

TRIVAC E 2

D 2,5 E for Leak Detector

Dual-Stage Rotary Vane Vacuum Pump

Operating Instructions GA01601_002_C1

This modified vacuum pump is intended for operation in the leak detector only.

Part Nos.

140 020

140 021

140 022

E 140 020



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Notes

NOTICE



Obligation to Provide Information

Before installing and commissioning the TRIVAC D 2,5 E-LD, carefully read these Operating Instructions and follow the information so as to ensure optimum and safe working right from the start.

The **TRIVAC D 2,5 E-LD** 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 figures, e.g. (4/2) consist of the consecutive Fig. No. and the Item No. in that order.

We reserve the right to alter the design or any data given in these Operating Instructions. The illustrations are not binding.

Retain the Operating Instructions for further use.

0 Important Safety Information

0.1 Mechanical hazards

- 1 Avoid exposing any part of the human body to the vacuum.
- 2 Never operate the pump without a connected intake line or without fitting a blank flange.
- 3 Do not operate the pump with any of the covers removed. Serious injury may result.
- 4 The location at which the TRIVAC (including its accessories) is being operated should be such that angles over 10° from the vertical are avoided.
- 5 The pump when filled with oil must only be moved in its vertical position. Spilled oil involves the risk of falling.
- 6 Make sure that the gas flow from the exhaust port is not blocked or restricted in any way.
- 7 If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurised. The pressure in the oil box must not exceed 0.5 bar relative to the atmospheric pressure. An exhaust line which is too small in diameter or which is blocked can result in the formation of overpressures within the pump. Possible consequences can be damage or even burst open the pump. Thus the exhaust line must be checked from time to time to ensure that there are no obstructions.
- 8 When moving the TRIVAC always use the lifting means provided.

WARNING



0.2 Electrical hazards

- 1 The electrical connections must only be provided by a trained electrician as specified, for example, by the regulations EN 50110-1. Observe local regulations.
- 2 Lethal voltages are present at the mains connections. Before starting with any maintenance and service work, de-energise (lockout/tagout) the product first.
- 3 Lay connecting lines so that they cannot be damaged. Protect the lines against humidity and contact with water. Avoid any heat stress on the line due to unfavourable laying conditions.
- 4 Suitably support the connecting lines so that the pumps are not exposed to any major mechanical stress.
- 5 After a mains power failure the pump will run up automatically again. This also applies in the case of an emergency shutdown. In order to prevent the pump from running up automatically again, the pump must be integrated within a control arrangement such that it can only be switched on manually again after the mains power has returned.
- 6 Provide an adequate ground connection for the pump so as to avoid any electrostatic charging.

WARNING



Safety information

CAUTION



0.3 Thermal hazards

- 1 Under certain ambient conditions the TRIVAC may attain a temperature of over 70 °C (158 °F). There then exists the danger of receiving burns.
Note the symbols on the pump pointing to the hazards, and in the case of a hot pump wear the required protective clothing. All work on the “pump still warm from operation” should only be done using protection gloves.
- 2 Before servicing and maintenance work always leave the pump to cool down.
- 3 Note the warning information on the housing surface. If these warning notices have been removed, covered or obstructed, include corresponding additional warning notices.

DANGER



0.4 Hazards caused by materials and substances

- 1 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
- 2 Before commissioning the TRIVAC, 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.
- 3 When pumping toxic, chemical, radioactive and corrosive gases as well as pyrophorous substances, the user is under the obligation to comply with the national and international safety regulations and guidelines. Regarding the suitability of the TRIVAC pumps for special applications in which such gases shall be pumped, Leybold should be consulted first.
- 4 If the pump has previously handled hazardous gases, implement the proper precautionary measures before opening the intake or exhaust connection.
Before opening the pump, purge it for a longer period of time with an inert gas.
If necessary, use gloves, a respirator and/or protective clothing and work under an exhaust hood. Firmly seal off the pump.
When shipping the contaminated pump for servicing, please also state the type of hazard. For this you must use a form which we have prepared for you.
- 5 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.

0.5 Danger of ignition

- 1 The standard version of the TRIVAC is not suited for operation in explosion hazard areas.
- 2 The TRIVAC pumps including the accessories are fundamentally not suited for pumping of combustible and explosive gases or vapours. Mixtures of substances may, regarding the fire and explosion risk be critical or uncritical. The operating company is under the commitment to analyse this and rate the hazard potential accordingly so as to thereafter derive the necessary safety measures which must be introduced.

Provided ignitable or pyrophorous substances are present in the equipment you must:

- ensure that no air can enter into the equipment,
- ensure that the system is leak-tight,
- with an inert gas purge (a nitrogen purge, for example) dilute all ignitable gases or vapours which may enter into the pump through the pump's inlet and/or with an inert gas purge reduce the concentration of ignitable gases or vapours in the pump and in the exhaust line to less than a quarter of the lower explosion limit (LEL) published for the respective gases.

CAUTION



NOTICE**0.6 Risk of damaging the pump**

- 1 Before starting up for the first time, the motor circuit must be equipped with a suitable protective motor switch. Please take note of the information in these Operating Instructions and on the electric motor (wiring diagram).
- 2 Do not allow the ingestion of small objects (screws, nuts, washers, pieces of wire, etc.) through the inlet port. For this reason always use the inlet screen which is supplied as standard.
- 3 Do not use the pump for applications that produce abrasive or adhesive powders or condensable vapours that can leave adhesive or high viscosity deposits. When planning to pump vapours other than water vapour please contact our sales or service department for advice.
- 4 This pump is suited for pumping water vapour within the specified water vapour tolerance limits.
- 5 Avoid vapours that can condense into liquids when being compressed inside the pump, if these substances exceed the vapour tolerance of the pump.
- 6 Before pumping vapours the TRIVAC should have attained its operating temperature. This will be the case approximately 30 minutes after having started the pump. During this warming up phase, the pump should be separated from the process, by a blocking valve in the intake line, for example.
- 7 In the case of wet processes we recommend the installation of liquid separators upstream and downstream of the pump as well as the use of the gas ballast.
- 8 The exhaust line should be laid so that it slopes down and away from the pump so as to prevent condensate from backstreaming into the pump.
- 9 The entry of particles and fluids must be avoided under all circumstances.
- 10 Reactive or aggressive substances in the pump chamber may impair the operating oil or modify it. In addition, such substances may be incompatible with the materials of the pump (Viton, grey cast iron, aluminium, steel, resins, glass etc.).
- 11 Normal amounts of humidity within the range of the pump's water vapour tolerance will not significantly affect pump performance when the gas ballast is active.
- 12 When operating the pumps at gas throughput, it is urgently recommended to connect an exhaust filter or use a suitable exhaust line. Here, the exhaust line must slope down and away from the pump.
- 13 In the case of custom pumps (with part numbers deviating from those stated in the EC Declaration of Conformity) please note the information provided in the supplementary sheets.

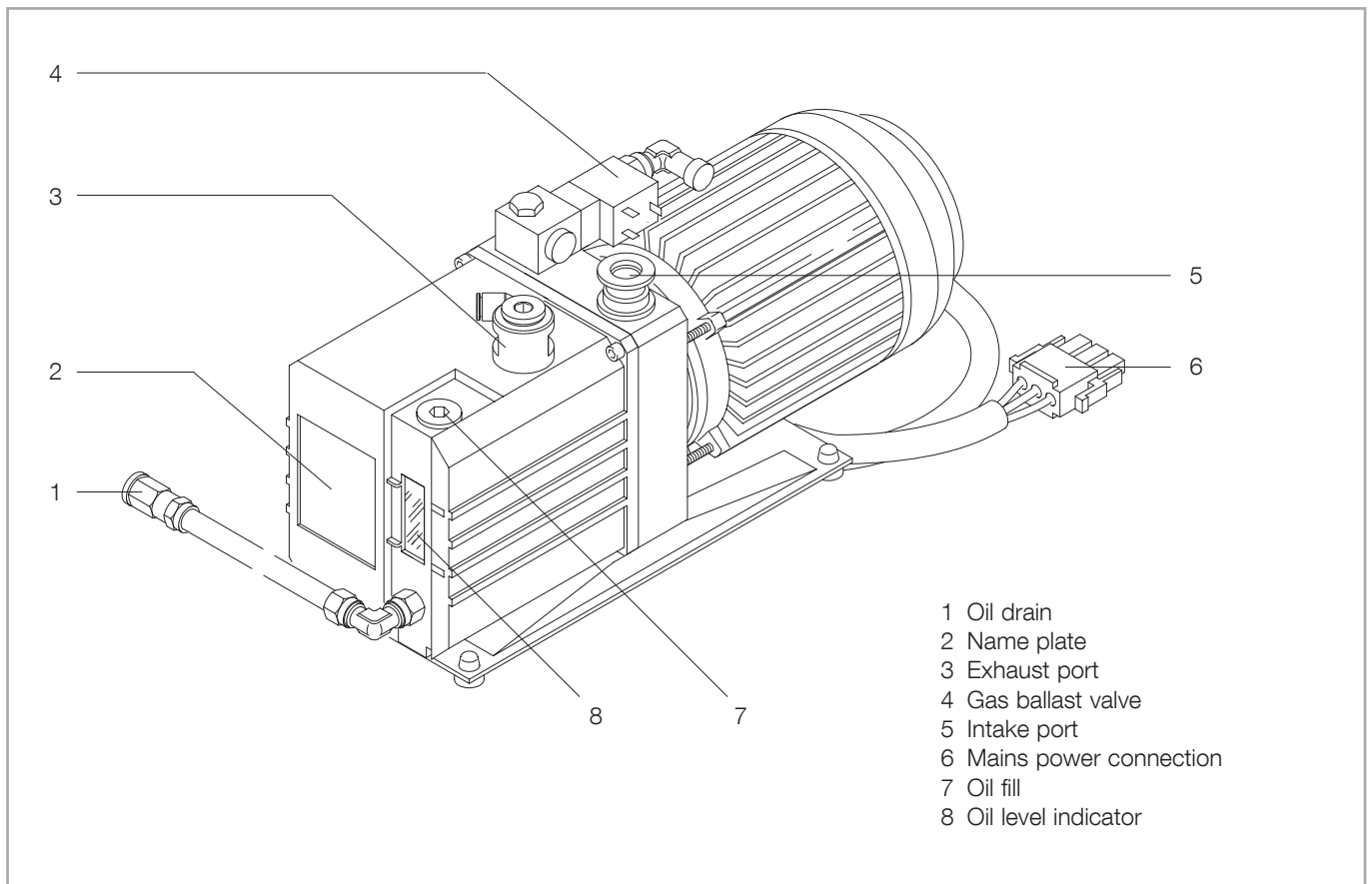


Fig. 1 Rotary vane pump TRIVAC D 2,5 E-LD

1 Description

The TRIVAC D 2,5 E-LD is a dual stage oil sealed rotary vane vacuum pump.

The number in the designation of the pump indicates the pumping speed of the pump in $\text{m}^3 \cdot \text{h}^{-1}$.

These pumps are capable of pumping gases and vapours out of vessels and vacuum systems down into the fine vacuum pressure range. The standard pumps are not designed to handle oxygen at concentrations exceeding the concentration of oxygen in the atmosphere. Moreover, these pumps are not suited for pumping of hazardous gases or extremely aggressive or corrosive media.

