



# **SOGEVAC 220B**

Oil-Sealed Rotary Vane Pump

**Operating instructions 300964804\_002\_C2**

Part Numbers

960602V

960617V

10330220V01

10330220V02

10330220V03

960617V3001

960602V3001



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You must use this product as described in this manual. Read the manual before you install, operate, or maintain the product.

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# Safety and compliance

## 1 Safety and compliance

For safe operation from the start, read these instructions carefully before you install or commission the equipment and keep them safe for future use. Read all the safety instructions in this section and the rest of this manual carefully and make sure that you obey these instructions.

The instruction manual is an important safety document that we often deliver digitally. It is your responsibility to keep the instruction manual available and visible while working with the equipment. Please download the digital version of the instruction manual for use on your device or print it if a device will not be available.

### 1.1 Definition of Warnings and Cautions

Important safety information is highlighted as warning and caution instructions which are defined as follows. Different symbols are used according to the type of hazard.

---

#### **WARNING:**

**If you do not obey a warning, there is a risk of injury or death.**

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#### **CAUTION:**

**If you do not obey a caution, there is a risk of minor injury, damage to equipment, related equipment or process.**

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#### **NOTICE:**

**Information about properties or instructions for an action which, if ignored, will cause damage to the equipment.**

---

We reserve the right to change the design and the stated data. The illustrations are not binding.

### 1.2 Trained personnel

For the operation of this equipment "trained personnel" are:



- skilled workers with knowledge in the fields of mechanics, electrical engineering, pollution abatement and vacuum technology and
- personnel specially trained for the operation of vacuum pumps

# Safety and compliance

## 1.3 Safety symbols

The safety symbols on the products show the areas where care and attention is necessary.

The safety symbols that we use on the product or in the product documentation have the following meanings:

|   |   |
|---|---|
|    | <b>Warning/Caution</b><br>Risk of injury and/or damage to equipment. An appropriate safety instruction must be followed or a potential hazard exists.                 |
|    | <b>Warning - Hot surfaces</b><br>Risk of injury. Identifies a surface capable of inflicting burns through contact.  |
|    | <b>Warning - Risk of explosion</b><br>Risk of injury or damage to equipment. Identifies a situation that could result in an explosion.                                |
|    | <b>Warning - Trip hazard</b><br>There is a risk of slipping, tripping or falling as a result of spilled liquids, trailing cords and pipes or other low-lying objects. |
|  | <b>Warning - Dangerous voltage</b><br>Identifies possible hazards from dangerous voltages.  |

# Important safety information

## 2 Important safety information



### **WARNING: HAZARDOUS VOLTAGES**

Risk of electric shock. Disconnect the unit from the power supply before starting any work. Take appropriate precautions to make sure that the pump will not start.

---



### **WARNING: HAZARDOUS GASES**

Risk of injury or damage to the equipment. If the pump has pumped hazardous gases, it will be absolutely necessary to determine the nature of the hazard involved and take the appropriate safety precautions. Observe all safety regulations. Take adequate safety precautions prior to opening the intake or exhaust port.

---



### **WARNING: TRANSPORTATION SAFETY**

Risk of injury or damage to the equipment. The pump must be packaged in such a way that it will not be damaged during shipping, and so that no harmful substances can escape from the package.

---



### **CAUTION: OPERATION SAFETY**

Risk of damage to the equipment. Do not open the pump to condensable vapours until it has reached the operating temperature. Pumping process gas with a cold pump results in vapours condensing in the oil.

---



### **CAUTION: INTERNAL CONDENSATION**

Risk of corrosion. When vapour are pumped, do not switch off the pump immediately after the completion of the process because the condensate dissolved in the pump oil may cause changes or corrosion. To prevent this, continue to operate the pump with open gas ballast valve and closed intake port until the oil is free of condensate. We recommend you to operate the pump in this mode for at least 30 minutes after completion of the process.

---

For processes with a high proportion of condensable vapours, the intake line must be opened slowly only after the pump has reached the operating temperature.

One sign of condensation of vapours in the pump is a rise of the oil level during the operation of the pump. During pumping, vapour may dissolve in the oil.

In cyclic operation, do not switch off the pump between the cycles and continue to run with the gas ballast valve open and intake port closed (if possible, through a valve). The power consumption is minimal when the pump is operating at ultimate pressure.

If all vapour are pumped off from a process (for example, during drying), the gas ballast valve can be closed to improve the ultimate pressure.



## 3 Description

### 3.1 Design and function

The pumps are single-stage, oil-sealed rotary vane vacuum pumps. The anti-suckback valve, gas ballast valve (optional), exhaust filter, oil return circuit and oil cooling oil are integrated functional elements. The pumps are driven by a directly flanged motor.

The rotor is eccentrically installed in the pump cylinder (stator) and has three vanes which divide the pump chamber into several compartments. The volume of these chambers varies with the rotation of the rotor.

As the rotor rotates, the intake portion of the pumping chamber expands and sucks gas through the intake port. The gas passes through the dirt trap and open anti-suckback valve and enters the pump chamber. As the rotor rotates, the vane separates part of the pump chamber from the intake port. This part of the pump chamber is reduced and the gas is compressed. Slightly above atmospheric pressure the gas is expelled from the chamber through the exhaust valve.

The oil injected into the pump chamber seal, lubricate and cool the pump. The oil and the compressed gas is coarsely trapped in the oil case by deflection. Fine filtering of the oil in the exhaust filter element is done, this reduces the proportion of oil in the exhaust gas below the visibility threshold (over 99.9% entrapment rate).

Oil trapped in the exhaust filters is returned to the inlet chamber through the oil return line. To prevent the gas flow at the atmospheric pressure from the oil reservoir into the intake port, the oil return line is controlled by a float valve.

The oil cycle is maintained by the pressure difference existing between the oil case (pressure above or equal to atmospheric pressure) and the intake port (pressure below atmospheric pressure).

A turbine running on the motor shaft between motor and generator generates the necessary cooling air. The oil cools down through a radiator.

By opening the gas ballast valve, a controlled amount of air (gas ballast) enters into the pump chamber. This gas ballast prevents condensation (up to the limit of water vapour tolerance specified in the [Technical data](#) on page 11) when pumping the condensable gases or vapour.

There are different types of gas ballast :

- Standard ISO-KF 16 gas ballast. This gas ballast corresponds to the most important part of applications. The gas ballast must be supplied with an inert gas for processes reacting with ambient air oxygen.
- Large gas ballast as a variant or accessory is intended for the applications where more vapours of condensable gases could come into the pump.
- Refer to [Pumping of condensable gases and vapour through gas ballast](#) on page 24.

The gas ballast flows are indicative and valid at ultimate pressure.

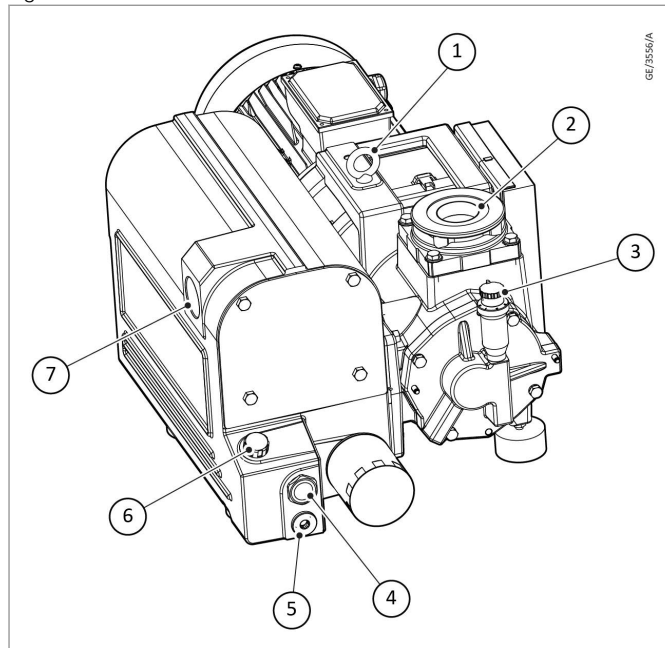
Anti-suckback valve prevents the unintentional venting of the vacuum chamber and an oil suckback when shutting down the pump. In applications where an oil suckback must be avoided by all means, it is recommended to install a safety inlet valve.

