . 10^{-3}$	$< 8 . 10^{-3}$	$< 8 . 10^{-3}$
Ultimate total pressure [2]	mbar	$< 8 . 10^{-4}$	$< 4 . 10^{-2}$	$< 4 . 10^{-2}$	$< 4 . 10^{-2}$
Poss. Cut-in pressure[2] - RUVAC WA	mbar	90	100	60	30
Maximum allowable pressure differential in continuous operation[3]	mbar	80	80	80	50
Leak rate, integral	$mbar \cdot l \cdot s^{-1}$	$\leq 5 \cdot 10^{-4}$			
Permissible ambient temperatures	°C	12 - 40			
Main supply IEC motor[7]	V	200-240/ 380-460			
Temperature class		F	F	F	F
Motor power	kW	1.1	2.2	4.0	7.5
Nominal speed, 50/60 Hz	min^{-1}	3000 / 3600			
Max. permissible speed	min^{-1}	3600			
Motor protection category	IP	55			
Oil filling for the bearing chamber[4] vertical pumping action, approx. horizontal pumping action, approx.	 l l	1. Filling [5] / 2. Filling 0.5 / 0.4 0.5 / 0.4	1. Filling [5] / 2. Filling 0.9 / 0.8 0.8 / 0.7	1. Filling [5] / 2. Filling 2.0 / 1.8 1.2 / 1.1	1. Filling [5] / 2. Filling 4.2 / 3.6 2.0 / 1.8
Oil filling of the shaft sealing ring housing	l	0.6	1.0	1.3	1.6
Connection flanges	DN	63 ISO - K	63 ISO - K	100 ISO - K	160 ISO - K
Weight WA/WAU	kg	90/94	137/142	239/254	446/452
Noise level [6]	dB (A)	< 64	< 67	< 75	< 80

1) To DIN 28 400 and subsequent numbers.
2) With double-stage rotary vane vacuum pump TRIVAC, resp. single-stage rotary vane vacuum pump SOGEVAC (Type of backing pump look at max. pumping speed). When using 2-stage backing pumps the ultimate pressures will be correspondingly lower.
3) Applicable for ratio up to 1 : 10 between backing pump and Roots vacuum pump at 3000 rpm
4) Authoriative, however, is the oil level at the oil-level glass.
5) After a complete disassembly.
6) At an operating pressure below $< 10^{-1}$ mbar ($< 0.75 \times 10^{-1}$ Torr).
7) Motor voltage and current may deviate depending on the type of motor.
Please always note the information on the nameplate.



Type	DN	DN_1	a	a_1	a_2	a_3	a_4	a_5	a_6
WA/WAU251	65	63 ISO-K	735	405	365	14	209	120	194
WA/WAU501	65	63 ISO-K	840	486	450	14	237	155	218
WA/WAU501H	65	63 ISO-K	840	486	450	14	237	155	218
WA/WAU1001	100	100 ISO-K	1059	560	520	16.5	298	180	262
WA/WAU1001H	100	100 ISO-K	1059	560	520	16.5	298	180	262
WA/WAU2001	150	160 ISO-K	1277	800	740	18	367	220	310
WA/WAU2001H	150	160 ISO-K	1277	800	740	18	367	220	310

	b	b_1	b_2	b_3	b_4	b_5	b_6	b_7 1)	b_8 1)
WA/WAU251	250	270	210	280	230	170	24	305	285
WA/WAU501	310	299	229	320	271	201	24	390	313
WA/WAU501H	310	299	229	320	271	201	24	414	330
WA/WAU1001	376	352	278	370	320	246	24	494	366
WA/WAU1001H	376	352	278	370	320	246	24	524	398
WA/WAU2001	463	518	388	460	422	292	23	638	456
WA/WAU2001H	463	518	388	460	422	292	23	642	460

	b_9	d	h	h_1	h_2	h_3	h_4	h_5 1)	h_6	h_7 1)
WA/WAU251	7.5	50	300	160	280	180	306	360	330	307
WA/WAU501	7.5	50	340	180	320	194	348	430	370	332
WA/WAU501H	7.5	50	340	180	320	194	348	430	370	350
WA/WAU1001	7.5	50	396	211	370	227	414	532	425	392
WA/WAU1001H	7.5	50	396	211	370	227	414	564	425	424
WA/WAU2001	7.5	50	530	300	460	348	578	753	541	523
WA/WAU2001H	7.5	50	530	300	460	348	578	760	541	530

1) For RUVAC WAU only.
Outside dimensions +/- 3mm
DN1 = ND 6 pump flange in accordance with DIN2501
DN1 = Collar flange with gasket for connecting ISO-K standard components

Fig. 1.5 Dimensional drawing for the RUVAC WA/WAU pumps

Description

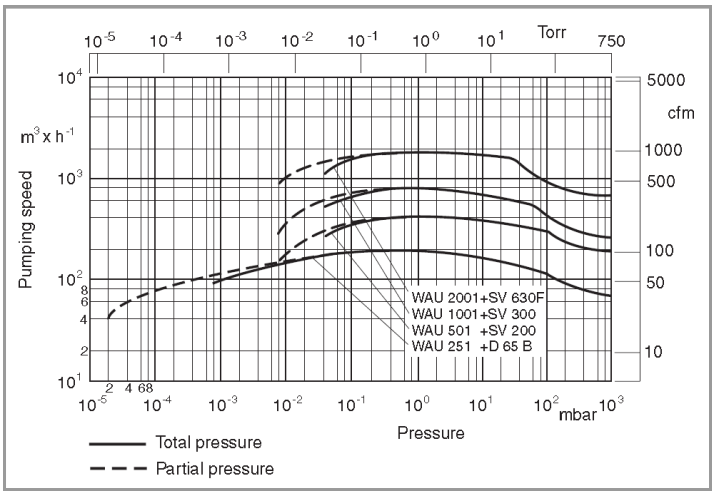


Fig. 1.6 Pumping speed of the RUVAC WA/WAU, 50 Hz

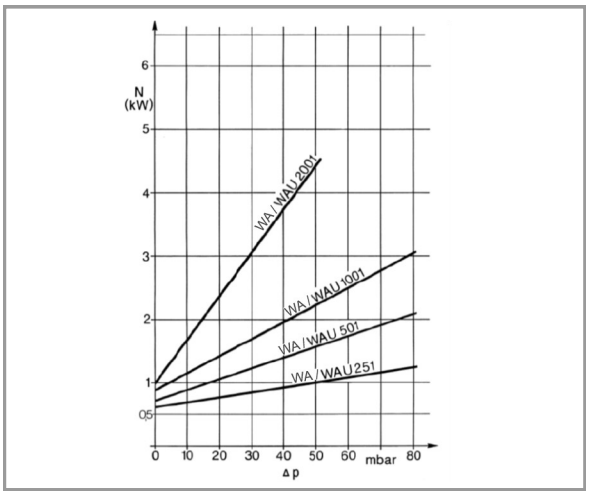


Fig. 1.7 Power consumption of the RUVAC WA/WAU

1.3.1 Motor Data

		WA(U) 251	WA(U) 501	WA(U) 1001	WA(U) 2001
Motor Type		AL80-02	AL90S/L-02	AL112M-02	AL132S-02
Motor Power 50/60Hz		1.1 kW	2.2 kW	4.0 kW	7.5 kW
Number of phase		3			
Number of pole pairs		1			
Nominal Frequency		50/60 Hz			
Nominal rotating speed 50Hz 60Hz		2840 rpm 3400 rpm	2870 rpm 3450 rpm	2900 rpm 3480 rpm	2900 rpm 3480 rpm
Nominal voltage and nominal current 50Hz	△	220-240 V / 4.3A	220-240 V / 7.9A	200-240 V / 14.7A	220-240 V / 24.8A
	YY	200 V / 4.8A	200 V / 8.9A	-	200 V / 27.6A
	Y	380-415 V / 2.5A	380-415 V / 4.6A	380-415 V / 7.9A	380-415 V / 14.4A
60 Hz	△	220 V / 4.0A	220 V / 7.6A	200-220 V / 14.5A	220 V / 24.2A
	YY	200 V / 4.4A	200 V / 8.4A	-	200 V / 26.7A
	Y	380 V / 2.3A	380 V / 4.4A	380 V / 7.7A	380 V / 14.0A
	Y	440-460 V / 2.1A	440-460 V / 4.0A	440-460 V 7.0A	440-460 V 12.4A
Nominal efficiency[%]					
50 Hz 220-230-240/380-400-415 V （IEC 60034-1)	100%	82.8/82.8/82.8	85.9/85.9/85.9	88.1/88.1/88.1	90.1/90.1/90.1
	75%	82.9/82.9/82.8	85.9/85.9/85.1	87.9/88.1/88.1	90.1/90.1/89.2
	50%	82.3/80.7/79.0	84.1/84.2/83.2	86.3/85.8/85.8	88.6/88.2/87.5
60 Hz 200-220/380-440-460 V (IEC 60034-1)	100%	84.0/84.0/84.0/84.0	86.5/86.5/86.5/86.5	88.5/88.5/88.5/88.5	90.2/90.2/90.2/90.2
	75%	83.3/83.5/83.2/82.5	86.0/85.7/86.2/85.7	86.3/87.5/88.5/87.9	89.1/89.5/89.5/89.5
	50%	81.5/82.0/80.2/78.9	85.4/85.0/85.1/84.5	85.4/86.3/86.0/86.0	87.6/88.3/88.1/87.3
Max. ambient temperature		40°C			
Type of protection		IP55			
Max. installation height		1000m			
Supplier		WEG Nantong			