The drive motor of the TRIVAC D 2,5 E-LD is screwed directly to the bearing piece. The shaft of the pump and the shaft of the motor are linked by a coupling piece. The bearings in the inner pump body are force-lubricated sliding bearings.

The oil level glass for viewing the minimum/maximum oil level and the oil drain plug as well as the name plate are located on the front of the pump.

The connection components, the gas ballast knob and the oil fill plug are located on the top of the pump.

Description

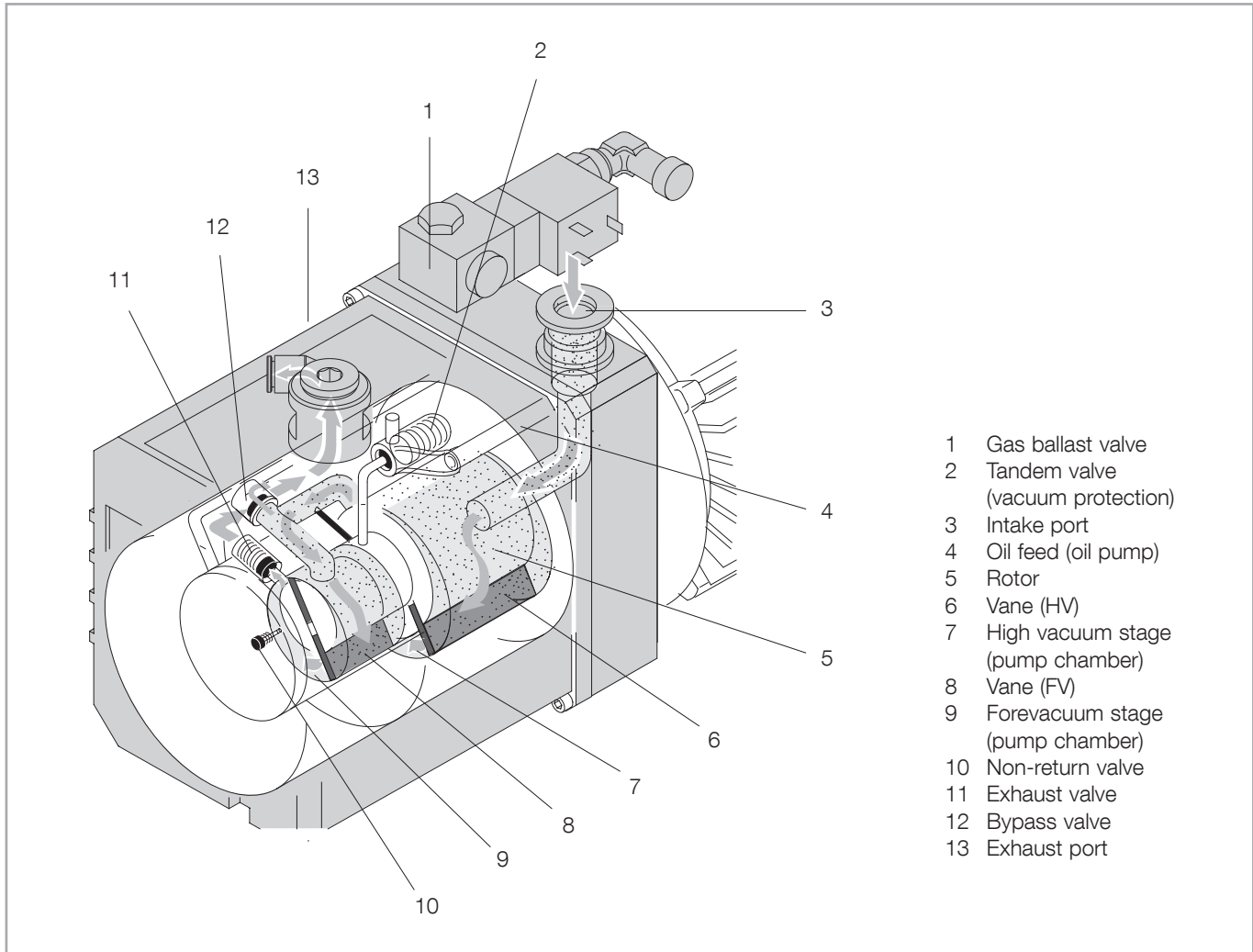


Fig. 2 Principle of operation of the TRIVAC D 2,5 E-LD

1.1 Function

The rotor (2/5) which is eccentrically arranged in the pump housing (pump chamber) has two radially sliding vanes (2/6 and 2/8) which divide the pump chamber of the pump into several chambers.

The volume of each chamber changes periodically with each turn of the rotor so that the gas at the intake port (2/3) is sucked in. The gas enters the pump chamber, and after the admission aperture has been sealed off by the vane, the gas is compressed and moved on.

The compressed gas is ejected from the pump chamber through the exhaust valve. Oil which is entrained in the gas is roughly separated by an internal demister and at the same time any mechanical contaminations are also removed from the oil. The gas exits the pump through the exhaust port (2/13).

Oil injected into the pump chamber serves the purpose of sealing and lubrication. The knocking noise (oil slap) which normally occurs when the pump approaches its ultimate pressure is avoided by injecting a small amount of air into the oil so that a silencing effect is attained.

By opening the gas ballast valve (2/1, optional) it is possible to admit a controlled quantity of air (gas ballast) into the pump chamber while the compression process is in progress. The gas ballast will prevent the condensation of vapours within the pump up to the extent of the vapour tolerance levels as stated in the specifications for the pump (these data refer to water vapour).

A special lubrication system with forced lubrication of the sliding bearings has been developed to enable operation of the pump at intake pressures up to 1000 mbar.

An oil pump supplies the oil from the oil reservoir into a high pressure oil system which in turn supplies all bearings. From here the oil enters the pump chamber of the vacuum pump. The oil pump is located in bearing piece of the high vacuum stage. Separation of oil and gas in the pump involves two stages. First an internal demister which is arranged ahead of the exhaust valve ensures the creation of larger droplets.

Next these are returned back to the oil reservoir via a separation panel. This ensures a minimal loss of oil.

This and the combination with the large usable oil reservoir, results in long intervals between the oil exchanges, even at high intake pressures.

When the pump is at standstill (mains power failure, or when the pump is shut down) the pump chamber is hermetically sealed off by a safety valve (tandem valve) which is controlled through the oil pressure. This requires that the gas ballast solenoid valve be closed.

This reliably avoids any inadvertent venting of the vacuum chamber and the backstreaming of oil.

Description

1.2 Supplied Equipment

The TRIVAC D 2,5 E-LD pump is supplied as standard with the following items:

Pump with motor

	Series pumps 140 020 - 140 022	Replacement pump E 140 020
Oil	is filled into the pump	is included separately
Operating Instructions	is included with the documentaton for the leak detector	is included separately
Parts / covers	sealing cap	adhesive tape

The TRIVAC D 2,5 E-LD pump is supplied ready for operation, complete with built-in thermal motor overload protection, mains cord (0.37 m long) and a custom plug

NOTICE



Notes on the Oil and how to order

Oil LVO 310 is used as standard. If any other kind of special oil is being used, this fact will be indicated by a sticker on the oil box stating the type of special oil used.

You must only use the kind of oil which has been specified for the particular pump.

Special oils upon request.

Only use the kind of oil specified by Leybold.

1.3 Technical Data

D 2,5 E-LD two-stage 50 Hz / 60 Hz

Nominal pumping speed ¹⁾	$\text{m}^3 \cdot \text{h}^{-1}$	3.2 / 3.6
Pumping speed ¹⁾	$\text{m}^3 \cdot \text{h}^{-1}$	2,5 / 3,3
Ultimate partial pressure without gas ballast ¹⁾	mbar	$3 \cdot 10^{-3}$
Ultimate total pressure without gas ballast ¹⁾	mbar	$5 \cdot 10^{-3}$
Ultimate total pressure with gas ballast ¹⁾	mbar	$1 \cdot 10^{-1}$
Oil filling, min./max..	l	0.3 / 0.55
Noise level to DIN 45 635 (without/with gas ballast)	dB (A)	47 / 49
Admissible ambient temperature ²⁾	°C	+10 ... +40
Connection intake side	DN	16 KF

¹⁾ In acc. with DIN 28 400 et seq. valid for LVO 310. For other oils the ultimate pressure may differ.

²⁾ The motor may accelerate with a delay when simultaneously an undervoltage is present at the motor and the pump is at the minimum permissible and ambient temperature.

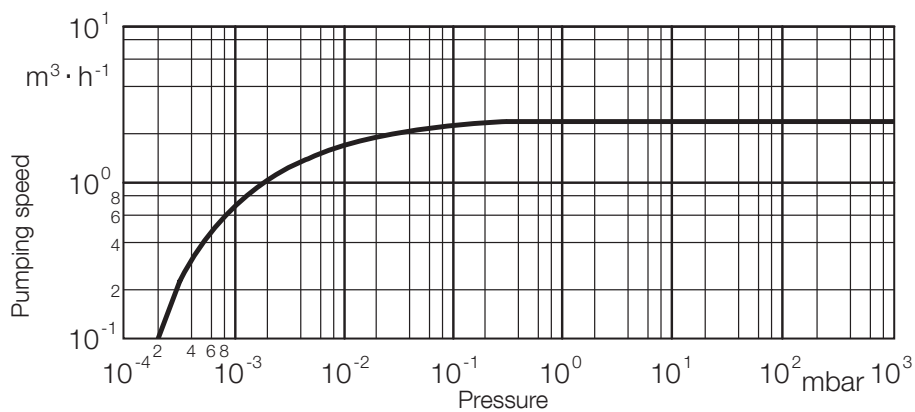





Fig. 3 Pumping speed characteristics of the TRIVAC D 2,5 E-LD

Description

Cat.-No. of the pump	140 020	140 021
Motor type	E6A4BS2-506	E6A4BS2-507
Motor L/N	20015408	20015410
IP rating		
Operating mode IEC34 / Duty		
Isolation class	F	F
Phases	1~	1~
Manufacturer	Hanning-Elektro-Werke GmbH & Co. KG 33813 Oerlinghausen Germany	Hanning-Elektro-Werke GmbH & Co. KG 33813 Oerlinghausen Germany
Number of poles	4	4
Nom. output power at 50 Hz	200 W	
Nom. output power at 60 Hz	250 W	250 W
Nom. in frequency	50 Hz 60 Hz	60 Hz
Nom. voltage range and nom. current at 50 Hz	220-240 V / 1.0 A	
Nom. voltage range and nom. current at 60 Hz	230 V / 1.2 A	110-120 V / 2.4 A
Tolerances of voltage range ¹⁾	±5 %	±5 %
Nom. speed at 50 Hz	1420 min ⁻¹	
Nom. speed at 60 Hz	1720 min ⁻¹	1720 min ⁻¹
Disposal	local directives have to be considered	
Max. altitude above sea level	1000 m above sea level	1000 m above sea level
Max. ambient temperature when operating ¹⁾	40 °C	40 °C
T-board / plug	Mains cord (0.37 m) with custom plug	Mains cord (0.37 m) with custom plug
Certificates ²⁾ for the motor		
Length of the pump	456 mm	456 mm
Weight	13.4 kg	13.4 kg

Description

Cat.-No. of the pump	140 022
Motor type	E6A4BS2-508
Motor L/N	20015409
IP rating	
Operating mode IEC34 / Duty	
Isolation class	F
Phases	1~
HManufacturer	Hanning-Elektro-Werke GmbH & Co. KG 33813 Oerlinghausen Germany
Number of poles	4
Nom. output power at 50 Hz	200 W
Nom. output power at 60 Hz	250 W
Nom. in frequency	50 Hz 60 Hz
Nom. voltage range and nom. current at 50 Hz	100 V / 2.3 A
Nom. voltage range and nom. current at 60 Hz	100 V / 2.6 A
Tolerances of voltage range ¹⁾	±5 %
Nom. speed at 50 Hz	1420 min ⁻¹
Nom. speed at 60 Hz	1720 min ⁻¹
Disposal	local directives have to be considered
Max. altitude above sea level	1000 m above sea level
Max. ambient temperature when operating ¹⁾	40 °C
T-board / plug	Mains cord (0.37 m) with custom plug
Certificates ²⁾ for the motor	
Length of the pump	456 mm
Weight	13.4 kg

Description

¹⁾ The motor may accelerate with a delay when simultaneously an undervoltage is present at the motor and the pump is at the minimum permissible and ambient temperature.