# Description

The pump is supplied with drive motor in ready-to-use condition. It is supplied with filled in oil.

Specific variants of the pump are delivered with different oils. The oil type is indicated on the pump. Do not use another oil than specified, no warranty claims would be accepted if use with different oil. The connection ports are blanked off by plastic protective caps. Take these caps away before turning on the pump.

Figure 1. SOGEVAC 220 B



- |                 |                    |
|-----------------|--------------------|
| 1. Lifting lug  | 2. Inlet port      |
| 3. Gas ballast  | 4. Oil sight glass |
| 5. Oil drain    | 6. Oil filling     |
| 7. Exhaust port |                    |

## 3.2 Range of use

The pump is designed for pumping the inert gases in the range of vacuum, between atmospheric pressure and ultimate pressure of the pump.

The pump are not designed for pumping of aggressive, corrosive, flammable or explosive gases. In the presence of aggressive, flammable, corrosive or explosive gases, contact us.

The pumps are not designed for working in flammable or explosive environment.

The pumps are not suitable for pumping liquids or media which contain dust. Protective measures must be introduced.

## 4 Technical data

**Table 1 SOGEVAC 220 B**

| Parameter                                     | 50 Hz   | 60 Hz                               |
|---|---|-------------------------------------|
| Nominal speed *                               | 200 m <sup>3</sup> .h <sup>-1</sup>                   | 240 m <sup>3</sup> .h <sup>-1</sup> |
| Pumping speed *                               | 179 m <sup>3</sup> .h <sup>-1</sup>                   | 214 m <sup>3</sup> .h <sup>-1</sup> |
| Noise level **                                | 69 dB(A)  | 73 dB(A)                            |
| Net weight (with oil filling)                 | 180 kg  |                                     |
| Oil volume                                    | 7.5 L (8 qt)  |                                     |
| Intake connection                             | G2" BSP<br>for NPT use adapter part number 8092301921 |                                     |
| Exhaust connection                            |   |                                     |
| Ambient temperature                           | 12 to 40 °C   |                                     |
| Ultimate total pressure without gas ballast * | ≤ 0.08 mbar   |                                     |

\* To DIN 28400 and following numbers, valid for mineral and some synthetic oils.

\*\* Operated at the ultimate pressure without gas ballast, free-field measurement at a distance of 1 m.

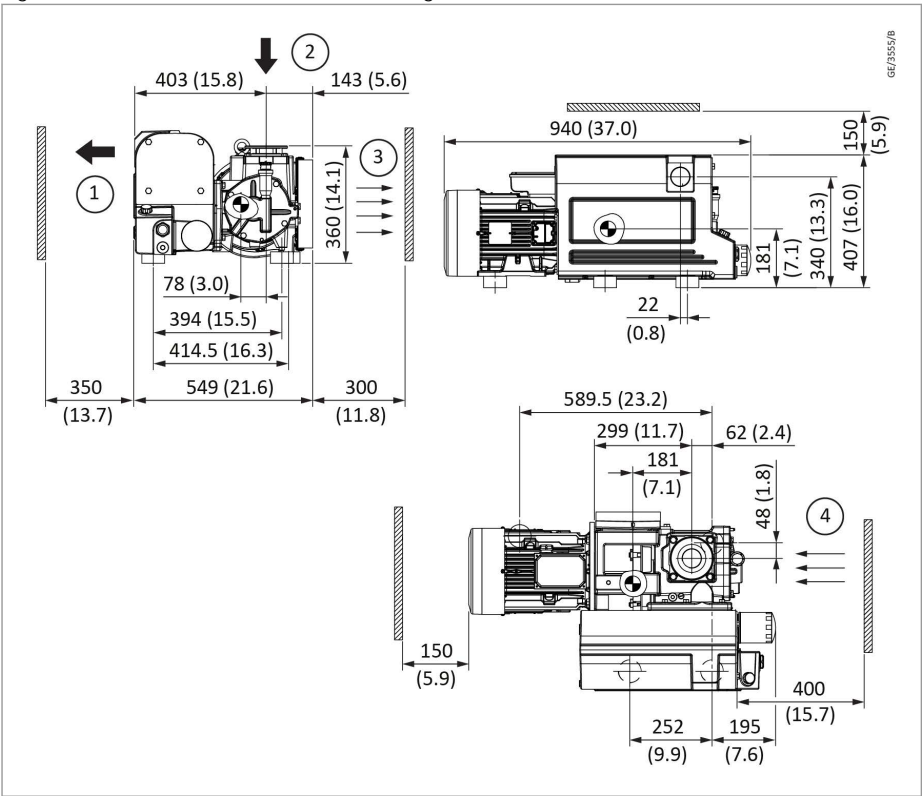
**Table 2 SOGEVAC 220B H<sub>2</sub>O capacity**

| Gas ballast           | Part number | Flow               | Ultimate pressure | H <sub>2</sub> O tolerance 50 Hz | H <sub>2</sub> O tolerance 60 Hz |
|-----------------------|-------------|--------------------|-------------------|----------------------------------|----------------------------------|
|                       |             | Nm <sup>3</sup> /h | mbar              | mbar (l/h)                       | mbar (l/h)                       |
| Manual, small flow    | GK6703134   | 2                  | ≤ 0.2             | 3 (0.5)                          | 3 (0.6)                          |
| Manual, medium flow   |             | 4                  | ≤ 0.4             | 6 (1.0)                          | 6 (1.1)                          |
| Manual, standard flow |             | 7                  | ≤ 0.7             | 10 (1.7)                         | 10 (2)                           |
| EM 24 V d.c.          | GK6704190   | 6                  | ≤ 0.7             | 10 (1.7)                         | 10 (2)                           |
| Permanent             | GK6704215   | 7                  | ≤ 0.7             | 10 (1.7)                         | 10 (2)                           |
| ATEX                  | GK6704191   | 7                  | ≤ 0.7             | 10 (1.7)                         | 10 (2)                           |
| Big                   | 9600GBB     | 18                 | ≤ 4.0             | 35 (4.2)                         | 40 (6.3)                         |

# Technical data

## 4.1 Dimension drawing

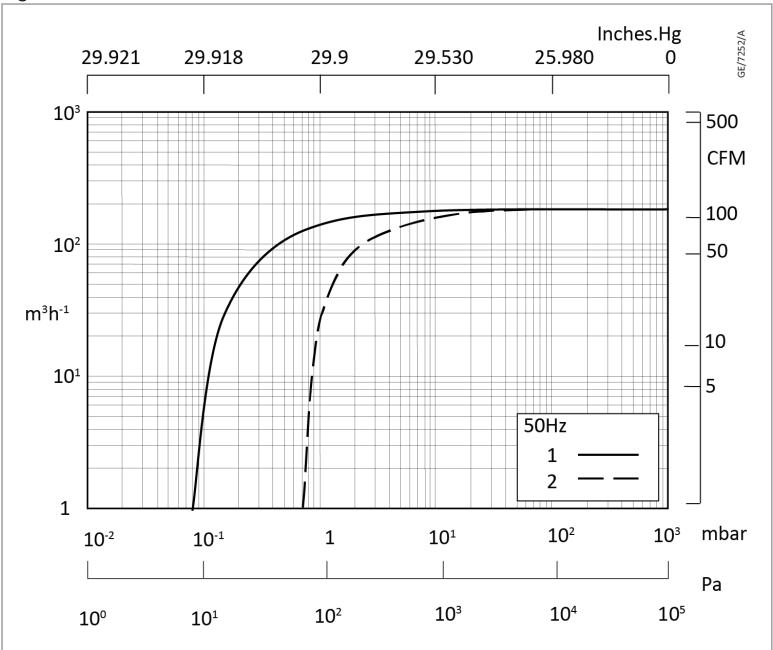
Figure 2. SOGEVAC 220 B dimension drawing