Description

1.4 Ordering data

Roots vacuum pump	WA/WAU 251	WA/WAU (H) 501	WA/WAU(H) 1001	WA/WAU(H) 2001
RUVAC WA	117 20TE			
WA with horizontal flow	-	128 38TE	-	
RUVAC WAU	117 21TE	117 31TE	117 41TE	117 51TE
WAU with horizontal flow	-	-		-
RUVAC WA, without Motor	-	117 34TE	-	112 54TE
RUVAC WAU, without Motor	155 011VTE	-	-	113 22TE
WAU H with ACE vibration absorber	-	118 31TE	118 41TE	118 51TE
Mandatory Accessories				
Collar flange with retaining ring, DN 2501 For connection to flange system DN...ISO-K				
DN 63 ISO-K	267 47 T	267 47 T	-	-
DN 100 ISO-K	-	-	267 50 T	-
DN 160 ISO-K	-	-	-	267 51 T
Accessories				
RUVAC WA/WAU (H) seal kit	194 60	194 64	194 68	194 72
ACE vibration absorber	-	200 03 251	200 03 252	100 22
Spare parts				
Shaft sealing ring replacement kit WA/WAU	EK 110 002 661	EK 110 002 661	EK 110 002 662	EK 110 002 662
Major maintenance kit WA	EK 110 002 663	EK 110 002 664	EK 110 002 667	EK 110 002 669
Major maintenance kit WAU	EK 110 002 665	EK 110 002 666	EK 110 002 668	EK 110 002 670

Accessories for all RUVAC WA/WAU

		Part Nos
Temperature sensor (Pt 100)		155 010
Oil drain facility (M 16 x 1.5)		
■ with straight drain coupling		190 02
■ with right-angled drain coupling		200 14 271
Pressure switch PS 115 (stainless steel) adjustable		160 04
Pressure switch adjustment		160 05
Accessories for mounting PS 115		
Adapter		168 40
Right-angle bend DN 16 KF		184 36
Centering ring DN 16 KF, 2 x		183 26
Clamping ring DN 16 KF, 2x		183 41
Contact amplifier SV 110, 230 V		160 78
Mineral oil LVO 130	1 litre	L13001
	5 litres	L13005
	20 litres	L13020
	208 litres	L13099

2 Transport and Storage

Roots pumps are heavy machines made of cast iron and thus should only be lifted using suitable lifting equipment tied to the eyes provided for this purpose, see Fig. 2.1.

When the pump is removed from the shipping container it has to be secured with suitable lifting equipment until it is safely bolted on either a vacuum flange or a rack that is stable enough to support the weight of the pump. If bolted to a forevacuum pump or a rack, sufficient tilt resistance has to be ensured.

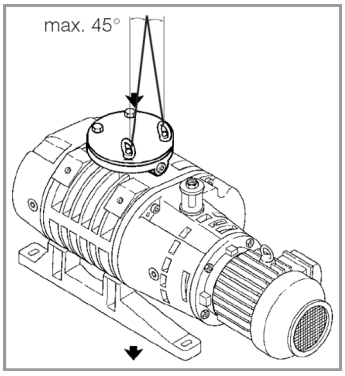


Fig. 2.1 Transport

When connecting or removing the pump, do not step under hoisted loads. Notice safety information 0.1.

CAUTION

Before transporting the pump always drain out the oil (see Section 5.2). Screw the oil-drain plug with its gasket back in and wipe any oil droplets off from the casing. It will not be required to drain out the oil from the shaft seal housing (oiler).

The pump should be transported and stored in a horizontal position (5° max. tilt). Otherwise the oil from the shaft seal housing (oiler) may drain. In addition, there is the danger that oil from the side chambers may enter the pump chamber, even before the pump is filled with oil for the first time.

NOTICE

When storing the pump for a longer period of time (> 2 weeks) the flanges should be sealed off with a piece of foil. Place a bag with desiccant in the pump chamber, if required. Before operating the pump once more do not forget to remove this bag first.

Temperature	-20 °C to +60 °C
Storage site	dry
Maximum atmospheric humidity	95 %, non-condensing

The area of the motor (fan and slits at the flange of the motor) must be protected against dust and dripping water.

Installation

1 Discharge flange
2 Oil-level glass
3 Crane eye
4 Oil-fill port
5 Collar flange
6 Connection for pressure switch
7 Adapter
8 Pressure switch
9 Centering and clamping ring
10 Right-angle bend
11 Oiler
12 Direction-of-rotation arrow
13 Junction box
14 Fan cowl

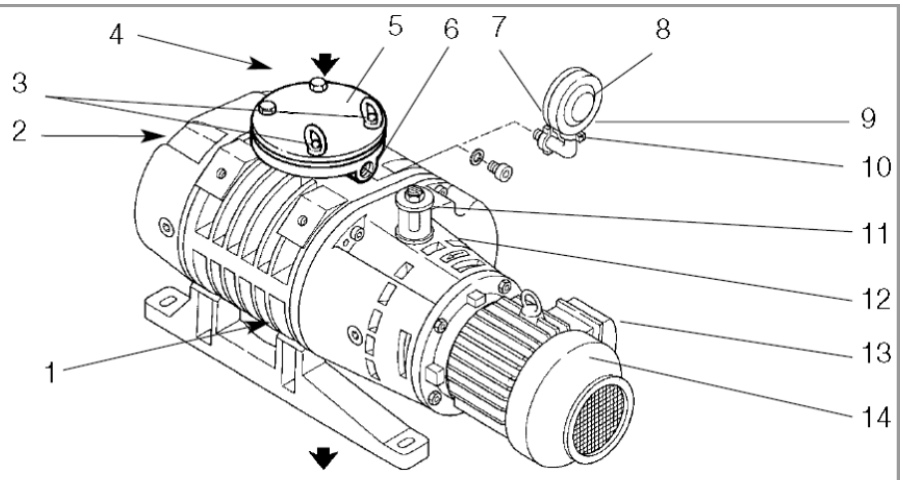


Fig. 3.1 Connections and controls

NOTICE

3 Installation

Only fill in the oil after having installed the pump.

3.1 Installation

Install RUVAC WA/WAU pumps on a flat, horizontal surface (1° max. tilt).

NOTICE

If the pump is not level, lubricant may enter the pumping chamber from the gear chambers.

Keep the air intake and exhaust ducts for cooling the motor unobstructed (for minimum clearance with respect to the fan cowl, see Fig. 1.5).

The pump's ambient temperature should be between 12 °C and 40 °C .
Lower temperatures hamper run-up; higher ones shorten the lubricant change intervals and may lead to greater wear.

Special oil for operation at temperatures below 12 °C is available upon request.

Secure the pump. Four bores in the feet are provided for this purpose.

NOTICE

When bolting the feet down, make certain that there is no stress or twist on the pump casing. Stress on the pump can change the close tolerances between the impellers and the pump casing and may result in damage to the pump (use washers to equalise).

Since compensation elements must be attached to the flanges on the suction and pressure sides, the screws for attachment of the feet must always be fitted and tightened.

Use the following screws:
RUVAC 251/501 : 4 x M 12
RUVAC 1001/2001 : 4 x M 16

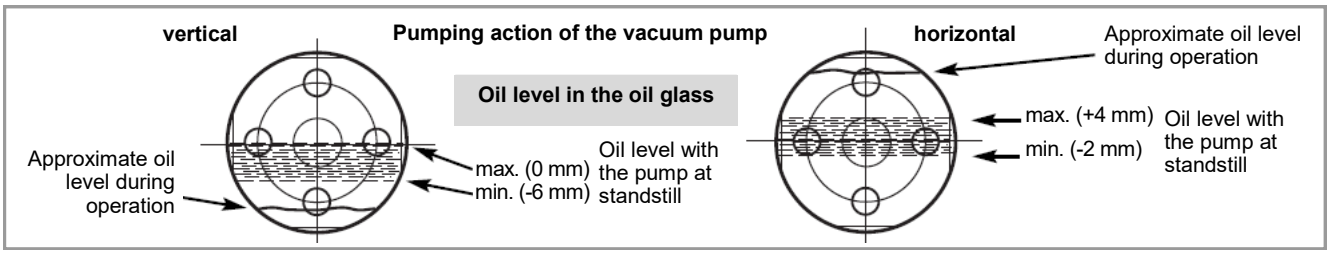


Fig. 3.2 Oil level in the oil level viewing glass: WAU 251-2001 with LVO 130

3.1.1 Filling in of the oil

The housing for the shaft seal and the oiler are filled with oil when the pump is supplied. The oil level must be visible in the oiler.

Correct oil level: 1/3 of the oiler must be filled when the pump is cold. Top up oil as required.

The lubricant needed for running the pump is supplied in a separate container.

Unscrew the oil-fill plug and add oil.

An oil without additives and of viscosity class ISO VG 100 (formerly SAE 30) must be used for the pump. We recommend our special oil LVO 130. Please consult us if you intend to run the pump with other oils or special lubricants.

NOTICE

The oil filling levels stated in Fig. 3.2 which apply to switched off pumps (at standstill) must be correctly maintained.

If the oil level is too low, the bearings and gearwheels are not lubricated adequately; if it is too high oil may enter the pumping chamber or the pump may overheat.

Clean the oil-fill port and screw the plug back in using a gasket which is in perfect condition.

The oil-fill port must be sealed air-tight. Entry of air from the outside may cause oil-containing gas to enter the pumping chamber via the impellers seals.

3.2 Conforming Utilisation

The RUVAC pumps are vacuum pumps which in connection with suitable backing pumps are capable of pumping gases and vapours.

They are employed to increase the pumping speed of backing pumps below 10-100 mbar by a very significant factor or for the purpose of attaining a lower ultimate pressure.