²⁾ Key to the certificates:



CSA certification mark for products certified in accordance with CSA for Canada.



UL certification mark for approved components for the USA.



UL certification mark for energy efficiency for listed products and approved components for Canada and the USA.

NOTICE



Observe the data given on the motor name plate.
For special pumps please note the information contained in the supplemental sheet.

Transport and Storing

2 Transport and Storing

To lift the pumps only use the lifting facilities. When connecting or removing the pump, do not move under hoisted loads.

If possible transport the pump in its original packaging, if not available exercise due care.

Pumps which are filled with oil must only be moved while standing upright. Otherwise oil may escape. Avoid any other orientations during transport. Check the pump for the presence of any oil leaks, since there exists the danger that someone may slip on spilt oil.

Before putting a pump into operation once more it should be stored in a dry place preferably at room temperature (20 °C). Before the pump is stored it must be properly disconnected from the vacuum system, purged with dry nitrogen and the oil should be changed too.

The inlets and outlets of the pump must be sealed with the shipping seals which are provided upon delivery.

If the pump is to be stored for a longer period of time it should be sealed in a PE bag containing some desiccant (silica gel).

When a pump is put into operation after it has been stored for over one year, standard maintenance should be run on the pump and the oil should also be exchanged. We recommend that you contact the Leybold Service.

CAUTION



Installation

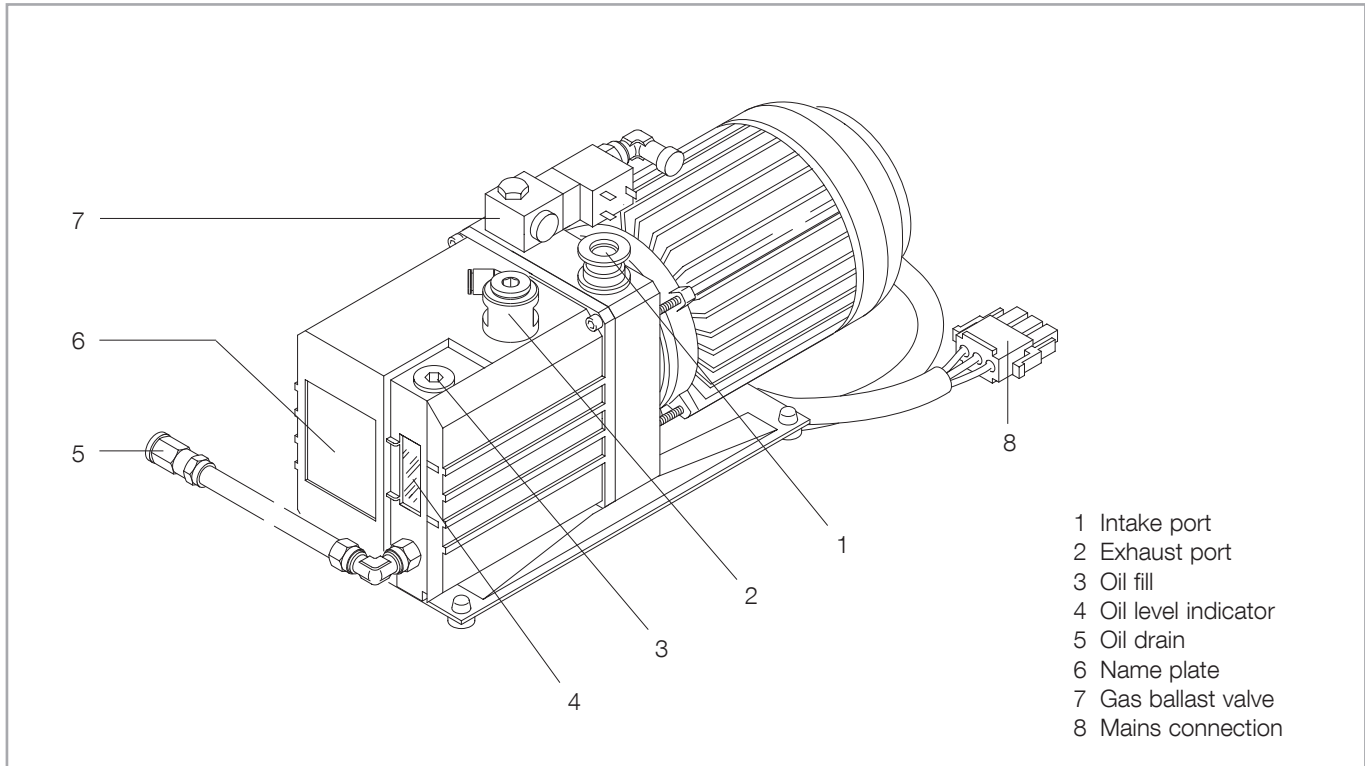


Fig. 7 Connections and controls

3 Installation

NOTICE



Instructions for the operating personnel
Before any kind of assembly work the personnel must be informed in advanced about potential hazards. Observe Safety Informations 0.1 to 05.

DANGER



3.1 Placement

Explosion risk

The standard pump is **not** suited for installation in the explosion hazard areas. Observe Safety Informations 0.5.

The TRIVAC D 2,5 E-LD pump can be set up on a flat, horizontal surface. Rubber feet under the coupling housing ensure that the pump can not slip. The location of the TRIVAC should be such that all controls are easily accessible.

CAUTION



Risk of toppling

Max. tilt for the pump with possibly fitted standard accessories is 10° from the vertical.

If you wish firmly install the pump in place, insert bolts through bore holes (Ø 5 mm) in the rubber feet.

The rubber feet act as vibration absorbers. They must therefore not be compressed by screws.

When installing the TRIVAC pump, make sure that the connections and controls are readily accessible.

The site chosen should allow adequate air circulation to cool the pump (keep front and rear unobstructed).

The oil-level glass must be visible.

Note the ambient conditions during operation

The ambient temperature should +40 °C not exceed and not drop below +10 °C (see Section 4.3.3).

For installation sites over 1000 m above sea level and/or a relative atmospheric humidity of over 90%, you must discuss this with technical sales.

The maximum heat which is dissipated corresponds approximately to the installed amount of motor power.

Install the pump so that only minimum quantities of dust can settle on the surfaces. Remove dust deposits in regular intervals.

The oil filling is included separately in the case of replacement pumps.

Before operating the pump you must fill in the correct quantity of oil, see Section 5.4.

NOTICE



3.2 Normal use

TRIVAC pumps can pump gases and vapours, and evacuate vessels or vacuum systems in the fine vacuum range.

The pumps are suited for pumping water vapour within the specified water vapour tolerance limits. Avoid vapours that can condense into liquids when being compressed inside the pump, if these substances exceed the vapour tolerance of the pump. In the case of wet processes we recommend the installation of liquid separators upstream and downstream of the pump as well as the use of the gas ballast and we recommend to run the pump for 30 minutes allowing it to warm up before beginning with the pumpdown process.

Pumping of dust or much contaminated media

The pumps are not suited for pumping of liquids or media which carry large quantities of dust. Corresponding protection devices need to be provided.

NOTICE



Our technical sales department is available for further advice in these matters.

Installation

3.2.1 Abnormal use

NOTICE

The TRIVAC D 2,5 E-LD is suited only for installation within housings providing adequate touch protection. This pump must not be operated without this additional touch protection.

CAUTION

The TRIVAC is not suited for pumping of:

- radioactive and toxic substances
- pyrophorous substances
- corrosive gases
- oxygen (or other highly reactive gases) at concentrations exceeding that of the atmosphere (> 21 % for oxygen).

NOTICE

The pumps are not suited for pumping of liquids or media which carry large quantities of dust. Corresponding protection devices need to be provided.

CAUTION

The standard pump is not suited for pumping of hazardous gases or vapours.

When cleaning a system in which a TRIVAC pump has been integrated, all parts in contact with the medium need to be compatible with the cleaning agent so as to prevent a chemical reaction. Residues of the cleaning agent within the pump must be avoided.

3.3 Connection to the System

Before connecting the pump, the shipping seals on the connection flanges (5/1 and 5/2) must be removed. If residues of adhesives are present on the connecting flanges you must remove these using a suitable solvent like alcohol, for example.

We recommend retaining of the shipping seals for use when wanting to decommission the pump.

The intake line is fitted with standard small flanges. The connection flanges must be clean and undamaged.

The intake line and the exhaust line must be connected using corrugated pipes or vacuum hoses so that no mechanical forces can be transferred to the pump.

The intake line must be clean. Any deposits in the intake line will tend to degas and impair the attainable vacuum pressures.

The cross section of the intake and exhaust line must at least be of the same diameter as that of the pump connections.

An intake line which is too small in diameter will throttle the pumping speed.

Note the specified cross sections for the connection lines

If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurised. The pressure in the oil box must not exceed 0.5 bar relative to the atmospheric pressure. An exhaust line which is too small in diameter or which is blocked can result in the formation of over-pressures within the pump. Possible consequences can be a damaged or even burst open the pump. Thus the exhaust line must be checked from time to time to ensure that there are no obstructions.

Never operate the pump with a sealed exhaust line. There is the danger of injury.

When pumping vapours we strongly recommend the installation of a condensate separator on the suction side and also on the exhaust side.

Avoid backflowing condensate

Install the exhaust line with a downward slope (lower than the pump) so as to prevent condensate from flowing back into the pump. If this is not possible, insert a condensate trap.

Safely lead the exhaust gases away

Exhaust gases may, depending on the type of application, present a health hazard and/or may be detrimental to the environment.

The exhaust gases from the vacuum pump must be safely led away and subjected to post-treatment as required. In order to reduce the emission of oil vapours we recommend the installation of an additional exhaust filter (Leybold accessory, see Section 1.4). Depending on the type of application or the kind of pumped media, the corresponding regulations and information sheets must be observed.

The maximum inlet pressure must not exceed atmospheric pressure (1013 mbar).

CAUTION



NOTICE



CAUTION



NOTICE



DANGER

3.4 Electrical Connection

Risk due to high voltages

Death or severe injury caused by an electric shock.

The electrical connections must only be made 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 being operated.

Electrical safety of the vacuum pump can only be ensured after it has been installed in the leak detector. During servicing of the vacuum pump you must make absolutely sure that the complete pump including the capacitor is connected to ground.

The pumps are supplied with an AC motor.