- 1. Exhaust port
- 2. Inlet port
- 3. Cooling air pump
- 4. Cooling air pump

## 4.2 Performance graphs

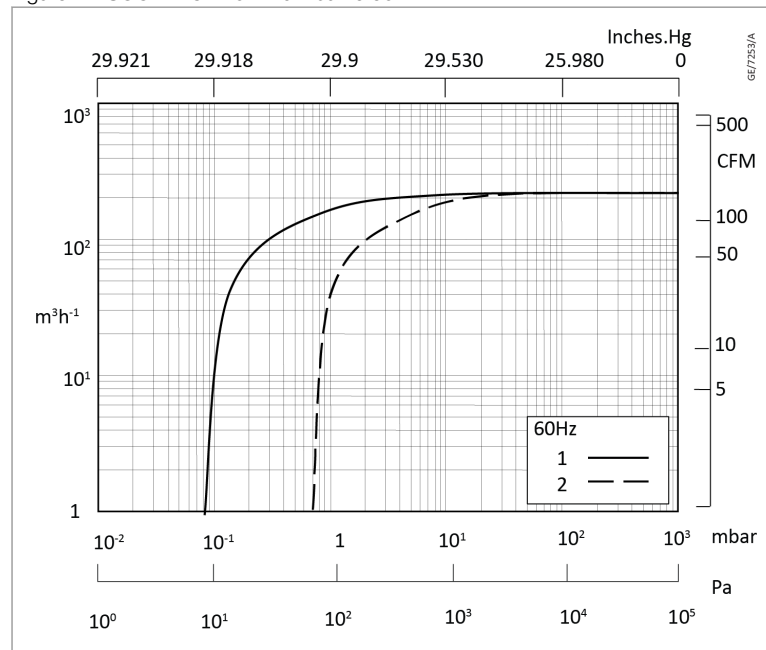
Figure 3. SOGEVAC 220 B flow curve 50 Hz



- 1. Without gas ballast
- 2. With standard gas ballast

# Technical data

Figure 4. SOGEVAC 220 B flow curve 60 Hz



1. Without gas ballast

2. With standard gas ballast

## 4.3 Ordering data

Table 3. Ordering data for SOGEVAC 220 B

| Description   | Part number |
|---|-------------|
| Pump with three-phase motor IEC and cUL and integrated gas ballast valve, air cooled, mineral oil<br>220 - 230 - 240/380 - 400 - 415 V, $\pm 10\%$ , 50 Hz, 4 kW<br>440 - 460 V $\pm 10\%$ , 60 Hz, 5.1 kW                              | 960602V     |
| Pump with wide range motor IEC and cUL and integrated gas ballast valve, air cooled, mineral oil<br>200... 240 V / 380 to 415 V, 50 Hz, 4.5 kW<br>200 V -15% to 230 V +10% / 380 to 400 V $\pm 10\%$ & 460 $\pm 10\%$ , 60 Hz, 5.5 kW   | 960617V     |
| Pump with wide range motor IEC and cUL and integrated gas ballast valve, water cooled, mineral oil<br>200 to 240 V / 380 to 415 V, 50 Hz, 4.5 kW<br>200 V -15% to 230 V +10% / 380 to 400 V $\pm 10\%$ & 460 $\pm 10\%$ , 60 Hz, 5.5 kW | 10330220V03 |

Other variants are also available. Contact us.

# Technical data

## 4.4 Conversion factor

These values are valid for the standard variants and with the use of the recommended company oils.

|                                | <b>mbar (millibar)</b> | <b>torr</b> | <b>inches Hg vacuum</b> |
|--------------------------------|------------------------|-------------|-------------------------|
| 1 lb = 0.453 kg                | 1013                   | 760         | 0                       |
| 1 qt = 0.946 l                 | 400                    | 300         | 18.12                   |
| 1 hp = 0.735 kW                | 133                    | 100         | 25.98                   |
| 1 inch = 25.4 mm               | 4                      | 3           | 29.80                   |
| 1 r.p.m. = 1 min <sup>-1</sup> | 1                      | 0.75        | 29.89                   |

1 atm (atmosphere) = 1013 mbar

1 Pa (pascal) = 0.01 mbar = 10<sup>-2</sup> mbar

1 bar = 1000 mbar

1 torr = 1.33 mbar

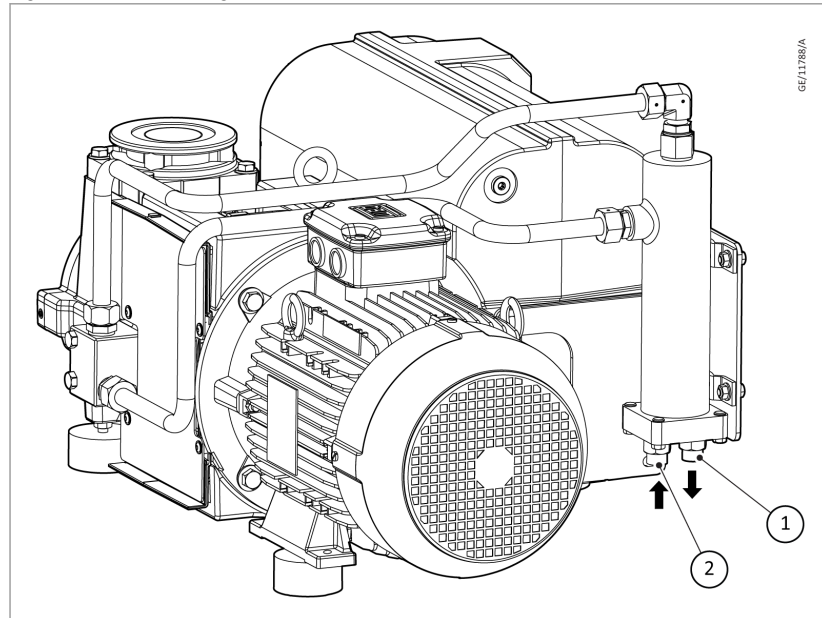
|   | <b>m<sup>3</sup>. h<sup>-1</sup></b> | <b>l.s<sup>-1</sup></b> | <b>cfm</b> |
|---|--------------------------------------|-------------------------|------------|
| m <sup>3</sup> . h <sup>-1</sup> = m <sup>3</sup> /h <sup>1</sup> | 1                                    | 0.278                   | 0.589      |
| l.s <sup>-1</sup> = l/s   | 3.60                                 | 1                       | 2.12       |
| cfm (cubic feet per minute)                                       | 1.699                                | 0.472                   | 1          |

For example: 1 m<sup>3</sup>.h<sup>-1</sup> = 0.589 cfm

## 4.5 Water cooling

|                           |  |
|---------------------------|--|
| Pressure of water network | 2 bar minimum and 8 bar maximum        |
| Minimum water supply      | 200 l/h for water temperature of 15 °C |
| Maximum water temperature | 30 °C                                  |