Accessories which have not been specified by Leybold may only be used after approval by Leybold.

3.2.1 Non-conforming Utilisation

Non-conforming utilisations for the pump are among others:

- Pumping of gases and vapours for which the materials of the pump are not suited.
- Pumping of condensable vapours without adequately controlling the temperature of the pump. Upon compression in the pump, these vapours may condense or form deposits.
- Pumping of dusts and solids without suitable screens and filters.
- Pumping of liquids.
- Pumping of ignitable gas mixtures.
- Operation at an impermissibly high differential pressures.
- Pumping of process gases which form hard or sticky deposits which may cause the pump to seize.
- Use of pump and frequency converter in explosion hazard areas.
- Non-compliance with the described maintenance and service intervals.
- Use in systems and pump systems in which the pressure may increase over 1.2 bar abs.
- Operation with an inadequately affixed pump.
- Operation without suitable backing pump.
- Operation at impermissibly high gas temperatures.
- Use in systems where pump, frequency converter and cables are subjected to impact stresses.
- Operation on movable systems or system components (locks or mobile pump systems).
- Use of pump, fitted ad-on components, drive electronics, flanges and cables to climb onto the system.
- Removing, covering or obstructing warning notices.
- Standstill or storing of pump and drive electronics without suitable sealing and drying. When stored in a humid atmosphere corrosion can occur.

- Conversions, manipulations and maintenance work by persons not authorized by Leybold.

  The non-conforming utilisation of pump and accessories may result in severe injury or damage to the components.

WARNING

3.3 Electrical Connection

For pumps without a motor, first fit a suitable motor, see Section 3.5.

Notice safety information 0.2.

WARNING

Always provide an uninterrupted connection for the protective ground conductor connecting it in a professional manner. Never leave the protective ground conductor for the pump unconnected.

Do not link control circuits to the power circuit of the motor. Observe the wiring diagrams.

NOTICE

The WA/WAU pumps are only limited suitable for operation in connection with frequency converters. The max. permissible speed is 3,600 rpm regardless of the size of the pump.

Never allow the pump to run in the wrong direction or with open flanges for a longer period of time.

The pump needs to be sufficiently grounded so as to avoid any electrostatic charging. This is attained when the ground connection is properly connected at the point provided for this purpose. During normal operation no dangerous electrical charges will be produced (for further information relating to the hazards caused by static electricity, see CENELEC report CLC/TR 50404: 2003 Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

Connect the mains voltage in accordance with. Fig. 3.4 using a standards-compliant lead and a suitable motor protection switch (circuit breaker). The motor protection switch setting must match the power rating indicated on the motor's nameplate (see Section 1.3.1 on motor data).

For motor monitoring using thermistors (full motor protection), temperature sensors (PTCs) are integrated within the motor windings(WAU1001/2001). Evaluate the PTC signals such that the motor circuit is interrupted when the permissible winding temperature is exceeded. When doing this, only ever connect these terminals to the pump controller via a protection switch with galvanic isolation (e.g. Klöckner Möller EMT6DBK).

Only the fittings provided on the junction box may be used.

The pump has no switching devices of its own. All protection measures in connection with the power supply need to be implemented from the side of the plant in the full responsibility of the customer.

After a mains power failure the pump will restart automatically once the power returns.

If for this reason there results in connection with the application a danger potential it needs to be ensured that a restart can only be performed after a manual reset. This applies equally **emergency** shutdowns.

The local connection conditions will possibly necessitate means for the purpose of reducing the surge currents upon switching the pump on. Star-delta start-up is not possible.

Installation

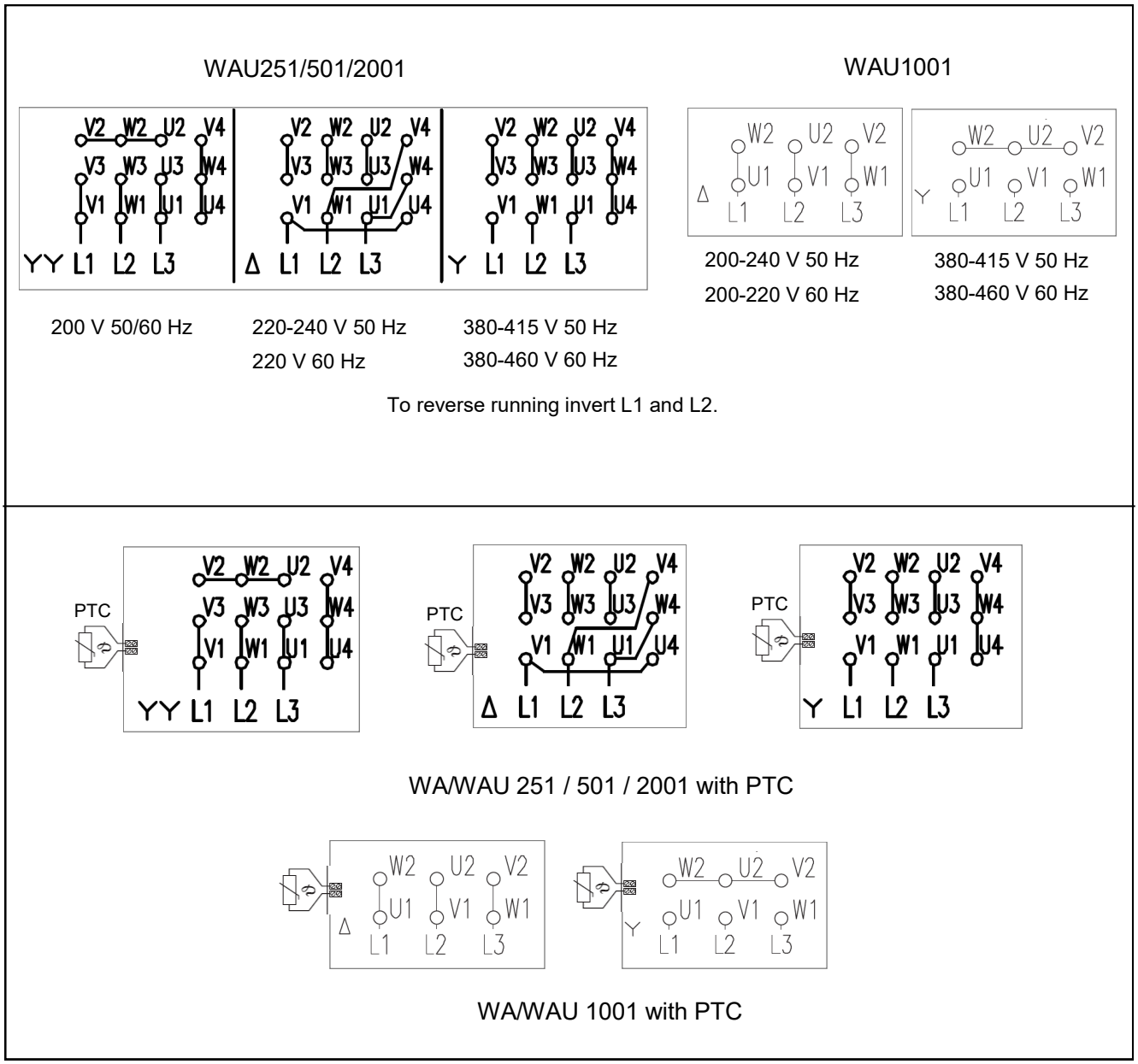


Fig. 3.3 Electrical connection

Motor protection switch

High-efficiency motors exhibit higher inrush currents during direct start-up, and require a circuit breaker suitable for fuse-protecting IE3 motors. For RUVAC WA(U) for example, we recommend the following products from the manufacturer Eaton:

	WA(U) 251	WA(U) 501	WA(U) 1001	WA(U) 2001
YY /△ 200-240V	PKE12/XTU(A)-12 PKE32/XTU(A)-12 (3 A - 12 A)	PKE12/XTU(A)-12 PKE32/XTU(A)-12 (3 A - 12 A)	PKE32/XTU(A)-32 (8 A - 32 A)	PKE32/XTU(A)-32 (8 A - 32 A)
Y 380-480V	PKE12/XTU(A)-4 PKE32/XTU(A)-4 (1 A - 4 A)	PKE12/XTU(A)-12 PKE32/XTU(A)-12 (3 A - 12 A)	PKE12/XTU(A)-12 PKE32/XTU(A)-12 (3 A - 12 A)	PKE32/XTU(A)-32 (8 A - 32 A)

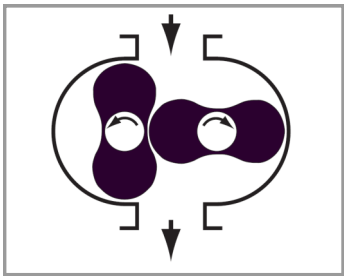
After connecting the motor and every time you alter the wiring, check the direction of rotation.

CAUTION

Wear protective goggles for protection against particles which may be forced out of the flange opening. Keep your hands away from the flange opening.

An arrow on the motor flange shows the correct direction of rotation for the impeller connected to the motor shaft (see fig. 3.1). To check rotation, switch on the motor briefly and observe the direction of impeller rotation through the pump's intake and then immediately switch off again.

The impellers should move up from the center and drop down to the side.



If this is not the case, disconnect the pump from the mains and interchange two mains phases.

Even if the pump has been already firmly connected to the piping, you may determine the direction of rotation.

For this, evacuate the vacuum system down to a pressure below 20 mbar with the aid of the backing pump. Then switch on the RUVAC briefly; now the pressure must drop. If the pressure increases or remains constant, the RUVAC is turning in the wrong direction.

Then rewire as described above.

Pressure switch
The RUVAC can be automatically switched on and off via a contactor using a pressure switch and the contact amplifier SV 110.