The AC motor may be connected directly by means of a mains cord and a plug to the mains power. Fusing must be provided always in accordance with national and local regulations for single-phase mains power supplies (in Germany 16 A). A check on the direction of rotation is not required since it is fixed. A thermal motor protection with automatic reset will protect the motor against overloads.

The mains voltage must comply with the voltage stated on the name plate.

WARNING

Warning against automatic start-up

If the thermal overload protector shuts off the pump, the motor will restart itself as soon as it cools. That's why the mains plug should be disconnected from the mains before starting with any work on the pump.

Observe Safety Informations 0.2.

4 Operation

4.1 Media Compatibility

The TRIVAC D 2,5 E-LD pump can pump condensable gases and vapours, provided that the gas ballast valve is open and the pump has attained its operating temperature.

4.2 Start-up

Check the oil level each time before switching on the pump, see Section 5.3.

Operate the pump only with the oil level above the minimum. Open all blocking devices in the exhaust line. Never operate the pump with a blocked or constricted exhaust line.

The pump is started by plugging the mains plug into a mains outlet.

During initial start up and after a longer period during which the pump has not been used, the pump may not immediately attain the specified ultimate pressure because the oil has to be degassed first. For this you should let the pump run for about 30 minutes with the intake line closed and the gas ballast valve (5/7) open.

Use matching accessories only

Before starting the pump ensure that the pump and the fitted accessories meet the requirements of your application and that safe operation can be guaranteed.

Start up the pump only after it has been fully installed

Never operate the pump with an open intake port. Vacuum connections as well as oil feed and discharge openings must not be opened while the pump is operating. Avoid exposing any part of the human body to the vacuum. There is the risk of suffering injury. Observe Safety Informations 0.1.

WARNING

WARNING

4.3 Operation

The TRIVAC D 2,5 E-LD pump is capable of pumping gases and vapours. For pumping vapours it is required that the gas ballast valve be open (5/7) and that the pump has attained its operating temperature.

If exhaust gases must be collected or contained, do not allow the exhaust line to become pressurised. The pressure in the oil box must not exceed 0.5 bar relative to the atmospheric pressure. An exhaust line which is too small in diameter or which is blocked can result in the formation of over-pressures within the pump. Possible consequences can be a damaged or even burst open pump. Thus the exhaust line must be checked from time to time to ensure that there are no obstructions.

CAUTION

4.3.1 Pumping of Non-Condensable Gases and Vapours

If the process contains mainly permanent gases, the TRIVAC may be operated without gas ballast, provided that the saturation vapour pressure at operating temperature is not exceeded during compression.

If the composition of the gases to be pumped is not known and if condensation in the pump cannot be ruled out, run the pump with the gas ballast valve open in accordance with Section 4.3.2.

4.3.2 Pumping of Condensable Gases and Vapours

With the gas ballast valve open and at operating temperature, TRIVAC pumps can pump pure water vapour up to the water vapour tolerance specified by the technical data. If the vapour pressure increases above the permissible level, the water vapour will condense in the oil of the pump.

When pumping vapours ensure that the gas ballast valve is open and that the pump has been warmed up for approximately 30 minutes with the intake line closed.

NOTICE**Pumping of Vapours**

Vapour phases may only be pumped up to the permissible limit after the pump has attained its operating temperature.

During pumping, vapours may dissolve in the oil. This changes the oil properties and thus there is a risk of corrosion in the pump. Therefore, don't switch off the pump immediately after completion of the process. Instead, allow the pump to continue operating with the gas ballast valve open and the intake line closed until the oil is free of condensed vapours. We strongly recommend operating the TRIVAC D 2,5 E-LD in this mode for about 30 minutes after completion of the process.

In cyclic operation, the TRIVAC D 2,5 E-LD should not be switched off during the intervals between the individual working phases (power consumption is minimal when the pump is operating at ultimate pressure), but should continue to run with gas ballast valve open and intake port closed (if possible via a valve).

Once all vapours have been pumped off from a process (e.g. during drying), the gas ballast valve can be closed to improve the attainable ultimate pressure.

4.3.3 Operating Temperature

Proper operation of the TRIVAC D 2,5 E-LD is ensured at ambient temperatures between 10 °C and 40 °C.

When the pump is warm, the temperature at the surface of the TRIVAC D 2,5 E-LD may rise to between 40 °C and 80 °C, depending on the load on the pump.

CAUTION**Beware of hot surfaces**

There is the danger of receiving burns.
Observe Safety Informations 0.3.

If – due to the ambient conditions – this temperature range is exceeded at either end of the range, contact Leybold Sales.

The motor may accelerate with a delay when simultaneously an undervoltage is present at the motor and the pump is at the minimum permissible and ambient temperature.

4.4 Shutdown

Under normal circumstances, all that you need do is to electrically switch off the TRIVAC D 2,5 E-LD.

No further actions will be required.

When pumping condensable media let the pump continue to operate with the gas ballast valve open and the intake line closed before switching off (see Section 4.3.2).

When pumping aggressive or corrosive media, let the pump continue to operate even during long non-working intervals (e.g. overnight) with the intake line closed and the gas ballast valve open. This avoids corrosion during idle periods.

If the TRIVAC D 2,5 E-LD is to be shutdown for an extended period after pumping aggressive or corrosive media or if the pump has to be stored, proceed as follows:

Pump and operating agents may be contaminated

If hazardous substances have been pumped, then these substances can escape from the pump and from the oil. Introduce adequate safety precautions; use gloves, face protection or a respirator, for example. Observe Safety Informations 0.4.

Seal the connection ports. Special conservation or anticorrosion oils aren't necessary.

Please also take note of the information given in Section 2 Transport and Storing.

4.4.1 Shutdown through Monitoring Components

When the pump has been switched off due to overheating sensed by the motor coil protector, the pump must only be started manually after the pump has cooled down to the ambient temperature and after having removed the cause first.

4.4.2 Controller/Mains Power Failure

In order to prevent the pump from running up unexpectedly after a mains power failure, the pump must be integrated in the control system in such a way that the pump can only be switched on again manually. This applies equally to emergency cut-out arrangements.

WARNING



DANGER



CAUTION



5 Maintenance



Danger by High Electric Voltages
Death or severe injury caused by an electric shock!
The electrical connections must only be provided by a trained electrician in accordance with the guidelines laid down in the international series of standards IEC 64.

Disconnect the electrical connections before disassembling the pump. Make absolutely sure that the pump cannot be accidentally started. Observe Safety Informations 0.2.

If the pump has pumped harmful substances, contrary to what has been stated in Section 3.2, ascertain the nature of hazard and take adequate safety measures. Observe Safety Informations 0.4.

When disposing of used oil, you must observe the applicable environmental regulations.

Due to the design concept, TRIVAC pumps require very little maintenance when operated under normal conditions. The work required is described in the sections below. In addition to this, a maintenance plan is provided in Section 5.1.

NOTICE



All work must be carried out by suitably trained personnel. Maintenance or repairs carried out incorrectly will affect the life and performance of the pump and will void any warranty claims.

Leybold offers practical courses on the maintenance, repair, and testing of TRIVAC pumps. Further details are available from Leybold on request.

NOTICE



If the TRIVAC is used in ambient air which is much contaminated, make sure that the air circulation and the gas ballast valve are not adversely affected.

When the TRIVAC D 2,5 E-LD has been pumping corrosive media we recommend that possibly planned maintenance work be carried out immediately in order to prevent corrosion of the pump while it is at standstill.

Please take the spare parts numbers from the enclosed spare parts list.

In case of special designs and variants please always indicate the serial number.

5.1 Maintenance Plan

Nr.	Rotary vane pump TRIVAC D 2,5 E-LD	Measurement/test quantity Operating/auxiliary materials	Interval						Remarks
			VE	VP	t	6m	a	n-a	
1	Operate the pump for at least 1 h with gas ballast..				x				Refer also to the Operating Instructions Section: individual components. Condensed water is thus removed from the oil.
2	Check the oil level, if required change the oil.	Oil: LVO 310 or special and alternative oils see Chapter 5.3	x		x				Refill: Only after the pump has been switched off.
3	Clean the internal demister, change it as required.	Suitable cleaning agent.					x		Already clean before the maintenance interval has elapsed when the noise level increases. ■ Clean internal demister with cleaning agent. ■ Replace the defective internal demister. ■ Dispose of the defective internal demister as special waste. Cleaning agent according to national/international specifications. Observe the safety regulations when using cleaning agents. (parts are contained in Maintenance Kit 1) (see Section 7.1)
4	Check the coupling bushings for damage and wear.							3	Check also in advance of the scheduled maintenance interval in case of extreme noise (parts are contained in Repair Set 1, see Section 7.1)
5	Change the oil and clean the oil level glass.	Oil: LVO 310 or special- and alternative oils Suitable cleaning agent and compressed air.					x		Oil change: ■ First oil change after 100 operating hours. ■ Further oil changes: at least every 2000 - 3000 operatinghours or after one year. ■ Pump switched off and cold. Exchange the oil while the pump is cold so as to avoid releasing adsorbed gases. Clean the oil level glass with a cleaning agent and blow it out with compressed air under a suction hood. Use cleaning agents only corresponding to the national/international specifications. Observe the safety regulations when using cleaning agents Quantity of oil: see Section 1.3 Oil disposal: see Section 8
8	Check the fan of the pump and motor as well as the cooling fins on the motor for deposits, and clean as required.	Brush and industrial vacuum cleaner.						x	Already clean before the maintenance interval has elapsed when the pump or the motor gets too warm. Caution: switch off the pump and ensure that it cannot run inadvertently (disconnect from the mains).
7	Full maintenance	Maintenance-Kit 2							3 Clean and perform maintenance on the pump as described in the instructions included with Maintenance Kit 2 (see Section 7.1).

Key to maintenance plan

VE = Maintenance before switching on the system
 VP = Maintenance before starting production
 t = Daily maintenance
 6m = Six monthly maintenance
 a = Annual maintenance
 n-a = Maintenance every n years

We recommend that you service the pump every two years covering the following:

- Cleaning
- Checking the individual components
- Exchange of all seals
- Functional check

This service should be run by the Leybold - Service.

Maintenance

5.2 Leybold Service

Whenever you send a pump to Leybold, indicate whether the pump is contaminated or is free of substances which could pose a health hazard. If it is contaminated, specify exactly which substances are involved. You must use the form we have prepared for this purpose; we will forward the form on request.

A copy of the form is printed at the end of these operating instructions: „Declaration of contamination of vacuum equipment and components“. Another suitable form is available from the Leybold homepage: www.leybold.com → Leybold → Documentation → Download Documents.

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

This statement detailing the contamination is required to satisfy legal requirements and for the protection of our employees.

Pumps which are not accompanied by a contamination statement will be returned to the sender.

CAUTION



Use secure shipping packaging

Package the pump such that it will not suffer any damage when being shipped and so that no oil or hazardous materials can escape from the packaging.

5.3 Monitoring the Oil Level

During operation of the TRIVAC the oil level must always remain between marks (6/2) and (6/3) on the oil-level glass. The amount of oil must be checked and topped up as required.

Check and top up oil only after having shut down the pump first.
Please note the safety information given in Section 0.3 and 0.4.

CAUTION

Pumps which have not directly been delivered from Leybold, e.g. in systems, may have been filled with oils different from LVO 310. In this case a refill with LVO 310 may cause problems. Therefore check before the refill the kind of oil in the pump and fill in only suitable oil or change the oil.