Figure 5. Water cooling connections



1. Water outlet - G3/8 male connection
2. Water inlet - G3/8 male connection

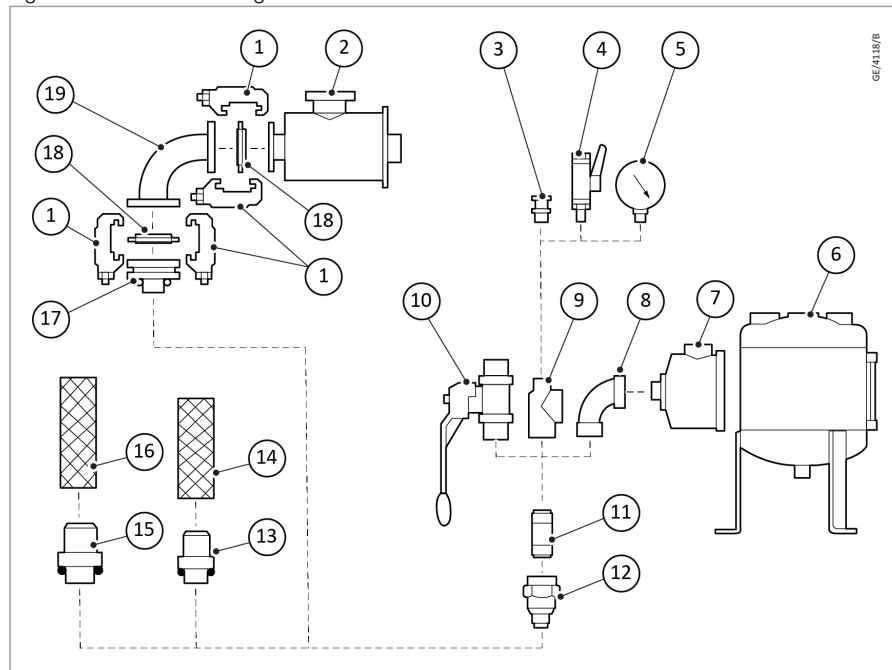
Figure 6. Water cooling

| WATER QUALITY    | 0°                              | 4°           | 8°               | 12°                                    | 20°                   |
|------------------|---------------------------------|--------------|------------------|--|-----------------------|
| TH(°F)           | CORROSION<br>(WATER TOO SOFT)   | SERVICE AREA |                  | INCRUSTING WATER<br>(DEPOSIT OF SCALE) |                       |
| CARBONAT CONTENT | 0                               | 30           | 90               | 160                                    | 300                   |
|                  | CORROSION<br>(AGGRESSIVE WATER) | SERVICE AREA | INCRUSTING WATER |  | VERY INCRUSTING WATER |
| PH               | CORROSION<br>(AGGRESSIVE WATER) | 5            | 7.5              | INCRUSTING WATER                       |                       |

# Technical data

## 4.6 Connection fittings

Figure 7. Connection fittings for SOGEVAC 220 B



| Item | Description   | Part number |
|------|---|-------------|
| 1    | Set of clamping screws DN ISO-K (4 pieces)  | 26701       |
| 2    | Dust filter with paper cartridge, DN 63 ISO-K (Spare cartridge 71213293)                          | 95168       |
|      | Dust filter with activated charcoal cartridge, DN 63 ISO-K (Spare cartridge 71213314)             | 71127125    |
|      | Dust filter with metal cartridge, DN 63 ISO-K (Spare cartridge 71213334)                          | 71127126    |
|      | Dust filter with polyester filter cartridge, DN 63 ISO-K (Spare cartridge 71261318)               | 71127127    |
| 3    | Threaded ISO-KF small-flange adaptor with NBR-O-Ring, G 1/2" M - DN 16 ISO-KF, Aluminium anodized | 71118120    |
| 4    | Ball valve, G 1/2" M/F, Brass nickelled/Aluminium   | 71130113    |
| 5    | Bourdon vacuum gauge, G 1/2" M  | 95192       |
| 6    | Condensate trap, G 2" – 2" – 1/2" F/F/F†  | 95144       |
| 7    | Dust filter with paper cartridge, G 2" M/F, (Spare cartridge 71213293)*                           | 95165       |
|      | Dust filter with activated charcoal cartridge, G 2" M/F, (Spare cartridge 71213314)*              | 71127122    |
|      | Dust filter with metal cartridge, G 2" M/F, (Spare cartridge 71213334)*                           | 71127123    |
|      | Dust filter with polyester filter cartridge, G 2" M/F, (Spare cartridge 71261318)*                | 71127124    |
| 8    | Elbow 90°, G 2" F/F, Grey cast iron   | 71118215V   |
| 9    | Tee reducer, G 2" – 2" – 1/2" F/F/F, Grey cast iron   | 71118265    |
| 10   | Ball valve, G 2" F/F, Brass nickelled   | 71130107    |
| 11   | Double nipple, G 2" M/M – 150 mm, Steel   | 71118035V   |



## Technical data

| Item | Description  | Part number |
|------|--|-------------|
| 12   | Screw coupling with NBR-O-Ring, G 2" M/F, Aluminium anodized                     | 71118025V   |
| 13   | Hose connection with NBR-O-Ring, M10 x 24, Steel zinc coated                     | 71118015    |
| 14   | PVC tubing, ø 50 mm, 1 m long, PVC   | 71118325    |
| 15   | Hose connection with NBR-O-Ring, G 2" M - DN 60 mm, Aluminium anodized           | 71118016    |
| 16   | PVC tubing, ø 60 mm, 1 m long, PVC   | 71118326    |
| 17   | Threaded flange adaptor with NBR-O-Ring, G 2" M – DN 63 ISO-K, Steel zinc coated | 71118126    |
| 18   | Centering ring with outer ring with NBR-O-Ring, DN 63 ISO-K, Aluminium/CR        | 26805       |
| 19   | Elbow 90°, DN 63 ISO-K, Stainless steel  | 88725       |

\* Set of gaskets for Dust filter F200-300 NBR (Buna N) - 71410850

† Drain valve - 71130113

# Transportation

## 5 Transportation



### **WARNING: TRIP HAZARD**

Risk of injury. Oil can get leak from the pump and can cause slippage on the floor. Check the pump for presence of oil leak.



### **CAUTION: TOPPLE HAZARD**

Pumps which have been filled with operating agent must only be moved in the upright position (horizontally). The angle of inclination should not be more than 10°, otherwise oil can leak. Avoid any other orientations during transportation.

Only use the lifting lugs which are provided on the pump to lift the pump with the specified lifting devices.

---

## 6 Installation

Set the pump on any flat and horizontal surface. There are metric threaded M10 holes for securing the pump located below the pump. In case of close coupled roots combinations, the holes are M14 threaded.

Do not tilt the pump to avoid error in reading of the oil level. Pump must be horizontal  $\pm 1$  degree.

Make sure that there is adequate cooling of the pump, leave sufficient space at the air intake and the exhaust points for cooling and to give access for maintenance. Make sure to keep the air intake clear for the motor.

Do not install the standard pump in and explosion hazard areas. Contact us, when you are planning such an application. Before you install the pump, disconnect it from the electrical power supply and prevent the pump from running up accidentally.

Observe all safety regulations.

### 6.1 Connection to system

#### 6.1.1 Intake side

The pump has an internally-threaded intake flange. With the suitable connecting elements (refer to [Connection fittings](#) on page 16), the pump can be connected to the vacuum system. The cross-section of the intake line must be a minimum of as same as the intake port. If the intake line cross-section is too narrow, it reduces the pumping speed. We recommend to apply LOCTITE or TEFLON tape to the screwed unions to make them vacuum-tight (especially if gases are dangerous).

- When you connect the pump to the inlet line, make sure that inlet line do not have any tension. Use flex lines or pipe unions in your inlet and exhaust lines so that they can be easily removed for pump maintenance.
- The maximum pressure at the inlet should not exceed atmospheric pressure (about 1013 mbar). Do not operate the pump in the presence of over pressures at the intake.
- Type of materials used for pipes must be compatible with pumped gases. It is the same for the tightness.