At Leybold, the pressure switch PS 115 is set to a fixed value. When ordering the pressure switch please state the required switch-on pressure.

After removing a screw plug, the pressure switch together with an adapter and a right-angle bend can be mounted on the bore (see fig. 3.1).

When doing so, ensure proper sealing and air-tight installation.

It is advisable to mount the switch vertically to reduce the entry of contaminants.

3.4 Connecting the Flanges

NOTICE

Already small quantities of liquids (from the vacuum chamber or the piping) can lead to liquid damages within the pump. These may lead to a deformation of the impellers and may entirely destroy the pump. Suitable protective measures should be provided as required in the piping on the suction side (separator, T-piece).

The pumps are vented with nitrogen. Only remove the packing flanges before immediate connection.

If not already done, remove the protective shipping collar flanges from the flanges (see Fig. 3.1).

We recommend that you retain the transport flanges in case you want to store the pump at a later date.

Clean the flanges and check that the sealing surfaces are in perfect condition.

Flange the pump to the vacuum system.

NOTICE

Don’t place any stress on the pump casing when installing the intake and exhaust lines. Fit compensation elements in order to avoid such stresses.

When attaching the pump directly (without bolting down the feet) to the forevacuum pump, you must always use on the pressure side the full number of screws defined by the flange standard (ISO-K, DIN or ASA) whereby these must comply with the demanded property class rating.

You must also check whether the backing pump is rigid and stable enough to support the load of the RUVAC pump in each case.

The intake screen which is supplied with the pump should always be fitted into the intake flange when there is the possibility of contaminants entering the pump coming from the vacuum chamber or the piping. Even with clean vacuum processes, contaminants from the system may enter upon initial start-up. Depending on the operating conditions, the intake screen may reduce the pumping speed of the pump.

3.5 Connecting the Customized-Motor

The RUVAC WA pump can also be ordered without a connected motor (see Ordering Data).

NOTICE

When motor is fitted by the customer, the operator will be responsible for selecting and operating the motor. Mounting the motor has an influence on the operation and reliability of various pump components, coupling and bearings in particular. Not complying with the technical data and installation information in the following will void CE conformity resulting in a rejection of any warranty claims.

3-ph motors must be ordered with a reduced diameter (see following Table).

NOTICE

4 Operation

4.1 Start-up

Check the pump motor's direction of rotation and the oil level in the oiler and the bearing chambers (see Section 3.1.1).

NOTICE

The RUVAC WA/WAU can be started together with the backing pump at atmospheric pressure. It is protected against excessively high pressure differentials by a bypass line.

NOTICE

The opening pressure of the differential valve is designed only for 50 or 60 Hz operation of the pumps.

RUVAC WA

Do not switch on the RUVAC WA until the backing pump has evacuated the vacuum vessel to the cut-in pressure.
For processes in which condensable vapours are pumped, it is advisable to evacuate the vacuum vessel via a roughing line to the cut-in pressure. Electrically switch on the Roots pump together with the backing pump and cut it in upon reaching the cut-in pressure. The initial bypassing of the Roots pump serves to prevent condensation of vapours in the cold pump.
The permissible cut-in pressure depends on the ratio between the Roots pump and the backing pump.

$$p_E = \frac{\Delta p_{max}}{k_{eff} - 1}$$

Since k_{eff} is not known in all cases, the following equation may be used for a first approximation:

$$p_E \sim \frac{\Delta p_{max}}{k_{th} - 1}$$

p_E = Switch-on pressure.

Δp_{max} =Maximum permissible pressure difference (see Technical Data).

K_{th} = Theoretical compression ratio = $\frac{\text{Nominal pumping speed1) RUVAC}}{\text{Nominal pumping speed of the backing pump}}$

K_{off} = Effective compression ratio = $\frac{\text{Effective pumping speed RUVAC}}{\text{Effective pumping speed of the backing pump}}$

Example - Pump combination: RUVAC WA 501[2]) / Sogevac SV100

$$p_E = \frac{505\ m^3\ h^{-1}}{100\ m^3\ h^{-1}} \sim 5 \qquad p_E \sim \frac{80\ mbar}{80\ mbar} \sim 20\ mbar$$

[1])at the corresponding operating frequency.
[2])at 50 Hz operation.

With small vacuum vessels, the maximum permissible pressure differential can be briefly exceeded (max. 3 min) upon start-up. If a pressure switch has been installed, do not set it to this higher pressure because it will fail to protect the pump against overload in the event of a greater gas quantity.

NOTICE

It is advisable to switch the RUVAC WA on and off via a pressure switch to ensure that it runs only in the permissible pressure range.

4.2 Operation

Do not operate the pump without having connected the flanges to a vacuum system.
The screws of the flanges on the suction and the pressure side must not be loosened in the presence of a vacuum even if the pump is not running.

During operation of the RUVAC, check the oil level and the condition of the oil in the oil level glass and the oiler from time to time. Correct as required (see Sections 5.2 and 5.3). Normally, the oil LVO 130 is transparent. If it turns dark, this is a sign of early ageing due to excessively high temperatures.

Run the Roots pump exclusively under the operating conditions for which it has been designed. Any modification of the operating parameters (e. g. intake pressure, intake temperature, ratio between Roots pump and backing pump) for a longer period may place an inadmissible thermal load on the pump. Increases in temperature which are not compensated by taking suitable measures may damage the Roots pump and/or the backing pump.

WARNING

Hot surfaces, risk of suffering burns.
Notice safety information 0.3.

Note the labels on the pump.

Never open the oil-fill or oil-drain screw in the presence of a vacuum or while the pump is running. There is the danger that oil may squirt out.

The oil level for the shaft seal housing must always be visible in the oiler (see fig. 4.1). The correct oil level is 1/3 of the height of the oil when the pump is cold 1/2 of the height of the oiler when the pump is warm. Top up any oil as required.

We recommend our vacuum pump oil LVO 130.

If it is required to top up oil very often, it is quite likely that a shaft seal is faulty.

4.3 Shutdown and Storage

Close the valve between the Roots pump and the vacuum system. First switch off the Roots pump, then the backing pump.

NOTICE

After working with corrosive gases, the system should be vented with dry protective gas (e.g. N2) to prevent corrosion during standstill.

When shutting down the pump and removing it from the system, it is advisable to seal the connecting flanges tightly.

Before removing pump from the vacuum system, disconnect it from the mains supply. Note any contamination affecting the pump.
Comply with all safety regulations. Observe safety informations 0.2.

For transportation and storing of the pump, observe the information provided in Section 2.

1 Oiler
2 Sealing screw
3 Sealing screw
4 Feet of the pump
5 Sealing screw
6 Sealing screw
7 Sealing screw
8 Oil-fill opening

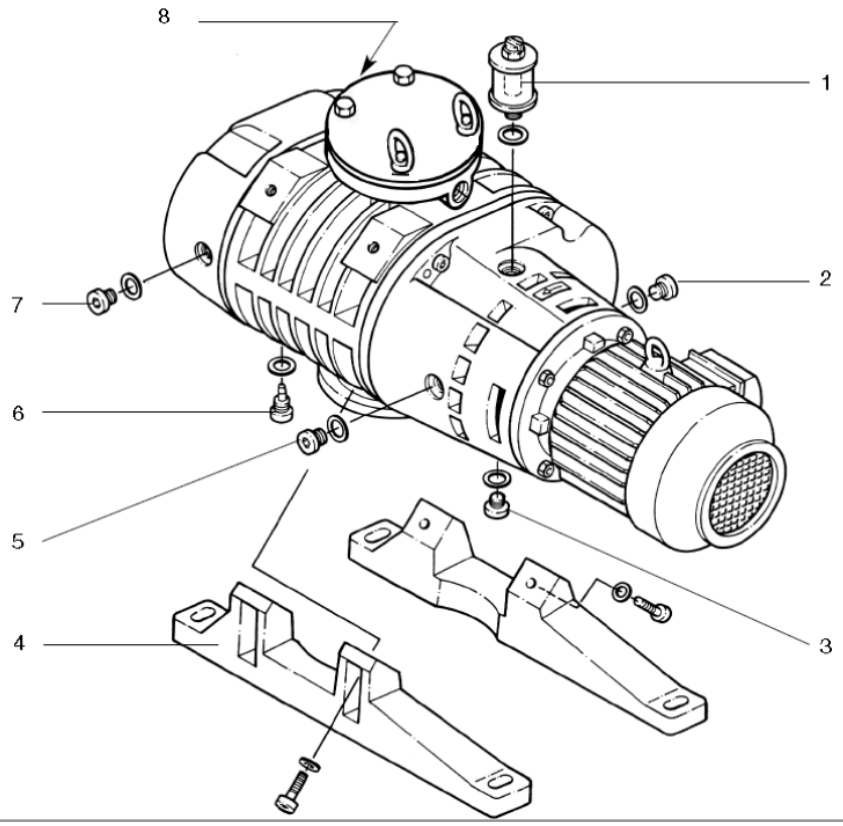


Fig. 4.1 Changing the direction of flow

4.4 Changing from Vertical to Horizontal Flow

The RUVAC WAUs are supplied as standard for vertical flow unless you specifically request horizontal flow. Moreover, the pump may be converted from one flow direction to the other.

For this proceed as follows:

Unscrew the sealing screws and drain out the oil from the side chambers (see fig. 4.2). Drain the oil from the oiler (see section 5.3).

Seal off of the bottom opening with the closure screw and a seal which is in perfect condition so that a vacuum-tight seal is attained again.

Unscrew the pump's feet, turn the pump by 90° and as shown in figure 1.5 (dimensional drawing) fit the feet for the changed direction of pumping action.