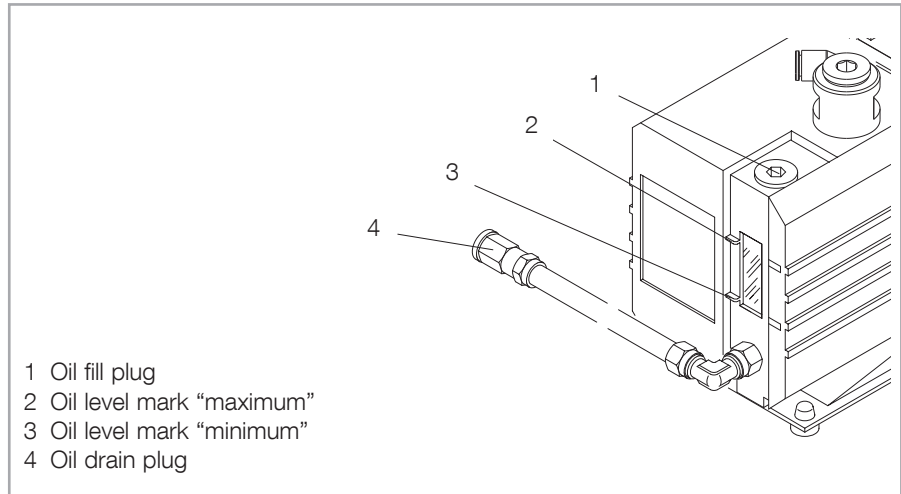


Fig. 6 Oil change

5.4 Oil Change



DANGER

Pump and operating agents may be contaminated

Hazardous substances may escape from the pump and the oil. If there is the danger that the operating agent may present a hazard in any way due to decomposition of the oil, or because of the media which have been pumped, you must determine the kind of hazard and ensure that all necessary safety precautions are taken use gloves, face protection or a respirator, for example.

Observe Safety Informations 0.3 und 0.4.



Change the oil while the pump is cold so as to avoid releasing adsorbed gases. If releasing adsorbed gases is no problem, change the oil after the pump has been switched off and while the pump is still warm.



Risk of suffering burns

With the pump warm from operation, both pump and oil can get so hot that there is the risk of suffering burns. If required, wear gloves.

NOTICE



Check and top up oil only after having shut down the pump first.

When disposing of waste oil, observe the applicable environment protection regulations!

When changing the oil use the same type of oil which was previously in the pump. If you want to change the type of oil entirely please consult us first.

The oil should be changed after the first 100 operating hours and then at least every 2000 - 3000 operating hours or after one year. At high intake pressures and intake temperatures and/or when pumping contaminated gases, the oil will have to be changed much more frequently.

Further oil changes should be made before and after long-term storage of the pump.

Contact us for more information in this matter.

Required tool: Allen key 8 mm.

Remove the oil-drain plug (6/4) and let the used oil drain into a suitable container. When the flow of oil slows down, screw the oil-drain plug back in, briefly switch on the pump (max. 10 s) and then switch it off again. Remove the oil-drain plug once more and drain out the remaining oil.

Screw the oil-drain plug back in (check the gasket and reinstall a new one if necessary).

Remove the oil-fill plug (6/1) and fill in with fresh oil.

Screw the oil-fill plug (6/1) back in.

The tightening torque for the bolts (6/1) and (6/4) has been specified at 10 Nm.

We can only guarantee that the pump operates as specified by the technical data if the lubricants recommended by us are used.

NOTICE

Maintenance

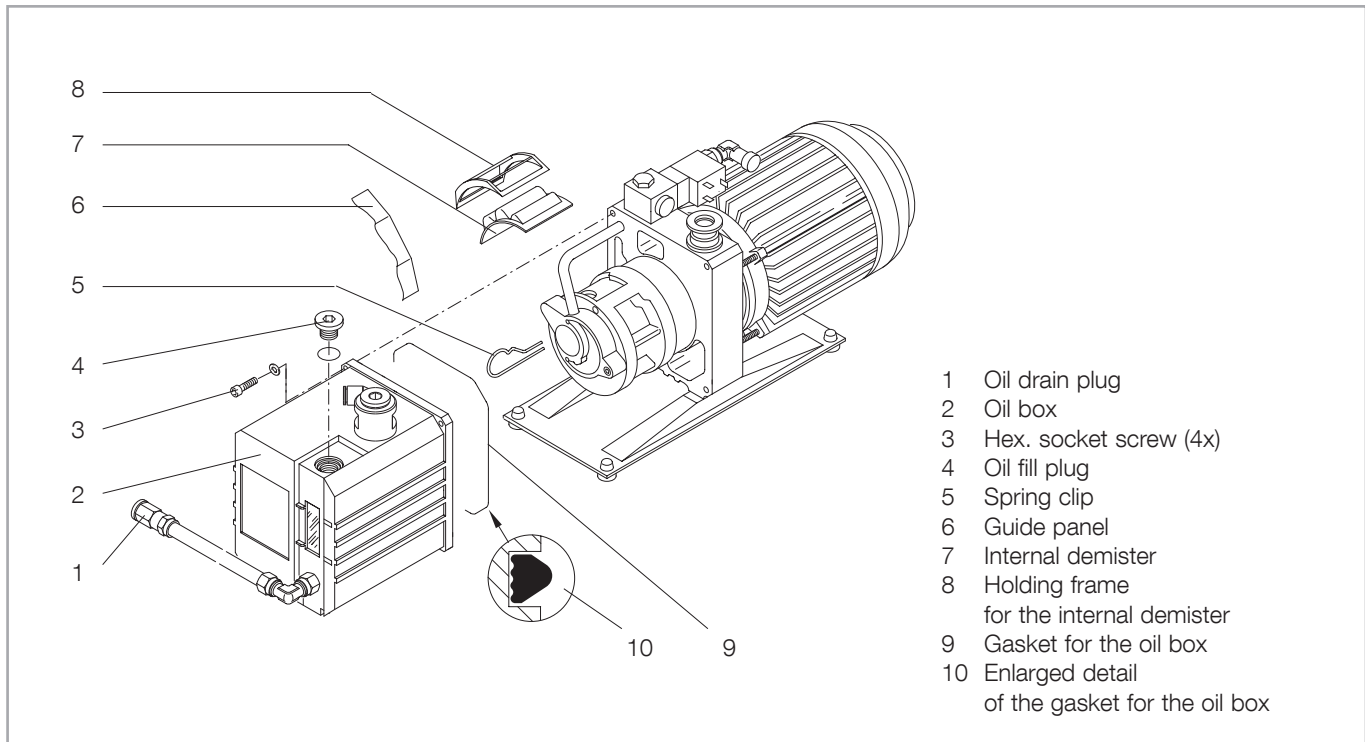


Fig. 7 Removing and inserting the internal demister

5.5 Removing and Inserting the Internal Demister

Simple maintenance on the side of the pump using Maintenance Kit 1

Required tools: Hex. socket screw key SW 4, SW 6 and SW 8, special pliers for spring clip.

The internal demister (7/7) has been installed in a resilient frame (7/8). When it has clogged it will lift itself up periodically at high intake pressures in order to equalise the resulting pressure difference.

The increased noise level at high intake pressure is thus a sign for a clogged internal demister.

Depending on the operating conditions the internal demister will have to be cleaned regularly or it must be exchanged. Cleaning must be performed using a suitable solvent.

Switch the pump off and drain out the oil (in accordance with Section 5.4).

In order to collect the remaining oil in the oil box we recommend that you lift the pump up slightly at the side of the motor.

Unscrew the four hex. socket screws (7/3) of the oil box.

Pull the oil box (7/2) out to the front.

Remove the gasket (7/9) of the oil box.

Use a pair of pliers to pull the spring (7/5) out to the front.

Detach the holding frame (7/8) and the internal demister (7/7).

Clean all parts and check them for perfect condition and replace them as required.

Reassemble in the reverse order.

Make sure to fit the gasket for the oil box (7/9) with the flat side in the groove, see item 10 in Fig. 7.

Torque for the hex. socket screws (7/3) is 5.5 Nm.

NOTICE



5.6 Disassembly and Reassembly of the Electric Motor

Risk due to high voltages

Death or severe injury caused by an electric shock!

Before starting work, always disconnect the motor from the mains. Pull the mains plug. Observe Safety Informations 0.2.

DANGER



Required tools: Hex. socket screw key size 4,
We recommend that you remove the foot (8/8) of the pump.

Place the pump on the front side of the oil box (8/1).

Remove the four hex. screws (8/4) from the fan cowl (8/5).

Detach the fan cowl.

Unscrew the tie rod (8/6).

Detach the motor (lever off using two screwdrivers inserted in parallel between the end plate A and the HV bearing piece (8/2 and 8/7).

Clean all parts and make sure that they are in perfect condition; replace any parts as required.

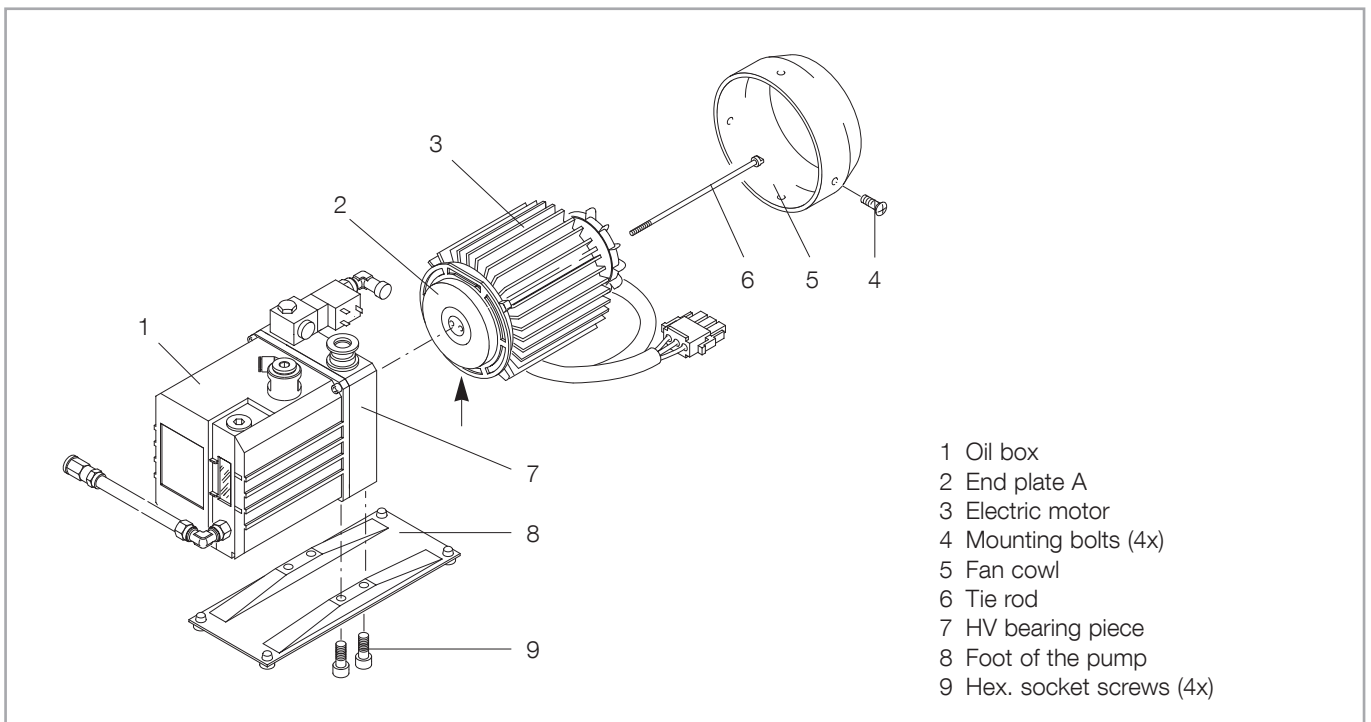


Fig. 8 Disassembly and assembly of the electric motor

Maintenance

In case of wear exchange the coupling bushings; these are included in Repair Set 1.