If the process gas contains dust or small particles, install a dust filter in addition to the dust trap supplied (refer to [Connection fittings](#) on page 16). We recommend you to install the dust filter horizontally using the T-piece or the elbow, to make sure that when you remove the filter, no particle falls into the intake port.

There are four type of cartridge for the optional inlet filters.

- The metal cartridge prevents solid particles such as paper or plastics from entering the pump.
- The paper and polyester cartridges remove small particles such as dust and powder (upto one micron thickness).
- The activated carbon cartridge absorbs chemical vapour of acids, solvents, etc.

#### Note:

If the carbon cartridge was stored in a damp place, bake it for 2 hours at 212 °F (100 °C) before use.

# Installation

Install condensate traps or condensers on the intake side (refer to [Connection fittings](#) on page 16), when you pump vapour.

Make sure that the inlet line is tightly sealed before you pump the dangerous gases.

No particles or liquids must enter in the pump.

## 6.1.2 Exhaust side



### **WARNING: EXPLOSION HAZARD**

**Risk of injury. Excessive back pressure can result in leakage of hazardous process gases out of the pump. If you are purging the oil casing with inert gas, limit the inert-gas flow. Contact us for recommendations.**

---



### **WARNING: EXPLOSION HAZARD**

**Risk of injury. The maximum exhaust pressure must not exceed 1.15 bar (absolute). Prevent the blockage in the exhaust line. Exhaust filter, accessories and the tubing must be rated according to the maximum pumping speed (maximum throughput) of the pumps.**

---



### **CAUTION: BLOCKED EXHAUST LINE**

**Risk of pump damage. Do not operate the pump with a blocked or restricted exhaust line. Before start-up make sure that any blinds or similar shut-off devices in the exhaust line on the pressure side are opened and that the exhaust line is not obstructed. Such restrictions reduce the pumping speed, increase the temperature and could overload the motor or cause a dangerous overpressure in the pump. Excessive pressure in the pump could damage the seals, blow out the sight glass or destroy the pump housing. When pumping dangerous gases, exhaust line must be tight.**

---



### **CAUTION: HIGH OIL CONSUMPTION**

**Risk of pump running dry. The pumps have integrated exhaust filters which at a high gas throughput, traps all the oil mist from the exhaust gases. If the exhaust filters are clogged, pressure relief valve opens and the filters are bypassed. As a result, the proportion of the oil in the exhaust gas as well as the pump's oil consumption rises. Install new exhaust filters when the exhaust filters are clogged (refer to [Exhaust filter replacement](#)).**

---

It is your responsibility to do maintenance to avoid exceeding of the limits authorised by the regulations.

Check that whether an exhaust line is necessary and/or prescribed. Volatile substances can pass through the filter. Depending on the processed gas, we recommend to connect an exhaust line, this is necessary when the exhaust gases are dangerous.

Observe the safety precautions that apply to your application and process gases. The pump's exhaust port also has an internal thread. A hose can be connected through a suitable screw-in nipple (refer to [Connection fittings](#) on page 16 and [Figure: Connection fittings](#)).

The cross-section of the exhaust line should be at least the same as the pump's exhaust port. If the exhaust line cross-section is too narrow, overpressure can occur in the pump.

Remove the exhaust-filter plate and make sure that the exhaust demister(s) are secured tightly in place. Exhaust demisters may get loosen during shipping and installation. A loose demister results in exhaust smoke during start-up and operation.

Install the exhaust line with a downward slope to prevent condensate from flowing back into the pump. If this is not possible, we strongly recommend you to install a condensate trap (refer to [Table: Accessories](#)). If several pumps are connected to one exhaust line, make sure that an adequate cross-section of the exhaust line is present and a non-return valve at the exhaust of each pump is installed.

## 6.2 Electrical connections

Refer to [Figure: Electrical connection](#).

Make sure that the power is off before wiring the motor or changing the wiring of the pump. Electrical connections must be done by a qualified electrician in accordance with the applicable safety regulations.

Wire the motor for the correct supply voltage through connections in the junction box, see the wiring diagram on the motor name plate. For proper connection, a suitable motor protection switch of at least class 10 must be used. Set the switch in accordance with the rating on the motor name plate.

After connecting the motor or every time you alter the wiring, check the direction of rotation of the motor. Observe the direction arrow on the motor hood. During the check, the intake port must be open. If the direction of rotation is wrong, oil may be ejected out of the intake port. The vacuum system may be pressurised. Do not use the motor fan for checking the rotation direction. The motor fan rotates too fast during operation and when slows during shutdown, it reserves its direction of rotation.

If you need to correct the direction of rotation, turn off the power supply and interchange two phases on the motor terminals.

We recommend you to check the direction of rotation with a phase-sequence indicator.

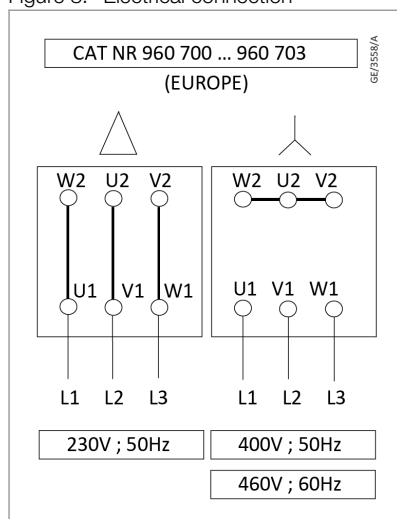
Prolonged running of the motor in the wrong direction of rotation will damage the pump.

A thermal overload switch is available as an accessory, which can be connected with control box. At nominal switching temperature it cuts out the pump triggers a warning signal. Under normal condition contact is closed.

# Installation

If any security switch or electrical defect cuts out the pump, restarting the pump must be only possible by manual action. See wiring diagram on motor name plate or junction box depending on the motor type.

Figure 8. Electrical connection



## 7 Operation



### **WARNING: HOT SURFACE**

**Risk of burns. Do not touch the pump when it is in operation. Few surfaces of the pump can reach a temperature of upto 80 °C (176 °F). Check for warning labels on the pump.**

The pumps can pump gases and vapour, provided that the gas ballast valve is installed, open and the pump has reached its operating temperature.

#### **Note:**

Contact us for important safety instructions before pumping greater than atmospheric concentrations of oxygen or other highly reactive gases. The pump must be degreased, modified, and special inert oil must be used for pumping oxygen. Also ATEX variants are available for pumping explosive gases.

The motor manufacturer guarantees a maximum of 6 starts per hour. To avoid exceeding 6 starts per hour, run the pump continuously and regulate the vacuum in your system with a pilot valve.

The connection ports are blanked off by plastic protective caps. Remove these caps before you turn on the pump.

It is essential to observe the following instructions step by step to make sure a safe start-up. Start-up may only be conducted by trained specialists.

The ambient temperature should be between 12 °C (55 °F) and 40 °C (104 °F) depending on the oil type. By modifying the pump or changing the oil type, the pump can be run at a lower ambient temperature, contact us for the information about this.

If the pump has been shelved for more than one year, standard maintenance must be run (refer to [Maintenance](#) on page 26). The oil must be changed before the pump is put into service again (refer to ). We recommend that you contact us for service.

Do not open the pump to condensable vapour until it has warmed to operating temperature, pumping process gas with a cold pump results in vapour condensing in the oil.

For processes with a high proportion of condensable vapour, slowly open the intake line, after reaching the operating temperature to prevent excessive quantities of vapour entering the pump.

One sign of condensation of vapour in the pump is a rise in the oil level during operation of the pump.

During pumping, vapour may dissolve in the oil. This changes the oil properties and causes a risk of corrosion in the pump. Therefore, do not 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 vapour. We strongly recommend operating the pump in this mode for about 30 minutes after completion of the process.