> The longitudinal axis of the pump must remain horizontal so that no residual lubricant can flow from the side chambers into the pumping chamber.

NOTICE

Unscrew oiler and sealing screw. Screw in the oiler from the top using a perfect gasket and screw in the sealing screw from the side also using a perfect gasket.

Fill in the oil for the side chambers at oil-fill opening and the oil for the shaft seal housing at the oiler.

If a pressure switch has been installed, turn it so that it again points vertically upwards.
The valve in the pressure balance line of the RUVAC WAU is designed to work with both vertical and horizontal flow of the pump.

Operation

1 Oil-drain screw for horizontal gas flow
2 Oil-drain screw for vertical gas flow
3 Oil level glass
4 Oil-fill screw

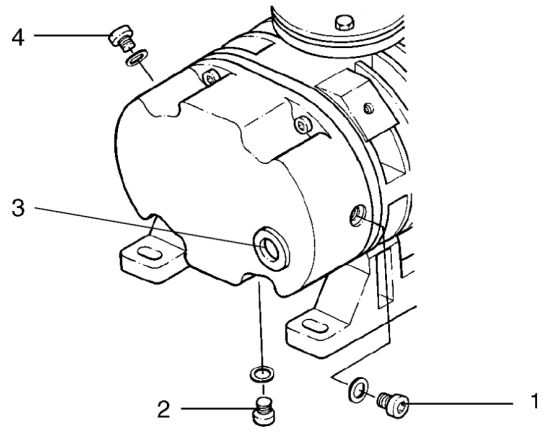


Fig. 4.2 Changing the oil

5 Maintenance

5.1 Safety Information

The safety information given in the following applies to all maintenance work.

WARNING

Notice safety information 0.1 to 0.3.

Disconnect the electrical power before disassembling the pump. Make absolutely sure that the pump cannot be accidentally started (logout/ tagout).

If the pump has been pumping harmful substances, determine the nature of hazard and introduce suitable safety measures. Observe all safety regulations.

When shipping contaminated pumps which require approval by the authorities, you must observe the applicable packaging and shipping regulations.

All maintenance and cleaning work described in this section must be carried out only by suitably trained personnel.

Improper maintenance or repairs may affect the service life and performance of the pump, and cause problems when filing warranty claims.

Advanced repair work not described here should be left to the Leybold service.

We would like to point out that Leybold offers training courses on the maintenance, repair, and troubleshooting of RUVAC pumps.
Further details are available on request.

5.2 Exchanging the Oil / Bearing Chambers

Observe all safety information provided in sections 0.3 to 0.5.

CAUTION

Before pumping oxygen (or other highly reactive gases) at concentrations exceeding the concentration in the atmosphere (> 21 % for oxygen) it will be necessary to use a special pump. Such a pump will have to be modified and de-greased, and an inert special lubricant (e.g. PFPE) must be used.

Very little oil is consumed by wear in the bearings and the gear under clean operating conditions. Under normal operating conditions, change the oil annually.

Change the oil more frequently when pumping corrosive vapours or large amounts of dust or when cycling frequently from atmospheric to working pressure.

Under such operating conditions it is recommended to regularly check the neutralisation value (to DIN 51 558) based on a sample of oil. If the neutralization value for LVO 130 exceeds 2, an oil exchange will be required.

WARNING

Before removing the oil-drain or oil-fill plug always switch off the pump first and vent to atmospheric pressure. When the pump has become warm during operation, the casing and the oil temperature may exceed 80 ºC. Leave the pump to cool down. Always wear protective gloves also to protect yourself against aggressive residues in the oil.

To simplify the process and also for safety reasons we recommend the use of our oil-drain facility (see Section 1.4).

Unscrew the oil-drain screws and the oil-fill screw and drain the oil (see fig. 4.2).

Clean the sealing surface and firmly reinstall the oil-drain screw using a gasket which is in perfect condition. Wipe off any oil residues from the casing.

Fill in new oil at a pump temperature of 15 ºC to 25 ºC.

For oil quantities and ordering data see Sections 3.1.1 and 1.4.

Only use Leybold oil.

Mineral oils and synthetic oils do not mix.

NOTICE

Please consult us if you intend to run the pump with other oils or special lubricants.

The oil filling levels stated in Fig. 3.2 - which apply to the shutdown (standing still) pump - must be observed.

The filling level visible in the oil-sight glass depends on the size of the pump and the type of oil used.

NOTICE

If the oil level is too low, the bearings and gearwheels are not lubricated adequately; if it is too high, oil may enter the pumping chamber or the pump may overheat.

Clean the oil-fill port and reinstall the plug using a gasket which is in perfect condition. Wipe off any oil residues from the casing.

NOTICE

The oil-fill port must be sealed air-tight. In the presence of a vacuum, the entry of air may cause oil-containing gas to enter the pumping chamber via the impeller seals.

5.3 Oil change / Shaft Seal Housing

Observe all safety information provided in Sections 0.3 to 0.5 and 5.1.

CAUTION

The oil in the shaft seal housing should be changed every 3,000 operating hours.

Unscrew the oil-drain screw under the shaft seal housing, drain out the oil and screw in the oil-drain screw using a gasket which is in perfect condition (see fig. 4.2).

Only use Leybold oil.

Mineral oils and synthetic oils do not mix.

NOTICE

Fill in fresh oil at the oiler. The oil level for the shaft seal housing must be visible in the oiler.

Maximum level – when the pump is warm = 1/2 of the height of the oiler
– when the pump is cold = 1/3 of the height of the oiler.

Wipe off any oil residues from the casing.

5.4 Cleaning the Fan Cowl and the Cooling Fins

Observe all safety information provided in Sections 0.3 to 0.5 and 5.1.

CAUTION

The slits in the fan cowl as well as the fins on the motor and on the pump may be contaminated depending on humidity conditions and the degree of contamination in the ambient air.

In order to ensure a sufficient air flow for the motor and the pump's casing, the grid of the fan cowl must be cleaned with a clean brush when contaminated.

Any coarse dirt must be removed from the fins on the motor and the pump.

5.5 Cleaning the Intake Screen

Observe all safety information provided in Sections 0.1 to 0.3 and 5.1.

CAUTION

A intake screen is located in the intake port to collect foreign objects. It should be kept clean in order to avoid a reduction of the pumping speed.

To do so, take off the intake line. Remove the dirt trap from the intake flange and rinse it using a suitable solvent. Then thoroughly dry it with compressed air. If the dirt trap is damaged, replace it.

5.6 Cleaning the Pumping Chamber

Observe all safety information provided in Sections 0.1 to 0.3 and 5.1.

CAUTION

Under dirty operating conditions, contaminants may be deposited in the pumping chamber or on the impellers. After removing the two connecting lines, the contaminants can be blown out with dry compressed air or flushed out with a suitable solvent.

Contaminants that cannot be blown or flushed out, can be removed completely from the pumping chamber with a wire brush, metallic sponge or scraper.
Then change the oil.

During cleaning, the impellers must be turned only by hand.
Please make sure that the impellers are turned in a way that fingers or hands can not be trapped between the impellers or between impellers and housing. Due to the high mass and inertia of the impellers serious injuries can occur even if the impellers are turned by hand only.

CAUTION

Maintenance

1 Cover
2 O-ring
3 Bushing
4 Spring
5 O-ring
6 Valve disc
7 O-ring

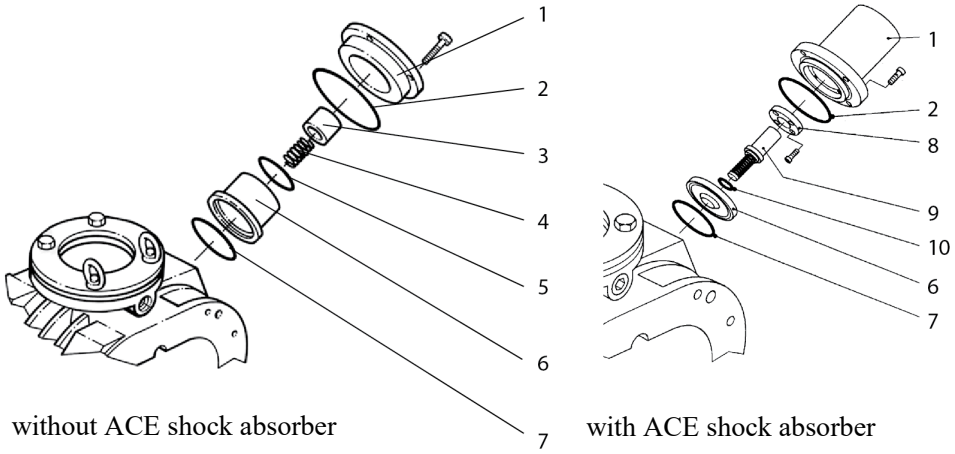


Fig. 5.1 Valve of the pressure

NOTICE

The loosened deposits must not remain in the pump. After cleaning, check the pump by slowly turning the impellers by hand. They should move freely and without any resistance.

Generally, the Roots pump does not need to be disassembled. If necessary, this should only be done by our after-sales service.

5.7 Cleaning the Valve of the Pressure Balance Line

CAUTION

Observe all safety information provided in Sections 0.3 to 0.5 and 5.1.

Remove the screws and take off the cover with O-ring.

Take out the spring.

Remove the valve disk with O-rings.

If the bushing is damaged, pull it out of the valve disk and replace it.

Clean all parts or replace them if necessary. Reassemble in the reverse sequence. When doing so, check the O-rings for leak-tightness and replace if found faulty. Finally a leak test should be run.