Reassemble in the reverse order.

Tighten the tie rods crosswise to 4 Nm.

Tighten the bolts for the pump's base to 5 Nm.

NOTICE

Especially note the position of the oil ejection hole (see arrow in Fig. 7) in the end plate A. The hole must always lead downward.

5.7 Full maintenance

Clean the pump and run maintenance on it.

Clean and perform maintenance on the pump as described in the instructions for maintenance kit 2, see Section 7.1.

Troubleshooting

6 Troubleshooting

Fault	Possible cause	Remedy	Repair*
Pump does not start.	Wiring is malfunctioning.	Check and repair wiring	-
	Power supply voltage does not match the rating of the motor.	Replace the motor.	5.6
	Motor is malfunctioning.	Replace the motor.	5.6
	Oil temperature is below 10 °C.	Heat the pump and pump oil or use a different oil.	4.3.3/5.4
	Oil is too thick.	Change the oil.	5.4
	Exhaust filter/exhaust line is clogged.	Replace the filter or clean the exhaust line.	-
	Pump is seized up (sign: pump is jammed).	Repair the pump.	Service
Pump does not reach ultimate pressure.	Measuring technique or gauge is unsuitable.	Use correct measuring technique and gauge. Measure the pressure directly at the pump's intake port.	-
	External leak ¹⁾ .	Repair the pump.	Service
	Dirty internal demister	Perform maintenance	M. Kit 1 / 2.3.5
	Exhaust valve is malfunctioning.	Repair the valve.	M. Kit 2
	Oil is unsuitable.	Change the oil (degas it, if necessary).	5.4
	Intake line dirty or leaky.	Clean or exchange the intake line.	-
	Pump is too small.	Check the process data, replace the pump, if necessary.	-
Pumping speed is too low.	Clogged exhaust filter.	Exchange the filter element.	-
	Connecting lines are too narrow or too long.	Use adequately wide and short connecting lines.	3.3
After switching off the pump under vacuum, pressure in the system rises too fast.	System has a leak.	Check the system.	-
	Faulty tandem valve.	Repair the valve.	Compl. Set
	Inner shaft seal is faulty.	exchange the shaft seal.	K Compl. Set
	Faulty exhaust or bypass valve.	Repair the valve(s).	M. Kit 2

* Repair: Refer to the stated section in these Operating Instructions.

¹⁾ Bubble test: The warm pump with degassed oil is running without gas ballast and the intake is blanked off. The exhaust line is led into a vessel with water.

If an evenly spaced line of bubbles appears then the pump has an external leak.

Troubleshooting

Fault	Possible cause	Remedy	Repair*
Pump gets hotter than usually observed.	Cooling air supply is obstructed.	Set pump up correctly.	3.1
	Ambient temperature is too high.	Set pump up correctly.	3.1/4.3.3
	Process gas is too hot.	Change the process.	-
	Oil level is too low.	Add oil.	5.4
	Oil is unsuitable.	Change the oil.	5.4
	Oil cycle is obstructed.	Clean or repair the oil lines and channels.	Service
	Exhaust filter/exhaust line is obstructed.	Replace the exhaust filter, clean the exhaust line.	-
	Exhaust valve is malfunctioning. Deviating mains voltage.	Repair the valve. Check power supply raiting of the motor and the mains supply	M. Kit 2 -
Oil in the intake line or in the vacuum chamber	Oil comes from the vacuum system.	Check the vacuum system.	-
	Blocked tandem valve.	Clean or repair the valve.	Compl. Set
Oil is turbid.	Condensation.	Degas the oil or change the oil and clean the pump. Precaution: open the gas ballast valve or fit separator.	4.3.2/5.4
Pump is excessively noisy.	Oil level is much too low (oil level is no longer visible).	Add oil.	5.3/5.4
	Intake pressure is too high.	Reduce the intake pressure.	-
	Internal demister is clogged.	Clean or replace demister.	5.6 / M. Kit 1
	Coupling bushings worn out.	Install new coupling bushings.	Rep. Set 1
	Vanes or bearings are damaged.	Repair pump.	Service
Faulty motor bearing.	Exchange the motor bearing.	Service	
Oil leak at the side of the motor.	Outer shaft seal damaged or worn out.	Exchange the shaft seal.	Rep. Set 1

Wearing Parts and Original Spare Parts

7 Wearing Parts and Original Spare Parts

As to spare parts for your vacuum pump, please refer to the spare parts list enclosed with the product.

7.1 Maintenance Kits and Repair Sets

The maintenance and repair kits have been so arranged that the spare and exchange parts they contain cover any servicing work which might be required.

Each set comes with brief instructions in which the necessary work is detailed. This very much simplifies the servicing or repair work.

Given in the following is a brief description of the individual kits and how to use these.

Maintenance Kit 1

This kit is recommended for maintenance after an operating period of one year. It contains the gaskets for the oil box, the internal demister which separates the oil from the gas (for contents see Fig. 9).

Repair Set 1

This set is used for the seal on the side of the motor. It contains the gaskets for the side of the motor, the shaft sealing ring as well as the following wearing parts: coupling sleeves and compression spring for the oil pump (for contents see Fig. 10).

Maintenance Kit 2

This kit will only be required in those cases where the pump is not capable of attaining its ultimate pressure. This kit contains the valves, the internal demister which separates the oil from the gas as well as the gaskets for the oil box (for contents see Fig. 11).

Complete Set

This set contains all wearing parts, all gaskets and the internal demister which separates the oil from the gas.

They are used as follows:

1. Maintenance after three years of operation
2. Complete repair

(for contents see Fig. 10, 11 and 12).

Wearing Parts and Original Spare Parts

7.2 Ordering Information for the Maintenance Kits and the Repair Sets

TRIVAC	D 2,5 E-LD
Maintenance kit 1	200 40 022
Maintenance kit 2	200 40 042
Repair set 1	200 40 020
Complete set	200 40 041

The use of the maintenance kits and the repair sets is detailed in the Tables 5.1 - Maintenance Plan and 6 - Troubleshooting.