### **7.1 Pumping of non-condensable gases**

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

# Operation

If you do not know the composition of the gases to be pumped and if you cannot remove the possibility of condensation, run the pump with gas ballast valve open in as given in [Pumping of condensable gases and vapour through gas ballast](#) on page 24.

## 7.2 Pumping of condensable gases and vapour through gas ballast

The pumps with gas ballast valves are delivered with the gas ballast valve open.

The pumps can be equipped with different gas ballast types refer to [Design and function](#) on page 9.

With the gas ballast valve open and at operating temperature, the pumps can pump pure water vapour up to the water vapour tolerance indicated in the [Technical data](#) on page 11. The pump's water vapour tolerance can be increased by raising the operating temperature.

The running noise of the pump is slightly louder when the gas ballast valve is open. Before you open the pump for vapour, make sure that the gas ballast valve is open and that the pump has been warmed up for about 30 minutes with closed intake line.

If the gas ballast is connected to an inert gas supply, the pressure of the latter must not be above 1 bar abs.

## 7.3 Working in cycles in and out

Limit starting of the pump up to 5 or 6 times per hour. If the process need it, use a pneumatic or electromagnetic piloted valve and to let the pump run continuously.

## 7.4 Start-up



### **WARNING: VACUUM HAZARD**

**Risk of injury. Do not expose part of the body to the vacuum. Do not lay the hand on the intake to check vacuum. Do not operate the pump with an open and accessible inlet. Exposure of a part of the body to the vacuum result in a rush of blood in the exposed part. Vacuum connections, oil filling and oil draining openings must not be opened during operation of the pump.**

---

Oil for the first filling is supplied with the pump.

- Before switching on, always make sure that the pump contains sufficient oil.
- The normal oil level is in the middle of sight glass.
- If oil has to be added, unscrew the oil-fill plug, add oil and screw the plug firmly back.

The pump is designed for fail-safe start-up at temperature over 12 °C with mineral oil.

To prevent overloading the motor:

- Do not start the pump more than six times within one hour.
- If frequent starts are needed, the pump must run continuously and be linked to the vacuum vessel by a valve. In that case, regulation will be made by the valve and not by start/stop of the pump.

With the valve closed, the pump consumes less energy.



- Before you start the pump, make sure that the pump and the fitted accessories meet the requirements of your application and that safe operation can be guaranteed.
- The safety regulations which apply to the specific application in each case must be observed. This applies to installation, operation and maintenance (service) as well as waste disposal and transportation. Contact us for details.

Depending on the process involved, dangerous substances may escape from the pump and oil. Take the appropriate precautions.

Observe the safety regulations.

## 7.5 Shutdown

Under normal circumstances, switch off the pump. The intake port of the pump contains an anti-suckback valve, which closes the intake port when the pump is shut down, this maintains the vacuum in the connected system and prevents oil from being sucked back into the system. The valve's functioning is not impaired by gas ballasting, but its cleanliness must be taken care.

When pumping condensable media, let the pump continue to operate with the gas ballast valve open and the intake line closed before switching off (refer to [Pumping of condensable gases and vapour through gas ballast](#) on page 24).



### Note:

Special preservation or slushing oils are not necessary.

When the pump has been switched off due to over-heating, initiated by the motor or its protection, the pump must be cooled down to the ambient temperature and must only be switched on again manually after correcting the cause for over-heating.

To prevent the pump from running up unexpectedly after a main power failure, integrate the pump into the control system in such a way that the pump can only be started by manually operated switch. This applies also to emergency cut-off switches.

In case of switching processes in connection with a pump which has warmed up under operating conditions, the pump must not be directly switched on again.

## 7.6 Pump ultimate pressure

If the system cannot reach the pressures specified in the [Technical data](#) on page 11, measure the ultimate pressure with a small vacuum tank at the pump's intake port after you disconnect the pump from the system.

Correct measurements can only be obtained with calibrated instruments.

Upon initial start-up, after long idle periods or after an oil change, it takes some time until the pump reaches the specified ultimate pressure. The pump has to attain its operating temperature and the pump oil has to be degassed. We recommend operating the pump initially with the gas ballast valve open.

The ultimate pressure depends on the pump temperature and the pump oil used. The best ultimate pressure can be obtained at a low pump temperature and by using the recommended oil types.

# Maintenance

## 8 Maintenance

Disconnect the power before you disassemble the pump. Make sure that the pump cannot be accidentally started.

If the pump has pumped hazardous gases it will be necessary to determine the nature of the hazard involved and take the appropriate safety precautions.

Observe the safety regulations.

### 8.1 Maintenance schedule

Do not install used seals. Always use new seals. Use only genuine parts provided by us.

To simplify the maintenance work we recommend you to combine several jobs.

The frequencies stated in the maintenance schedule are approximate values for normal pump operation.

Unfavourable ambient conditions or aggressive media may require more frequent maintenance.

**Table 4 Maintenance job interval for mineral oil and synthetic oil**

| Maintenance job   | Frequency at normal (clean) application - mineral oil                     | Frequency at normal (clean) application - synthetic oil                   | Reference   |
|---|---|---|---|
| Check the oil level   | Daily   | Daily   | Refer to <a href="#">Oil level</a> on page 28                             |
| Oil leaking checking  | Monthly   | Monthly   | In case of leakage, contact us  |
| Check the oil condition   | Every 2000 hours  | Every 2000 hours  | Refer to <a href="#">Oil condition</a> on page 28                         |
| Check exhaust filter condition  | Every 2000 hours  | Every 2000 hours  | -   |
| Subsequent oil changes  | Every 4000 hours or 1 year<br>(1 <sup>st</sup> oil exchange by 150 hours) | Every 6000 hours or 1 year<br>(1 <sup>st</sup> oil exchange by 150 hours) | Refer to <a href="#">Oil change and replace the oil filter</a> on page 29 |
| Replace the oil filter  | At each oil change  | At each oil change  | Refer to <a href="#">Oil change and replace the oil filter</a> on page 29 |
| Replace exhaust filter  | At each oil change or if back pressure is over 0.5 bar                    | At each oil change or if back pressure is over 0.5 bar                    | Refer to <a href="#">Exhaust filter replacement</a>                       |
| Check the inlet filter cartridge, replace if necessary in case of an inlet filter being installed | Every 8,000 hours or 1.5 year<br>(which comes first)                      | Every 12,000 hours or 2.5 year<br>(which comes first)                     | -   |
| Check and clean the dirt trap   | Every 8,000 hours or 1.5 year<br>(which comes first)                      | Every 12,000 hours or 2.5 year<br>(which comes first)                     | Refer to <a href="#">Clean the dirt trap</a> on page 30                   |

# Maintenance

| Maintenance job                         | Frequency at normal (clean) application - mineral oil                 | Frequency at normal (clean) application - synthetic oil               | Reference   |
|---|---|---|---|
| Check and clean the anti-suckback valve | Every 8,000 hours or 1.5 year (which comes first)                     | Every 12,000 hours or 2.5 year (which comes first)                    | Refer to Check the anti-suckback valve <a href="#">Check the anti-suck back valve</a> on page 31              |
| Check and clean gas ballast valve       | Every 8,000 hours or 1.5 year (which comes first)                     | Every 12,000 hours or 2.5 year (which comes first)                    | Refer to Clean the gas ballast intake filter <a href="#">Clean the gas ballast</a> on page 31                 |
| Clean the radiator                      | Depends on ambient conditions (minimum once a year)                   | Depends on ambient conditions (minimum once a year)                   | Refer to <a href="#">Clean the radiator</a> .   |
| Heat exchanger cleaning                 | Depends on cooling water and process conditions (minimum once a year) | Depends on cooling water and process conditions (minimum once a year) | Refer to Clean the water/oil heat exchanger <a href="#">Clean the water cooling heat exchanger</a> on page 34 |
| Overhaul (replace all wear parts)       | Every 24000 hours or 3 year   | Every 30000 hours or 5 year   | Contact us  |

The above recommendation are only for pump running in normal application.