5.8 Exchanging the Shaft Seals

Observe all safety information provided in Sections 0.3 to 0.5 and 5.1.

The shaft seals should be exchanged every 16,000 hours.

CAUTION

The shaft feedthrough of the RUVAC WA/WAU is sealed with two shaft seals. In order to reduce wear on the shaft these shaft seals run on a bushing.

A dropping oil level in the oiler is a sign for malfunctioning shaft seals.

When the oil level in the oiler drops and when no oil appears under the shaft seal housing, it is likely that the inner shaft seal is faulty. In this case the oil flows from the shaft seal housing into the bearing spaces of the pump thereby creating in the bearing spaces an unacceptably high oil level. In such a case the pump must be switched off immediately and it must be repaired.

When the oil level in the oiler drops and when oil appears under the shaft seal housing, it is likely that the outer shaft seal is malfunctioning. If the oil loss is only slight, the pump may still be operated for some time, provided the lost oil is topped up regularly.

Collect the oil which drips out under the motor. There is the danger that someone may slip. Have the pump repaired.

CAUTION

5.8.1 Preparations

Unscrew sealing screw with the gasket, drain the oil out from the shaft seal housing and screw the sealing screw back in using a gasket which is in perfect condition.

Support the motor so that it can not drop.

Unscrew the nuts and remove the motor with the coupling piece.

Remove protection tube. Remove the coupling element.

Unscrew screw with the disc and pull off coupling piece using the puller.

Remove key.

Unscrew screws.

5.8.2 RUVAC WA/WAU 251, 501

(see figs. 5.2 and 5.3).

Pull the shaft seal housing out. Forcing threads are provided on the shaft seal housing for this purpose.

Take the O-ring out of the flange of the coupling.

Use a puller to pull the bushing off from the shaft.

Take the O-ring from the shaft.

Take the O-ring from the housing. Remove securing ring.

Pull out the shaft seal.

Take out snap ring and felt ring.

Take out shaft seal. Remove securing ring.

It is strongly recommended always to exchange the shaft seals, the bushing and the felt ring against new parts. Clean all other parts and replace them as required.

Fit securing ring.

Use a shaft seal driver to drive the shaft seal down to the securing ring.

Fit felt ring and snap ring.

Use a shaft seal driver to drive the shaft seal down. Here the depth must be defined by the tool.

Fit securing ring.

Now reassemble the parts in the reverse order as for disassembly.

Before starting the pump, fill in the required amount of oil at the oiler (see Section 3.1.1).

5.8.3 RUVAC WA/WAU 1001, 2001
(see figs. 5.2 and 5.3).

Use a puller to pull out shaft seal housing and bushing together.

Remove O-rings.

Pull the bushing out of the housing.

Take the O-ring out of the housing. Remove securing ring.

Pull out shaft seal.

Pull out snap ring and felt ring.

Remove shaft seal.

Remove securing ring. Pull out bearing.

Take out spacing disc, wave washers as well as adjusting discs.

It is strongly recommended always to exchange the shaft seals, the bushing and the felt ring against new parts. Clean all other parts and replace them as required.

Place adjusting disc, wave washer, adjusting disc, wave washer and spacing disc into the housing.

Drive bearing back in.

Fit securing ring.

Use a shaft seal driver to drive the shaft seal down to the stop.

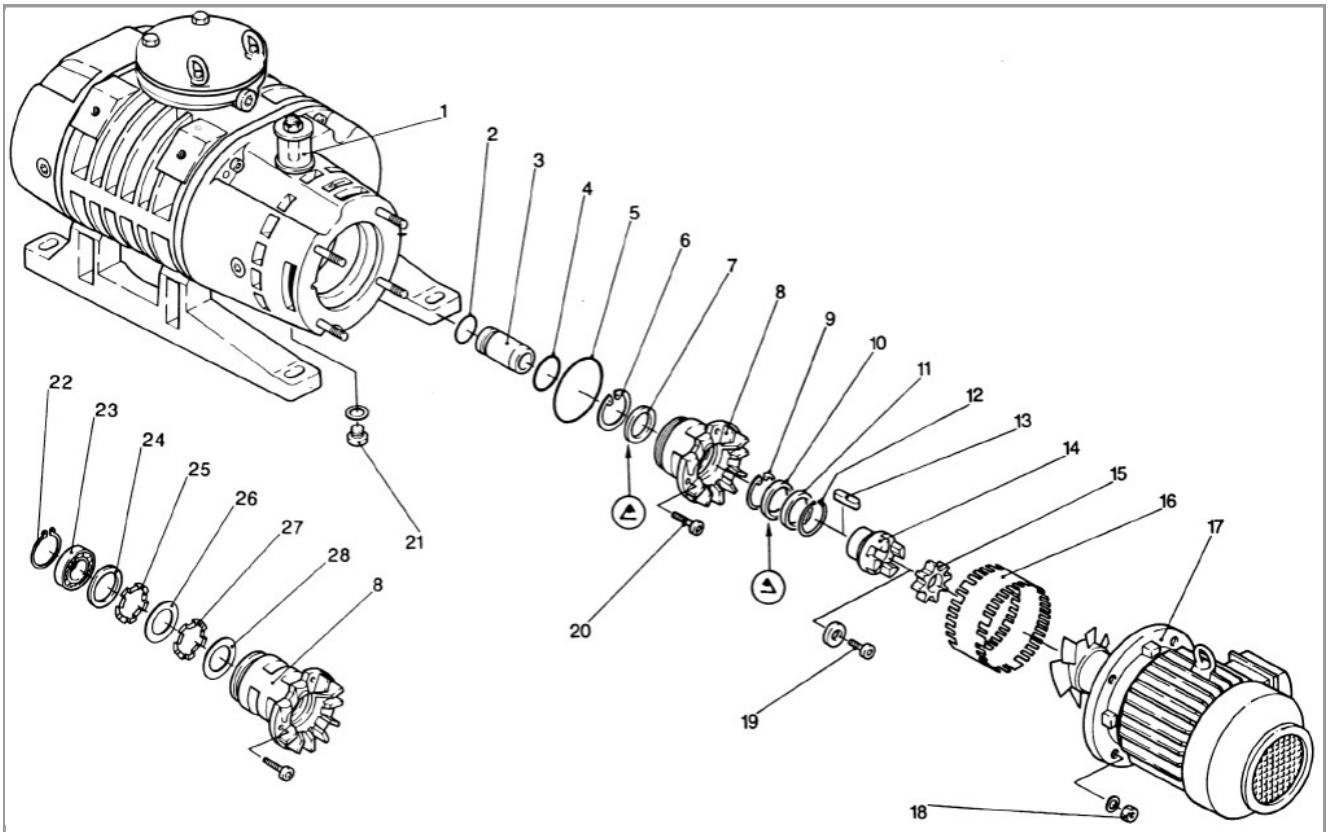
Fit felt ring and snap ring.

Use a shaft seal driver to drive the shaft seal down.
Here the depth must be defined by the tool.

Fit securing ring.

Now reassemble the parts in the reverse order as for disassembly.

Before starting the pump, fill in the required amount of oil at the oiler (see section 3.1.1).



1 Oiler
2 O-ring
3 Bushing
4 O-ring
5 O-ring
6 Securing ring
7 Shaft seal
8 Shaft seal housing
9 Securing ring (WAU 251 and 501 only)
10 Shaft seal
11 Felt ring
12 Snap ring
13 Key
14 Coupling piece (one half)
15 Coupling element
16 Protection tube
17 Motor with coupling piece (other half)
18 Nuts
19 Screw
20 Screw
21 Sealing screw (WAU 1001 and 2001 only)
22 Securing ring
23 Ball bearing
24 Spacing disc
25 Wave washer
26 Adjusting disc
27 Wave washer
28 Adjusting disc

Fig. 5.2 Exchanging the shaft seal

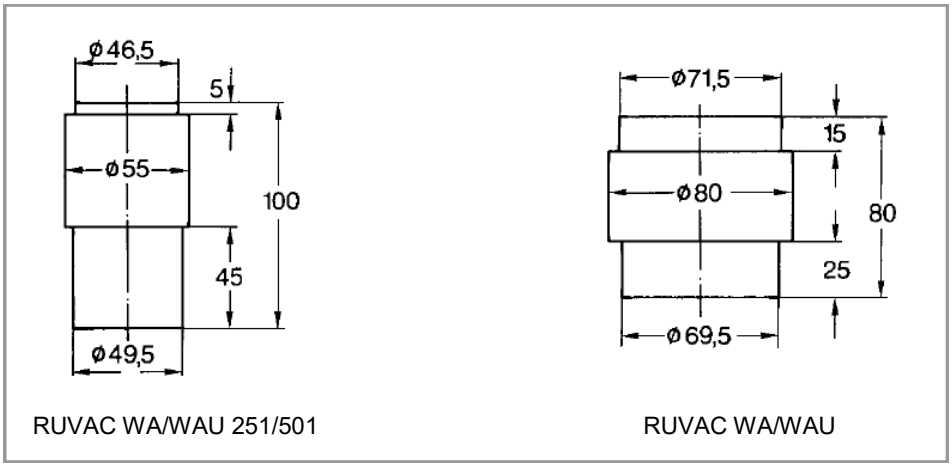


Fig. 5.3 Dimensions for shaft seal drivers

5.9 Service at Leybold

If you send a pump to Leybold indicate whether the pump is free of substances damaging to health or whether it is contaminated.

If it is contaminated also indicate the nature of hazard. To do so, you must use a preprinted form which we shall send to you upon request.

A copy of this form is reproduced at the end of these Operating Instructions: “Declaration of Contamination of Compressors, Vacuum Pumps and Components”. Moreover, you may download a suitable form from the Internet: www.leybold.com → Downloads → Download Documents → Declaration of Contamination 。

Please attach this form to the pump or enclose it with the pump.