7.3 Ordering Information for the Special Tools

TRIVAC	D 2,5 E-LD
Special tool for the tie rods	200 02 760

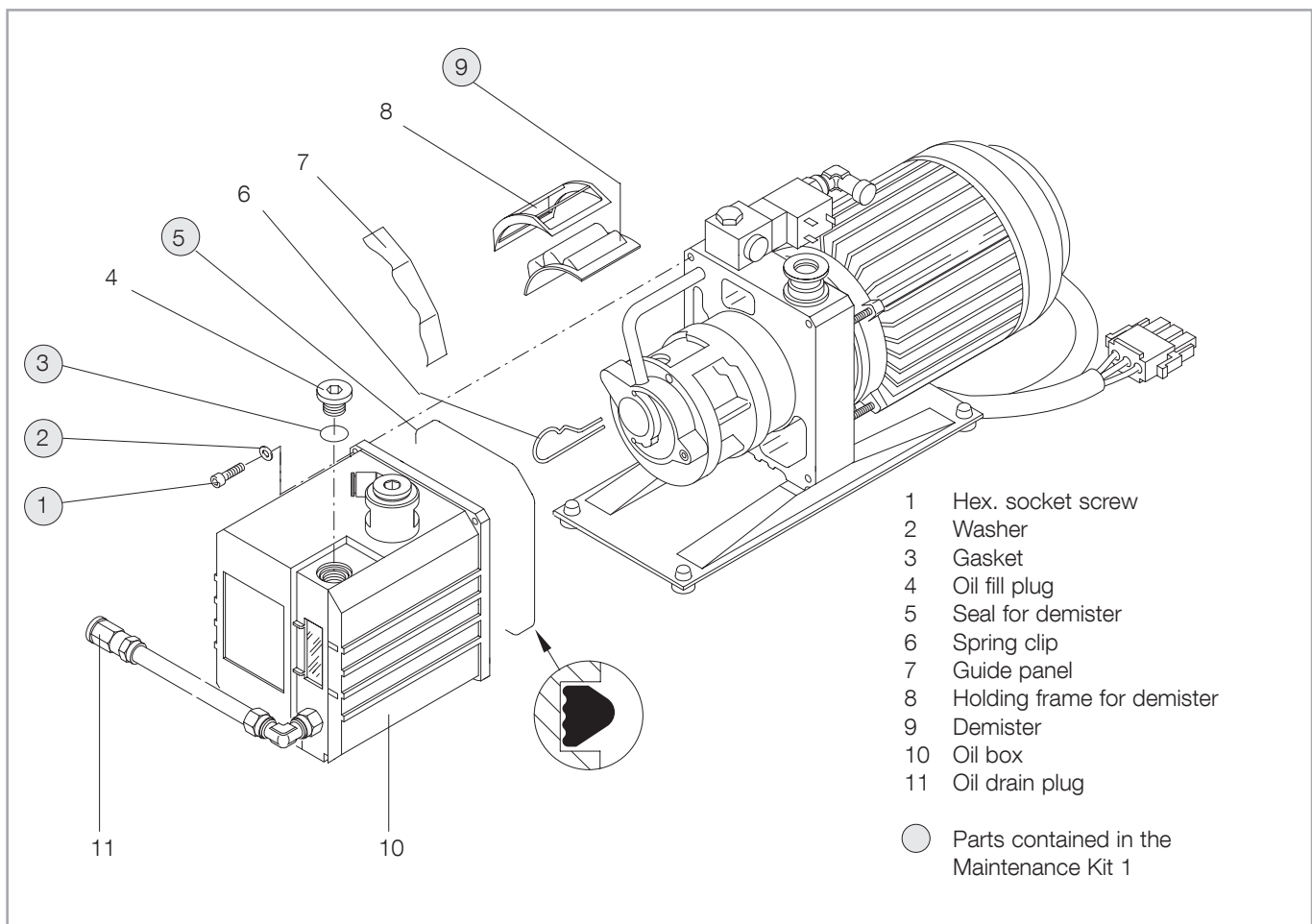


Fig. 9 Maintenance Kit 1

Wearing Parts and Original Spare Parts

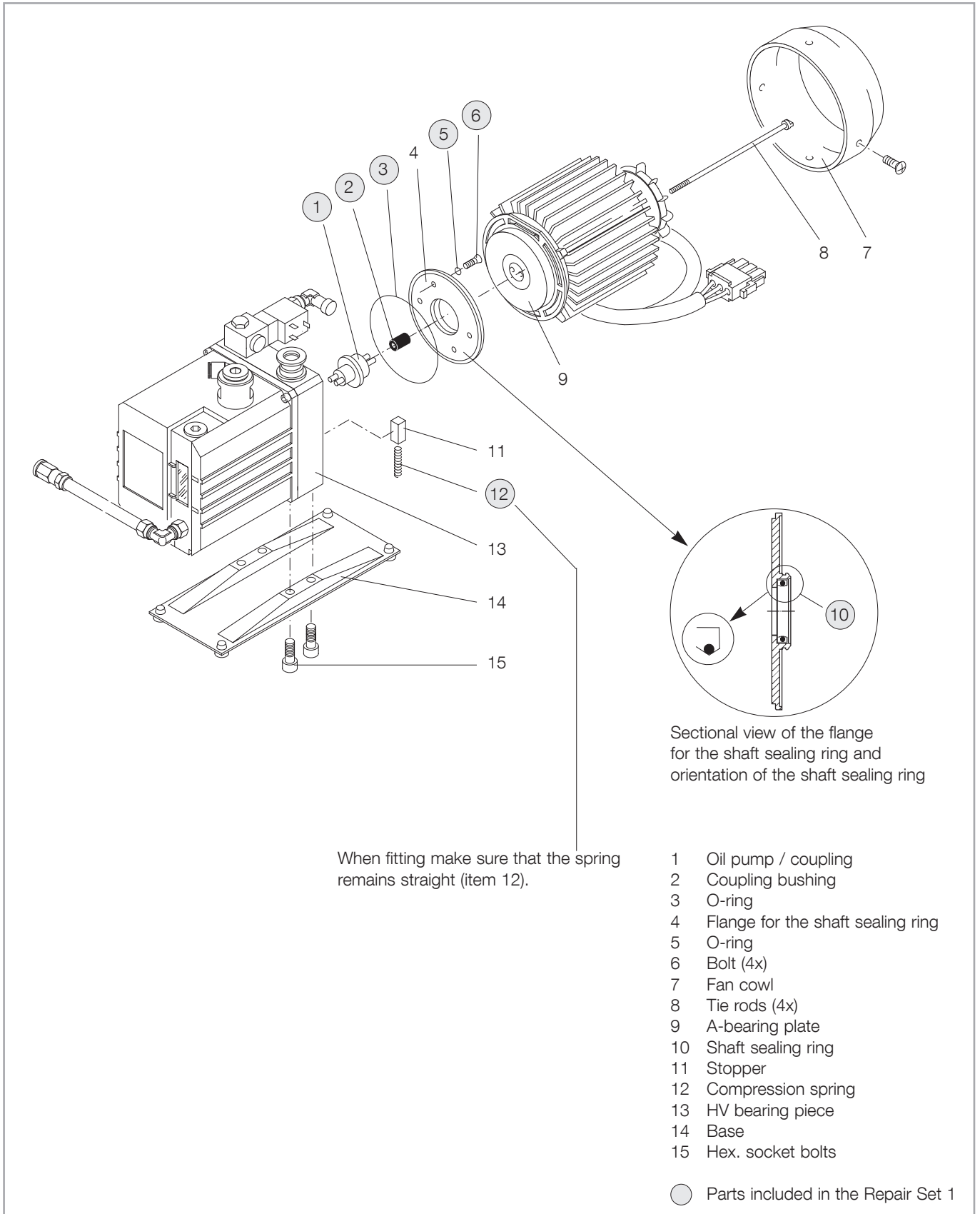


Fig. 10 Repair Set 1

Wearing Parts and Original Spare Parts

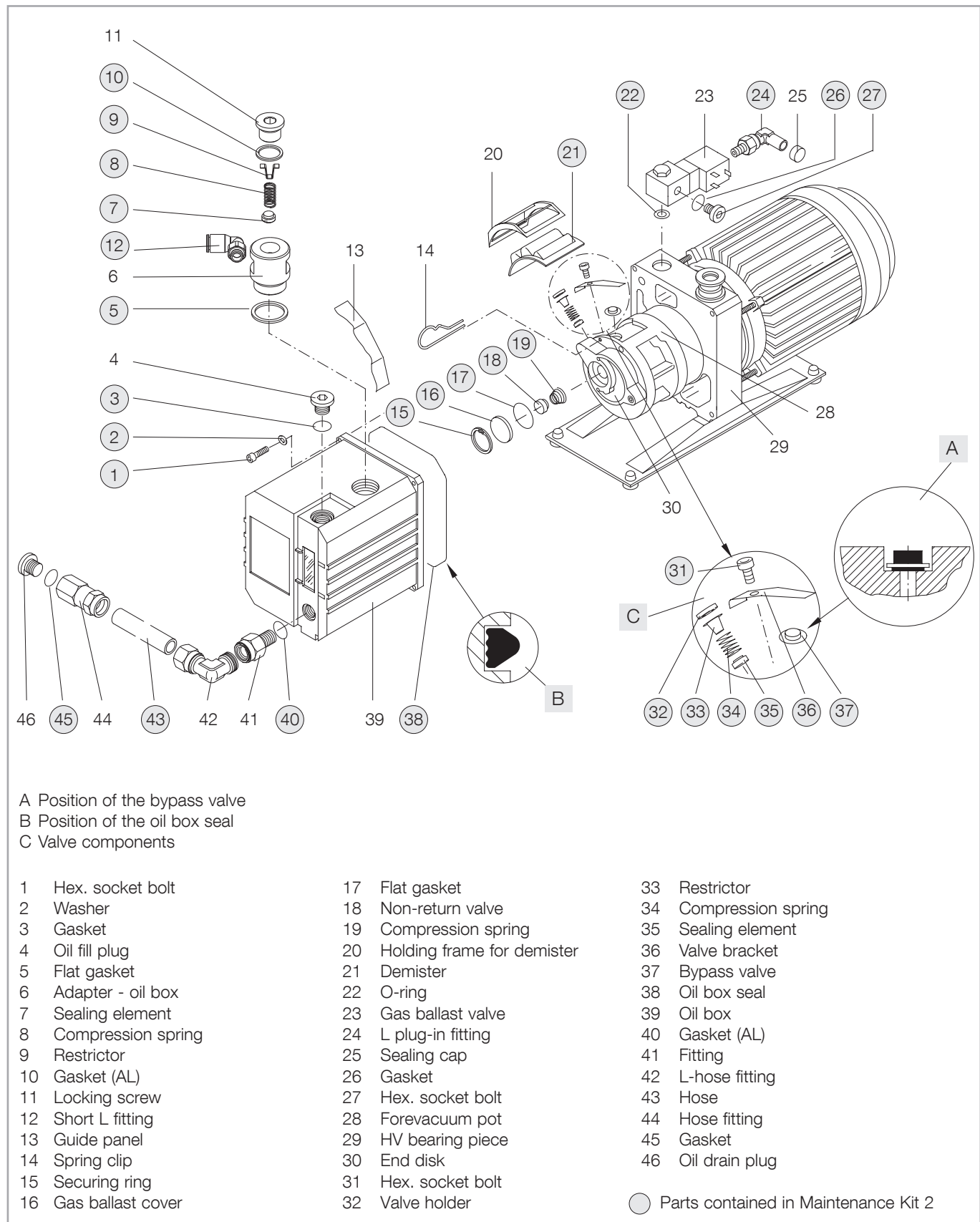


Fig. 11 Maintenance Kit 2

Wearing Parts and Original Spare Parts

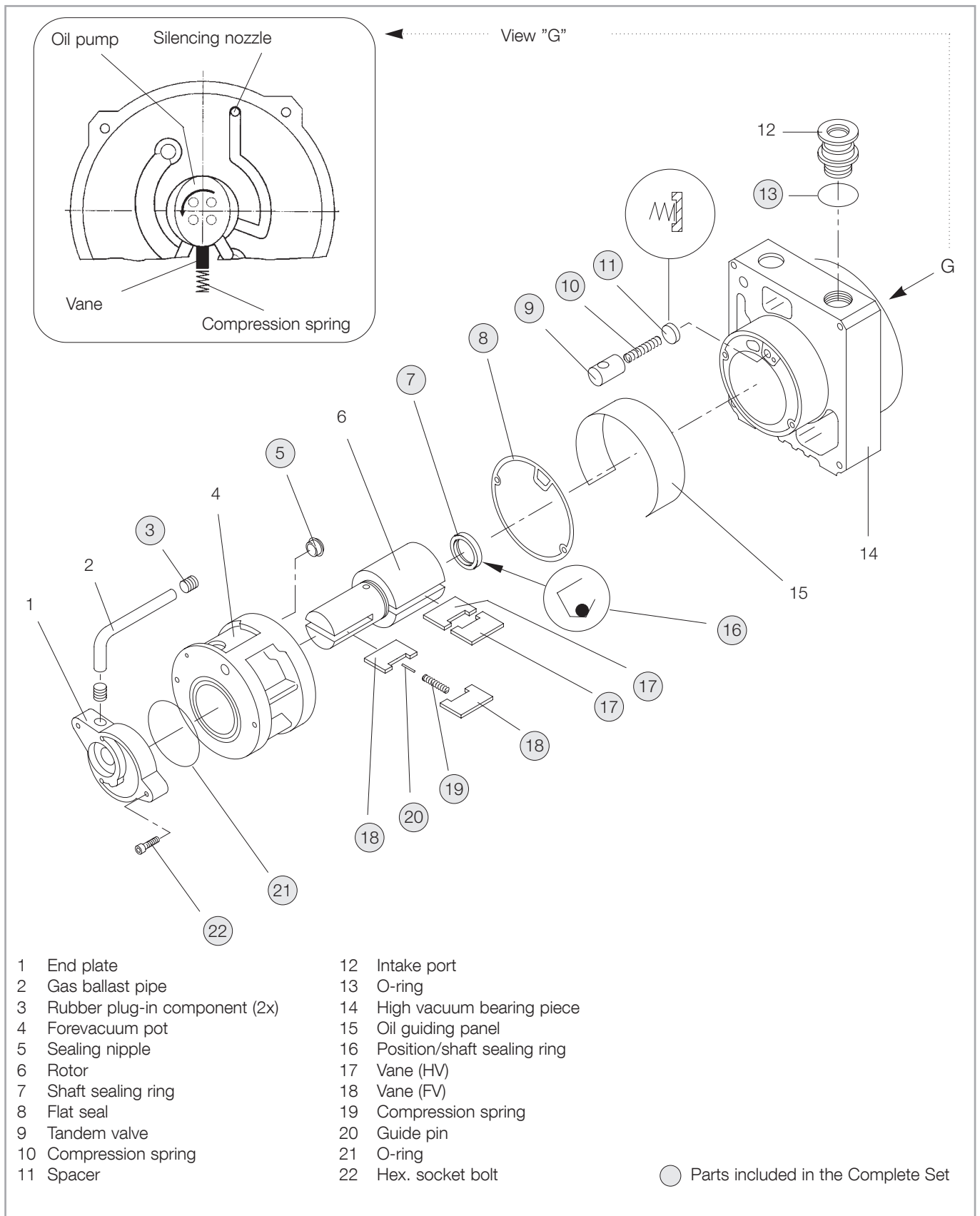


Fig. 12 Complete Set

8 Waste Disposal

The equipment 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



Risk of injury and environmental damage

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; For example wear gloves, face protection or breathing protection.

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

When sending us any equipment, observe the regulations given in Section "5.2 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

(Translation of original Declaration of Conformity)

The manufacturer: Leybold GmbH
Bonner Strasse 498
D-50968 Köln, Germany

herewith declares that the products specified and listed below which we have placed on the market, comply with the applicable EU Directives. This declaration becomes invalid if modifications are made to the product without agreement of Leybold GmbH.