In case if the pump is operating in medium and harsh applications, the maintenance interval needs to be shortened according to application requirements. For more information contact us.

## 8.2 Lubricants and grease

Unless otherwise specified on the pump, we recommend to run the pumps with Leybonol provided by us which is approved by us and meets following requirements:

- Low vapour pressure, even at high temperatures
- Flat viscosity curve
- Minimum water content and absorption
- Good lubricating properties
- Resistant to ageing under mechanical strain.

If you use a non-approved oil, we cannot guarantee that our pumps will meet their operating specifications (ultimate pressure, pumping speed, noise, operating temperature, etc). However, the warranty is voided only if the non-approved oil adversely affects the operation or reliability of the pump.

When using other oil brands, employ non-detergent mineral oils of viscosity class ISO VG68 to ISO VG 100.

Use of other special-grade lubricants for specific applications is possible.

Please consult us.

Only use lubricants and grease which are approved by us.

# Maintenance

**Table 5. Lubricants**

| <b>Pump oil</b> | <b>Mineral oil</b> | <b>Synthetic oil</b> |
|-----------------|--------------------|----------------------|
| 5 litres        | L13005             | L21105               |
| 20 litres       | L13020             | L21120               |
| 200 litres      | L13099             | L21199               |

## **8.3 Check the oil**

### **8.3.1 Oil level**

The pump oil level during operation must always be in the middle of the oil level glass. When necessary, switch off the pump and add the correct quantity of oil.

High oil consumption, indicates that exhaust filters are clogged. Change the exhaust filter change (refer to [Exhaust filter replacement](#)).

Check the oil level daily.

### **8.3.2 Oil condition**

Normally the oil is clear and transparent. If gases or liquids dissolved in the oil result in deterioration of the ultimate pressure, the oil can be degassed by allowing the pump to run for about 30 minutes with the intake port closed and the gas ballast valve open.

The amount of oil required for an oil check must be drained through the oil-drain plug into a beaker or similar container with the pump switched off but at operating temperature.

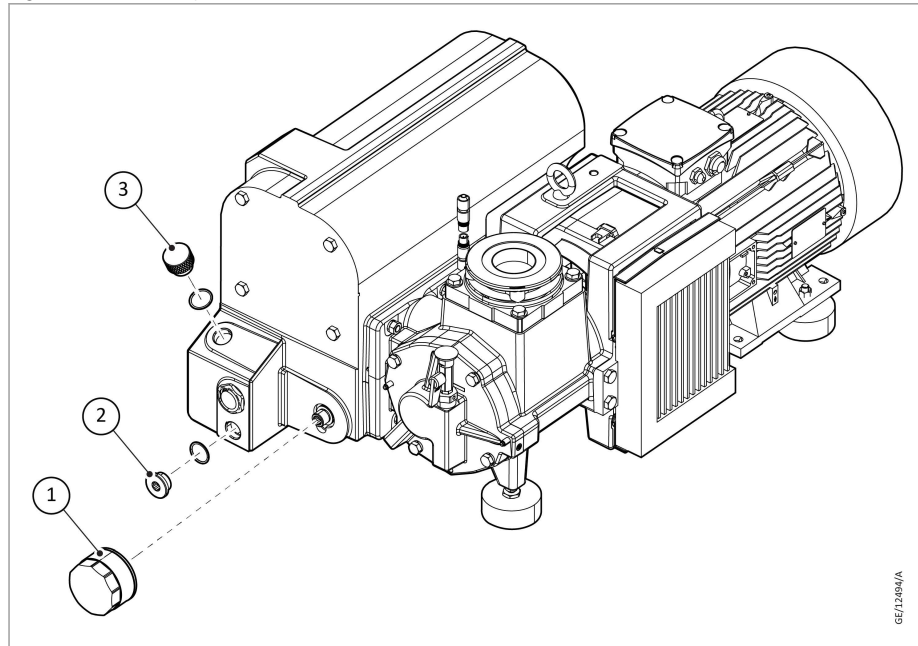
## 8.4 Oil change and replace the oil filter



### **WARNING: HOT SURFACE**

**Risk of burn. Do not touch the pump or surrounding surfaces during the operation as it could reach temperature higher than 80 °C (176 °F).**

Figure 9. Oil filter replacement



- 1. Oil filter
- 3. Oil fill plug

- 2. Oil-drain plug

1. Always change the oil when the pump is switched off but still at working temperature.
2. If there is a risk of the oil being polymerized by the connected process, change the oil immediately after operation of the pump.
3. Put a suitable oil drain container below the oil-drain plug, or better utilize a fluid extractor.
4. Unscrew the oil-drain plug with the allen key 12 or open the drain valve. Refer to [Table: Tools required](#).
5. Drain the used oil into the into appropriate waste container.
6. Depending on the process involved, dangerous substances may escape from the pump and oil. Take the appropriate precautions.
7. When the flow of oil slows down screw the oil-drain plug.
8. Switch on the pump for a maximum of 10 seconds and switch it off.
9. Remove the oil-drain plug or open the valve and drain the remaining oil.
10. Remove the old oil filter, turn right filter is machined with left thread.
11. Moisten the new oil filter gasket with oil and screw it in manually.
12. Check the plugs, O-ring and replace it with a new one if necessary.
13. Re-insert the oil-drain plug.
14. Unscrew the oil-fill plug.
15. Fill the pump with fresh oil up to the bottom edge of the oil-level glass, use only suitable oil.

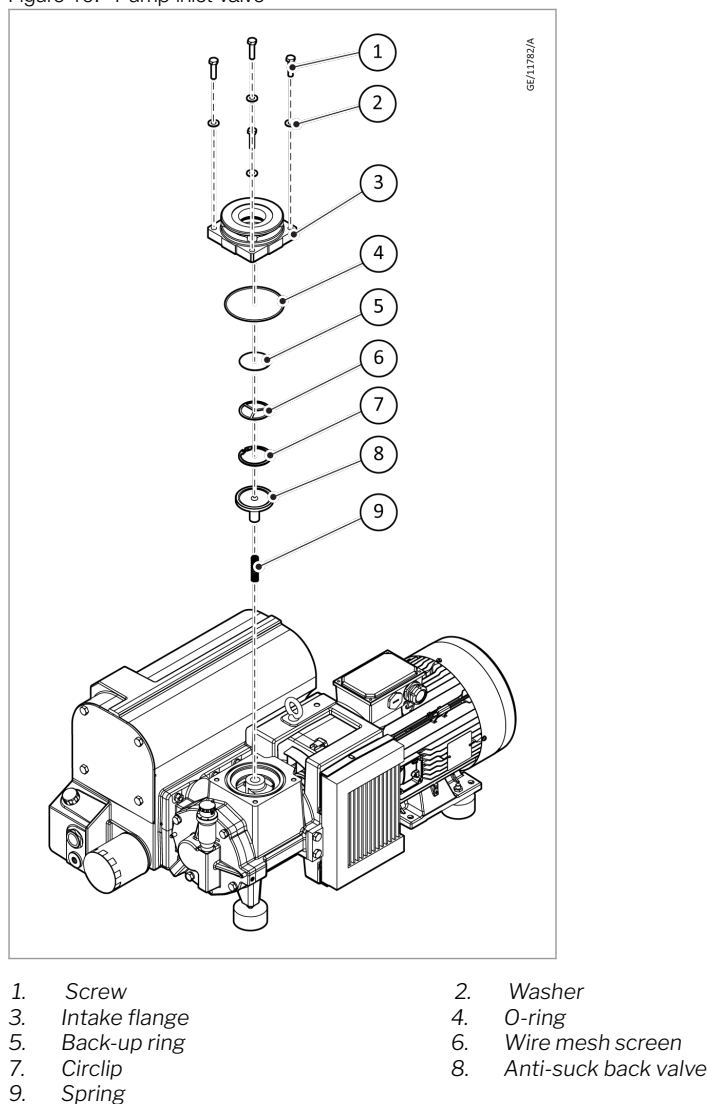
# Maintenance

16. Run the pump for a short time and check the oil level, top up if required.
17. Use suitable oil only (refer to [Table: Lubricants](#)).