This “Declaration of Contamination” is required to meet the requirements of German Law and to protect our personnel.

Leybold must return any pumps without a “Declaration of Contamination” to the sender’s address.

Before packaging (respectively shipping) the pump it should, if possible, be purged with inert gas, but as a minimum requirement it should be completely emptied of all pumped substances.

CAUTION

The pump must be packed in such a way, that it will not be damaged during shipping and so that any contaminants are not released from the package.

Leybold is not in a position to perform servicing (repairs) and waste disposal of radioactively contaminated pumps. Both needs to be ensured from the side of the user.

5.10 Maintenance Schedule

Process	Meas./test quantity	Maintenance interval	Remark
Check oil level	Min./max. oil level in oil level glass	Before switching on and daily	Check oil level with the pump at standstill, see Section 3.1.1
Check oil quality	Visual	Weekly	In the normal state LVO 130 is transparent. In the case of black oil an oil change is necessary, see Section 5.2.
Check oil quality	Neutralisation value (DIN 51 558)	For normal operating conditions annually When pumping corrosive vapours, in the case of much dust and cyclic operation weekly to quarter yearly	If the neutralisation value for LVO 130 is > 2, then an oil change will be required, see Section 5.2.
Oil change		For normal operating conditions annually When pumping corrosive vapours, in the case of much dust and cyclic operation weekly to quarter yearly	See Section 5.2.
Clean motor fan and cooling fins		The cleaning intervals will depend on the ambient conditions.	See Section 5.4.
Check the oil level in the shaft sealing ring housing			The oil level in the oiler can be checked during operation (see Section 4.2)
Exchange the oil for the shaft sealing ring housing.		after 3000 operating hours	See Section 5.3
Exchange shaft seals		after 16000 operating hours	See Section 5.8

Troubleshooting

6 Troubleshooting

Malfunction	Likely cause	Remedy	Repair
Pump does not start up.	Motor incorrectly connected.	Connect motor correctly.	3.4
	Pressure switch is defective.	Replace the pressure switch.	3.4
	Oil is too thick.	Exchange the oil or warm up oil and pump.	5.2
	Motor defective.	Replace the motor.	3.5
	Pump has seized: defective impellers, bearings or toothed gears.	Leybold Service.	-
Motor protection switch trips.	Motor defective.	Replace the motor.	3.5
	Motor protection switch incorrectly set.	Set Motor protection correctly.	3.3
	Pump seizes mechanically.	Leybold Service.	-
Pump gets too hot.	Ambient temperature is too high or cooling air flow is obstructed.	Install the pump at a suitable place or ensure a sufficient flow of cooling air.	3.1
	Pump is operating in the wrong pressure range.	Check the pressure levels within the system.	-
	Pressure differences too high.	Check the pressure levels within the system.	-
	Gas temperature is too high.	Check system.	-
	Clearance between housing and rotors are too small due to		
	- contamination	Clean pumping chamber.	5.4
	- distortion of the pump	Affix and connect the pump free of tension.	3.1/3.5
	Friction resistance is too high due to contaminated bearings and/or contaminated oil.	Change oil.	5.2
		Drain oil down to the correct level.	5.2
	Oil level is too high.	Top up oil to the correct level.	5.2
	Oil level is too low.	Drain oil, fill in correct oil.	5.2
	Wrong oil filled in.	Leybold Service.	-
	Bearing is defective.	Clean the valve or have it repaired.	5.6
	Valve of the pressure balance line does not open.		
Power consumption of the motor is too high.	Like “Pump gets too hot”.	Like malfunction “Pump gets too hot”.	-
	Incorrect mains voltage for the motor.	Connect the motor to the correct mains voltage.	1.3/3.4
Pump is too loud.	Motor defective.	Replace the motor.	3.5
	Distances between housing and rotors is too small due to		
	- contamination	Clean pumping chamber.	5.4
	- distortion of the pump	Affix and connect the pump free of tensions.	3.1/3.5
	Bearing or gear damage.	Leybold Service, shutdown pump immediately.	-
	Pistons make contact with the housing.	Leybold Service, shutdown pump immediately.	-
	Rotor is running untrue.	Leybold Service, shutdown pump immediately.	-
	Oil slinger disc makes contact with the gear housing or the oil pipe.	Leybold Service.	-
	Oil pump is blocked or defective.	Leybold Service, shutdown pump immediately.	-

Troubleshooting

Malfunction	Likely cause	Remedy	Repair
Pump is losing oil.	Oil leak is apparent:		
	Oil drain plug is leaky.	Drain oil, firmly screw in a new oil drain plug with the gasket, fill in correct oil quantity.	5.2
	Oil level glasses leaky.	Leybold Service.	-
	Gear cover is leaky.	Replace the O-ring of the gear cover.	-
	Leaky coupling flange	Replace the O-ring of the coupling flange.	-
	No oil leak is apparent:		
	See malfunction “Oil in the pump chamber”.	See malfunction “Oil in the pump chamber”.	
The oil level in the oiler drops.	Visible oil leak:	Replace the shaft sealing rings.	5.8
	Outer shaft sealing ring is defective.	In case the oil loss is only slight, the pump may continue to operate providing it is ensured that a sufficient quantity of oil is topped up at the oiler.	
	No visible oil leak:	Replace the shaft sealing rings.	
	Inner shaft sealing ring is defective.	Switch the pump off; the draining out oil enters into the bearing chambers causing there an unacceptably high oil a level.	
Oil gets too dark.	Oil has been used up.	Exchange the oil.	5.2
	Pump gets too hot.	See malfunction “Pump gets too hot”; after remedy of the malfunction, exchange the oil.	-
Oil in the pump chamber.	Oil level is too high.	Drain the oil down to the correct level.	5.2
	Oil is ejected from the system.	Check system.	-
	Pump is not standing horizontally.	Place the pump correctly.	3.1
	Pump has a gas leak towards the outside.	Check to see that the oil fill and oil drain plugs are correctly seated, if required replace gaskets. Replace the O-ring of the gear cover.	5.2
	Pump has an internal leak.	Leybold Service.	-
	Piston rings are defective.	Leybold Service.	-
Pump does not attain its pumping speed.	Intake screen is clogged.	Clean intake screen.	5.3
	Motor incorrectly connected.	Connect motor correctly.	3.4
	Vacuum pump system has a gas leak.	Detect leak and seal it.	-
	Valve of the pressure balance line does not close. (WAU only)	Clean the valve or have it repaired.	5.6

Disposal

7 Wearing and Original Spare Parts

Original spare parts are available from the Leybold Service facilities.

8 Waste Disposal

The pump may have been contaminated by the process or by environmental influences. In this case the equipment must be decontaminated in accordance with the relevant regulations. We offer this service at fixed prices. Further details are available on request.

WARNING

Contaminated parts can be detrimental to health and environment. Before beginning with any work, first find out whether any parts are contaminated. Adhere to the relevant regulations and take the necessary precautions when handling contaminated parts.

Separate clean pumps according to their materials, and dispose of these accordingly. We offer this service. Further details are available on request.

When sending us a pump, observe the regulations given in Section “5.9 Leybold Service”.

Disposal of Waste Oil

Owners of waste oil are entirely self-responsible for proper disposal of this waste.

Waste oil from vacuum pumps must not be mixed with other substances or materials.

Waste oil from vacuum pumps (Leybold oils which are based on mineral oils) which are subject to normal wear and which are contaminated due to the influence of oxygen in the air, high temperatures or mechanical wear must be disposed of through the locally available waste oil disposal system.

Waste oil from vacuum pumps which is contaminated with other substances must be marked and stored in such a way that the type of contamination is apparent. This waste must be disposed of as special waste.

European, national and regional regulations concerning waste disposal need to be observed. Waste must only be transported and disposed of by an approved waste disposal vendor.

EU Declaration of Conformity

CE

Leybold GmbH
Bonner Strasse 498
D-50968 Koln
Germany

Documentation Officer
T: +49(0) 221 347 0
documentation@leybold.com

The product specified and listed below

Product: Roots Booster RUVAC WA(U) with and without motor
Models: WA251, WAU251, WA501, WAU501, WA1001, WAU1001, WA2001, WAU2001
Pump codes:

- **With motor:** 11720TE, 11730TE, 12838TE, 11740TE, 11740JYT, 11342TE, 11750TE, 11721TE, 11721V0001TE, 11731TE, 11741TE, 11741V0001TE, 11751TE, 11831TE, 11841TE, 11851TE, 11721FP, 11731FP, 11741FP, 11751FP
- **Without motor*:** 11734TE,11744TE, 11254TE, 155011VTE, 11322TE

Is in conformity with the relevant requirements of European CE legislation:

2006/42/EC	Machinery directive *Note: The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Annex 1 No. 1.5.1 of this directive.*
2011/65/EU	Restriction of certain hazardous substances (RoHS) directive as amended by Delegated Directive (EU) 2015/863
2014/30/EU*	Electromagnetic compatibility (EMC) directive

Based on the relevant requirements of harmonised standards:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 60204-1:2018	Safety of machinery. Electrical equipment of machines. General requirements
EN 61000-6-2:2005*	Electromagnetic Compatibility (EMC) - Part 6-2: Generic Industrial Immunity Standard
EN 61000-6-4:2007\A1:2011*	Electromagnetic Compatibility (EMC) - Part 6-4: Generic Industrial Emission Standard

*: Not valid for pump bare-shaft version without motor as indicated above

You must retain the signed legal declaration for future reference
This declaration becomes invalid if modifications are made to the product without prior agreement.