Product designation: Rotary vane pump
Type designation: TRIVAC D2,5E
Catalogue No.: 140000; 140001; 140002; 140003; 140004; 140005; 140008;
140009; 140020; 140021; 140022; E140020

The products complies to the following Directives:

Machinery Directive (2006/42/EC)

The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Appendix 1 No. 1.5.1 of Machinery Directive 2006/42/EC.

Electromagnetic Compatibility (2014/30/EU)


The following harmonized standards have been applied:

EN 1012-2:1996+A1:2009	Compressors and vacuum pumps — Safety requirements Part 2: Vacuum pumps
EN 60204-1:2006	Safety of machinery — Electrical equipment of machines Part 1: General requirements
EN 61000-6-2:2005/AC:2005	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4:2007/A1:2011	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Documentation officer: Herbert Etges
T: +49(0)221 347 0
F: +49(0)221 347 1250
documentation@leybold.com

Cologne, September 01, 2016

Cologne, September 01, 2016



ppa. Martin Tollner
VP / Head of Product Lines



ppa. Dr. Monika Mattern-Klosson
Head of Quality & Business Process Management

Document-No.: 300307860_002_A3 09/2016

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 hand, the handling of different materials and substances can result in hazards for our employees.

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.

Many thanks for your understanding.

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: <input checked="" type="checkbox"/> applicable please mark Repair: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty Exchange: <input type="checkbox"/> chargeable <input type="checkbox"/> warranty <input type="checkbox"/> Exchange already arranged / received Return only: <input type="checkbox"/> rent <input type="checkbox"/> loan <input type="checkbox"/> for credit Calibration: <input type="checkbox"/> DKD <input type="checkbox"/> Factory-calibr. <input type="checkbox"/> Quality test certificate DIN 55350-18-4.2.1																																																																								
A. Description of the Leybold product: _____ Failure description: _____ Material description : _____ Catalog number: _____ Additional parts: _____ Serial number: _____ Application-Tool: _____ Type of oil (ForeVacuum-Pumps) : _____ Application- Process: _____																																																																									
B. Condition of the equipment <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:60%;"></th> <th style="width:10%; text-align: center;">No¹⁾</th> <th style="width:10%; text-align: center;">Yes</th> <th style="width:10%; text-align: center;">No</th> <th style="width:10%;"></th> <th style="width:10%;"></th> <th style="width:10%;"></th> <th style="width:10%;"></th> </tr> </thead> <tbody> <tr> <td>1. Has the equipment been used</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;">→</td> <td>Contamination :</td> <td style="text-align: center;">No¹⁾</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>2. Drained (Product/service fluid)</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td>toxic</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>3. All openings sealed airtight</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td>corrosive</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>4. Purged</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td></td> <td>flammable</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>If yes, which cleaning agent</td> <td></td> <td></td> <td></td> <td></td> <td>explosive ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>and which method of cleaning</td> <td></td> <td></td> <td></td> <td></td> <td>radioactive ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>¹⁾ If answered with "No", go to D. ←</td> <td></td> <td></td> <td></td> <td></td> <td>microbiological ²⁾</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td>other harmful substances</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>			No ¹⁾	Yes	No					1. Has the equipment been used	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	→	Contamination :	No ¹⁾	Yes	2. Drained (Product/service fluid)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		toxic	<input type="checkbox"/>	<input type="checkbox"/>	3. All openings sealed airtight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		corrosive	<input type="checkbox"/>	<input type="checkbox"/>	4. Purged	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		flammable	<input type="checkbox"/>	<input type="checkbox"/>	If yes, which cleaning agent					explosive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>	and which method of cleaning					radioactive ²⁾	<input type="checkbox"/>	<input type="checkbox"/>	¹⁾ If answered with "No", go to D. ←					microbiological ²⁾	<input type="checkbox"/>	<input type="checkbox"/>						other harmful substances	<input type="checkbox"/>	<input type="checkbox"/>
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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) <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:5%;"></th> <th style="width:25%;">Tradename:</th> <th style="width:70%;">Chemical name:</th> </tr> </thead> <tbody> <tr><td>a)</td><td></td><td></td></tr> <tr><td>b)</td><td></td><td></td></tr> <tr><td>c)</td><td></td><td></td></tr> <tr><td>d)</td><td></td><td></td></tr> </tbody> </table>			Tradename:	Chemical name:	a)			b)			c)			d)																																																											
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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

Sales and Service

Germany

Leybold GmbH

Bonner Strasse 498
D-50968 Cologne
T: +49-(0)221-347 1234
F: +49-(0)221-347 31234
sales@leybold.com
www.leybold.com

Leybold GmbH Sales Area North

Branch Office Berlin
Industriestrasse 10b
D-12099 Berlin
T: +49-(0)30-435 609 0
F: +49-(0)30-435 609 10
sales.bn@leybold.com

Leybold GmbH Sales Office South

Branch Office Munich
Karl-Hammerschmidt-Strasse 34
D-85609 Aschheim-Dornach
T: +49-(0)89-357 33 9-10
F: +49-(0)89-357 33 9-33
sales.mn@leybold.com
service.mn@leybold.com

Leybold Dresden GmbH Service Competence Center

Zur Wetterwarte 50, Haus 304
D-01109 Dresden
Service:
T: +49-(0)351-88 55 00
F: +49-(0)351-88 55 041
info.dr@leybold.com

Europe

Belgium

Leybold Nederland B.V. Belgisch bijkantoor

Leuvensesteenweg 542-9A
B-1930 Zaventem
Sales:
T: +32-2-711 00 83
F: +32-2-720 83 38
sales.zv@leybold.com
Service:
T: +32-2-711 00 82
F: +32-2-720 83 38
service.zv@leybold.com

France

Leybold France S.A.S.

Parc du Technopolis, Bâtiment Beta
3, Avenue du Canada
F-91940 Les Ulis cedex
Sales and Service:
T: +33-1-69 82 48 00
F: +33-1-69 07 57 38
info.ctb@leybold.com
sales.ctb@leybold.com

Leybold France S.A.S.

Valence Factory
640, Rue A. Bergès
B.P. 107
F-26501 Bourg-lès-Valence Cedex
T: +33-4-75 82 33 00
F: +33-4-75 82 92 69
marketing.vc@leybold.com

Great Britain

Leybold UK LTD.

Unit 9
Silverglade Business Park
Leatherhead Road
Chessington
Surrey (London)
KT9 2QL
Sales:
T: +44-13-7273 7300
F: +44-13-7273 7301
sales.ln@leybold.com
Service:
T: +44-13-7273 7320
F: +44-13-7273 7303
service.ln@leybold.com

Italy

Leybold Italia S.r.l.

Via Filippo Brunelleschi 2
I-20093 Cologno Monzese
Sales:
T: +39-02-27 22 31
F: +39-02-27 20 96 41
sales.mi@leybold.com
Service:
T: +39-02-27 22 31
F: +39-02-27 22 32 17
service.mi@leybold.com

Netherlands

Leybold Nederland B.V.

Floridadreef 102
NL-3565 AM Utrecht
Sales and Service:
T: +31-(30) 242 63 30
F: +31-(30) 242 63 31
sales.ut@leybold.com
service.ut@leybold.com

Switzerland

Leybold Schweiz AG

Hinterbergstrasse 56
CH-6312 Steinhausen
Warehouse and shipping address:
Riedthofstrasse 214
CH-8105 Regensdorf
Sales:
T: +41-44-308 40 50
F: +41-44-302 43 73
sales.zh@leybold.com
Service:
T: +41-44-308 40 62
F: +41-44-308 40 60
service.zh@leybold.com

Spain

Leybold Hispánica, S.A.

C/. Huelva, 7
E-08940 Cornellá de Llobregat
(Barcelona)
Sales:
T: +34-93-666 43 11
F: +34-93-666 43 70
sales.ba@leybold.com
Service:
T: +34-93-666 46 11
F: +34-93-685 43 70
service.ba@leybold.com

America

USA

Leybold USA Inc.

5700 Mellon Road
USA-Export, PA 15632
T: +1-724-327-5700
F: +1-724-325-3577
info.ex@leybold.com
Sales:
T: +1-724-327-5700
F: +1-724-333-1217
Service:
T: +1-724-327-5700
F: +1-724-325-3577

Brazil

Leybold do Brasil

Rod. Vice-Prefeito Hermenegildo Tonolli,
nº. 4413 - 6B
Distrito Industrial
Jundiaí - SP
CEP 13.213-086
Sales and Service:
T: +55 11 3395 3180
F: +55 11 99467 5934
sales.ju@leybold.com
service.ju@leybold.com

Asia

P. R. China

Leybold (Tianjin) International Trade Co. Ltd.

Beichen Economic
Development Area (BEDA),
No. 8 Western Shuangchen Road
Tianjin 300400
China
Sales and Service:
T: +86-400 038 8989
T: +86-800 818 0033
F: +86-22-2697 4061
F: +86-22-2697 2017
sales.tj@leybold.com
service.tj@leybold.com

India

Leybold India Pvt Ltd.

T-97/2, MIDC Bhosari
Pune-411 026
Indien
Sales and Service:
T: +91-80-2783 9925
F: +91-80-2783 9926
sales.bgl@leybold.com
service.bgl@leybold.com

Japan

Leybold Japan Co., Ltd.

Headquarters
Shin-Yokohama A.K.Bldg., 4th floor
3-23-3, Shin-Yokohama
Kohoku-ku, Yokohama-shi
Kanagawa-ken 222-0033
Japan
Sales:
T: +81-45-471-3330
F: +81-45-471-3323
sales.yh@leybold.com

Leybold Japan Co., Ltd.

Tsukuba Technical Service Center
1959, Kami-yokoba
Tsukuba-shi, Ibaraki-shi 305-0854
Japan
Service:
T: +81-29 839 5480
F: +81-29 839 5485
service.iik@leybold.com

Malaysia

Leybold Malaysia

Leybold Singapore Pte Ltd.

No. 1 Jalan Hi-Tech 2/6
Kulim Hi-Tech Park
Kulim, Kedah Darul
Aman 09000
Malaysia
Sales and Service:
T: +604 4020 222
F: +604 4020 221
sales.ku@leybold.com
service.ku@leybold.com

South Korea

Leybold Korea Ltd.

3F. Jellzone 2 Tower
Jeongja-dong 159-4
Bundang-gu Sungnam-si
Gyeonggi-do
Bundang 463-384, Korea
Sales:
T: +82-31 785 1367
F: +82-31 785 1359
sales.bd@leybold.com
Service:
623-7, Upsung-Dong
Cheonan-Si
Chungcheongnam-Do
Korea 330-290
T: +82-41 589 3035
F: +82-41 588 0166
service.cn@leybold.com

Singapore

Leybold Singapore Pte Ltd.

42 Loyang Drive
Loyang Industrial Estate
Singapore 508962
Singapore
Sales and Service:
T: +65-6303 7030
F: +65-6773 0039
sales.sg@leybold.com
service.sg@leybold.com

Taiwan

Leybold Taiwan Ltd.

10F., No. 32, Chenggong 12th St.,
Zhubei City, Hsinchu County 302
Taiwan, R.O.C.
Sales and Service:
T: +886-3-500 1688
F: +886-3-550 6523
sales.hc@leybold.com
service.hc@leybold.com

Headquarter

Leybold GmbH

Bonner Strasse 498
D-50968 Cologne
T: +49-(0)221-347-0
F: +49-(0)221-347-1250
info@leybold.com