Cologne, February 15th, 2022

Andries De Bock
VP Engineering
Industrial Vacuum Division

Tianjin, February 15th, 2022

YS Cho
GM of Leybold Tianjin
Industrial Vacuum Division

This product has been manufactured under a quality management system certified to ISO 9001:2015

Declaration of Conformity

Leybold GmbH
Bonner Strasse 498
D-50968 Koln
Germany

Documentation Officer
Innovation Drive
Burgess Hill
West Sussex
RH15 9TW
documentation@leybold.com

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- **Without motor*:** 11734TE,11744TE, 11254TE, 155011VTE, 11322TE

The object of the declaration described above is in conformity with relevant statutory requirements:

Supply of Machinery (Safety) Regulations 2008
The objectives of the Electrical Equipment (Safety) Regulations 2016 are governed by Annex 1 1.5.1 of this regulation.

Electromagnetic Compatibility Regulations 2016 *

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Relevant designated standards or technical specifications are as follows:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 60204-1:2018	Safety of machinery. Electrical equipment of machines. General requirements
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Signed for and on behalf of Leybold GmbH

Cologne, February 15th, 2022

Andries De Bock
VP Engineering
Industrial Vacuum Division

Tianjin, February 15th, 2022

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This product has been manufactured under a quality management system certified to ISO 9001:2015

ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

EMC (EU, UK): Class A/B Industrial equipment

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

RoHS (EU, UK): Material Exemption Information

This product is compliant with the following Exemptions
Annex III:

- 6(a) **Lead** as an alloying element in steel for machining purposes and in galvanised steel containing up to 0.35% lead by weight

REACH (EU, UK)

This product is a complex article which is not designed for intentional substance release. To the best of our knowledge the materials used comply with the requirements of REACH. The product manual provides information and instruction to ensure the safe storage, use, maintenance and disposal of the product including any substance based requirements.

Article 33.1 Declaration (EU, UK)

This product contains Candidate List Substances of Very High Concern above 0.1%ww by article as clarified under the 2015 European Court of Justice ruling in case C-106/14.

- Lead (Pb)
  This substance is present in certain steel components.

Compliance Information – incorporated products and assemblies

Motors	2009/125/EC Ecodesign directive requirements for energy-related products *From 1 July 2021:* Regulation (EU) No 2019/1781 electric motors and variable speed drives *Based in the requirements of harmonised standard:* EN 60034-30:2009: Rotating electrical machines -- Part 30: Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)

Additional Applicable Requirements

The product is in scope for and complies with the requirements of the following:

2012/19/EU	Directive on waste electrical and electronic equipment (WEEE)

This product has been manufactured under a quality management system certified to ISO 9001:2015

材料成分声明
China Material Content Declaration

	有害物质 Hazardous Substances					
部件名称 Part name 	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
钢合金制品 Steel alloys	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。
O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

This product has been manufactured under a quality management system certified to ISO 9001:2015

Notes

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- **Without motor*:** 11734TE,11744TE, 11254TE, 155011VTE, 11322TE

Is in conformity with the relevant requirements of European CE legislation:

2006/42/EC	Machinery directive *Note: The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Annex 1 No. 1.5.1 of this directive.*
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Cologne, February 15th, 2022

Andries De Bock
VP Engineering
Industrial Vacuum Division

Tianjin, February 15th, 2022

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The object of the declaration described above is in conformity with relevant statutory requirements:

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The objectives of the Electrical Equipment (Safety) Regulations 2016 are governed by Annex 1 1.5.1 of this regulation.

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Industrial Vacuum Division

Tianjin, February 15th, 2022

YS Cho
GM of Leybold Tianjin
Industrial Vacuum Division

ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

EMC (EU, UK): Class A/B Industrial equipment

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

RoHS (EU, UK): Material Exemption Information

This product is compliant with the following Exemptions
Annex III:

- 6(a) **Lead** as an alloying element in steel for machining purposes and in galvanised steel containing up to 0.35% lead by weight

REACH (EU, UK)

This product is a complex article which is not designed for intentional substance release. To the best of our knowledge the materials used comply with the requirements of REACH. The product manual provides information and instruction to ensure the safe storage, use, maintenance and disposal of the product including any substance based requirements.

Article 33.1 Declaration (EU, UK)

This product contains Candidate List Substances of Very High Concern above 0.1%ww by article as clarified under the 2015 European Court of Justice ruling in case C-106/14.

- Lead (Pb)
  This substance is present in certain steel components.

Compliance Information – incorporated products and assemblies

Motors	2009/125/EC Ecodesign directive requirements for energy-related products *From 1 July 2021:* Regulation (EU) No 2019/1781 electric motors and variable speed drives *Based in the requirements of harmonised standard:* EN 60034-30:2009: Rotating electrical machines -- Part 30: Efficiency classes of single-speed, three-phase, cage-induction motors (IE-code)

Additional Applicable Requirements

The product is in scope for and complies with the requirements of the following:

2012/19/EU	Directive on waste electrical and electronic equipment (WEEE)

材料成分声明
China Material Content Declaration

	有害物质 Hazardous Substances					
部件名称 Part name 	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
钢合金制品 Steel alloys	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。
O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

Contamination Declaration

Tips for declaring correctly

Why such a declaration?

Our customers operate in a variety of sectors and with the related applications. Furthermore, there are a large number of applications and internal uses, which in some cases are not known to us. On the other

A. Description of the device

You will make it easier for us to repair or service the device if you enter all the information required here. In particular in the case of justified claims under warranty, we can then settle the matter quickly. The details are also necessary for our own process organisation: for procuring spare parts and storing relevant components.

B. Ambient conditions

For inexpensive repairs it is important to know what the pump has been used for so far. If for example – the best-case scenario for us – the pump has not been in operation, there is no need for cleaning. For severely soiled devices or mounted parts we can then ensure consistent component quality.

C. Description of process substances

1. Which substances has our pump been in contact with?
2. Are these substances harmless?
3. If the pump has been warmed or heated, other hazards are possible.

By telling us the applications you are aware of, you make it easier for us to select the protective measures (technical, organisational, personnel) in our service centers. We can then try to prevent any risk to the health of our staff or at least reduce it to a minimum.

D. Binding signature

You complete the declaration by adding your legally binding signature. You thus assure us that you are acting in good faith and will not expose our staff to any unnecessary risk.

Hazards due to chemicals

The relevant legislation has divided chemicals into various categories of risk, with different symbols for different hazardous substances (see above). For continued use it is important to indicate known hazards, so as to avert injury to repair staff when they open or later repair the pump. This can be crucial if you are going to send us a soiled pump. Airlines for instance refuse to transport devices in case of inflammable gases or adhesion of toxic substances.

Important note for transport

For the pump to be transported safely it must be free of residues, properly sealed and well packed. Reusable packaging materials are available for the purpose. This can be crucial if you are going to send us a soiled pump. Airlines for instance refuse to transport devices in case of inflammable gases or adhesion of toxic substances.

Important note for returns

In order to obtain an appraisal of the general conditions, please complete and add the cover note on the outside in fully legible form.

Other useful hints

Please note that your employees must in certain cases use personal protective equipment when they are packing or handling our pumps. A carry-over or dispersion of hazardous substances or oils is dangerous, and it is costly to remove them.

If your staff injure themselves when using or handling your pump, or if there is the possibility of a „near miss“ accident, please let us know. We too are concerned to reduce accidents and develop means of improvement.

Leybold

Declaration of Contamination of Compressors, Vacuum Pumps and Components

The repair and / or servicing of compressors, vacuum pumps and components will be carried out only if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer can refuse to accept any equipment without a declaration.
A separate declaration has to be completed for each single component.
This declaration may be completed and signed only by authorized and qualified staff.

Customer/Dep./Institute :
Address :
Person to contact:
Phone : Fax:
End user:

Reason for return: ☒ applicable please mark
Repair: ☐ chargeable ☐ warranty
Exchange: ☐ chargeable ☐ warranty
☐ Exchange already arranged / received
Return only: ☐ rent ☐ loan ☐ for credit
Calibration: ☐ DKD ☐ Factory-calibr.
☐ Quality test certificate DIN 55350-18-4.2.1

A. Description of the Leybold product:
Material description :
Catalog number:
Serial number:
Type of oil (Fore/Vacuum-Pumps) :

Failure description:
Additional parts:
Application-Tool:
Application- Process:

B. Condition of the equipment

	No [1]	Yes	No
1. Has the equipment been used	☐	☐	
2. Drained (Product/service fluid)		☐	☐
3. All openings sealed airtight		☐	
4. Purged		☐	☐

If yes, which cleaning agent
and which method of cleaning

[1] If answered with "No", go to D.

Contamination :	No [1]	Yes
toxic	☐	☐
corrosive	☐	☐
flammable	☐	☐
explosive [2]	☐	☐
radioactive [2]	☐	☐
microbiological [2]	☐	☐
other harmful substances	☐	☐

C. Description of processed substances (Please fill in absolutely)

1. What substances have come into contact with the equipment ?
Trade name and / or chemical term of service fluids and substances processed, properties of the substances
According to safety data sheet (e.g. toxic, inflammable, corrosive, radioactive)

X Tradename:	Chemical name :
a)	
b)	
c)	
d)	

	No	Yes
2. Are these substances harmful ?	☐	☐
3. Dangerous decomposition products when heated ?	☐	☐

If yes, which ? _____

[2] Components contaminated by microbiological, explosive or radioactive products/substances will not be accepted without written evidence of decontamination.

D. Legally binding declaration

I / we hereby declare that the information supplied on this form is accurate and sufficient to judge any contamination level.

Name of authorized person (block letters) : _____

Date _____ signature of authorized person _____

firm stamp

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