## 8.5 Clean the dirt trap

A dirt trap for coarse particles is located in the intake flange of the pump. It should be kept clean to avoid reduction of the pumping speed.

Figure 10. Pump inlet valve



1. Remove four screws with with wrench 16. Refer to [Table: Tools required](#).
2. Remove the intake flange and gasket.
3. Remove the circlip and support piece from inside.
4. Remove the wire-mesh screen.
5. Clean the wire-mesh screen with a suitable solvent.
6. Re-assemble in the reverse sequence. We recommend you to replace the gasket by a new one.
7. Depending on the process involved, dangerous substances may escape from the pump and oil. Take the appropriate precautions.
8. Install new seal. Do not use old seal.

## 8.6 Check the anti-suck back valve

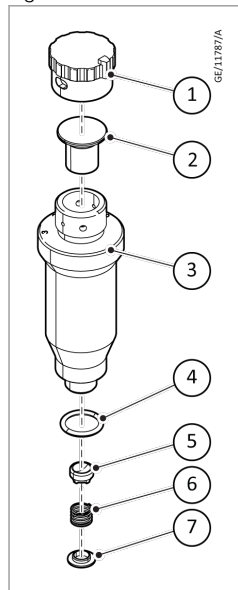
Keep the anti-suck back valve clean to make sure proper operation of the pump. If the pump is exposed to large amounts of dust or dirt, install a dust filter upstream (refer to [Connection fittings](#) on page 16).

Refer to [Clean the dirt trap](#) on page 30 for details about pump inlet valve assembly.

1. Disconnect the intake line.
2. Remove four screws with wrench 16. Refer to [Table: Tools required](#).
3. Remove the intake flange and the gasket.
4. Remove the spring and the anti-suck back valve.
5. If the anti-suck back valve closes too soon, carefully compress the spring slightly.
6. The top edge of the valve should be 1-2 mm away from the bottom side of the intake port. Specific gauge is available see [Table: Tools required](#).
7. Depending on the process involved, dangerous substances may escape from the pump and oil. Take the appropriate precautions.
8. Install new seal. Do not use old seal.

## 8.7 Clean the gas ballast

Figure 11. Gas ballast valve



- |                     |             |
|---------------------|-------------|
| 1. Gas ballast plug | 2. Silencer |
| 3. Body             | 4. O-ring   |
| 5. Non-return valve | 6. Spring   |
| 7. Spring base      |             |

# Maintenance

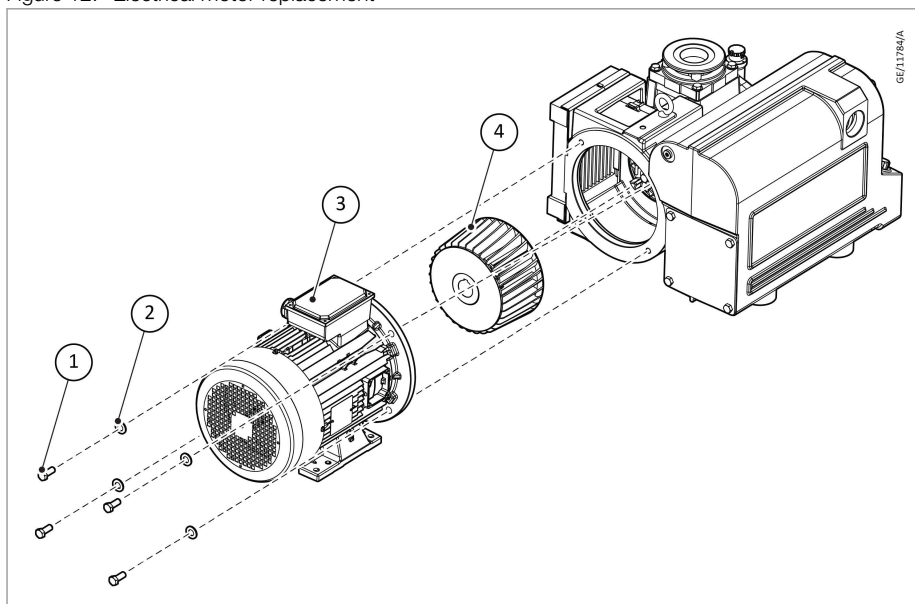
## 8.8 Electrical motor replacement



### **WARNING: DANGEROUS VOLTAGE**

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

Figure 12. Electrical motor replacement



- |           |                |
|-----------|----------------|
| 1. Screws | 2. Washers     |
| 3. Motor  | 4. Turbine fan |

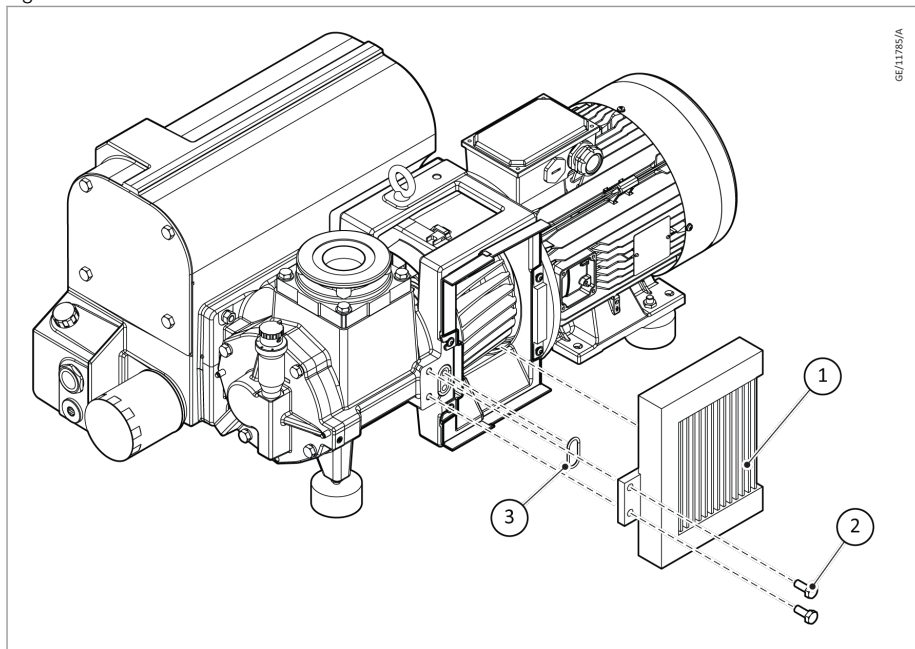
1. Remove the four hexagonal head screws to disassemble motor from coupling housing. For safety reason contact us, additional centering tools could be necessary.
2. Loosen the turbine locking screw with a wrench 8.
3. Remove the coupling of the motor shaft with an extractor puller.
4. Re-assemble in the reverse sequence. Apply tightening torque of 80 N.m to the motor screws.
5. Check the direction of motor rotation.



## 8.9 Clean the radiator

Keep the air oil cooler and turbine clean to have an efficient cooling. During oil exchange once oil is drained:

Figure 13. Radiator



- 1. Radiator
- 3. O-ring

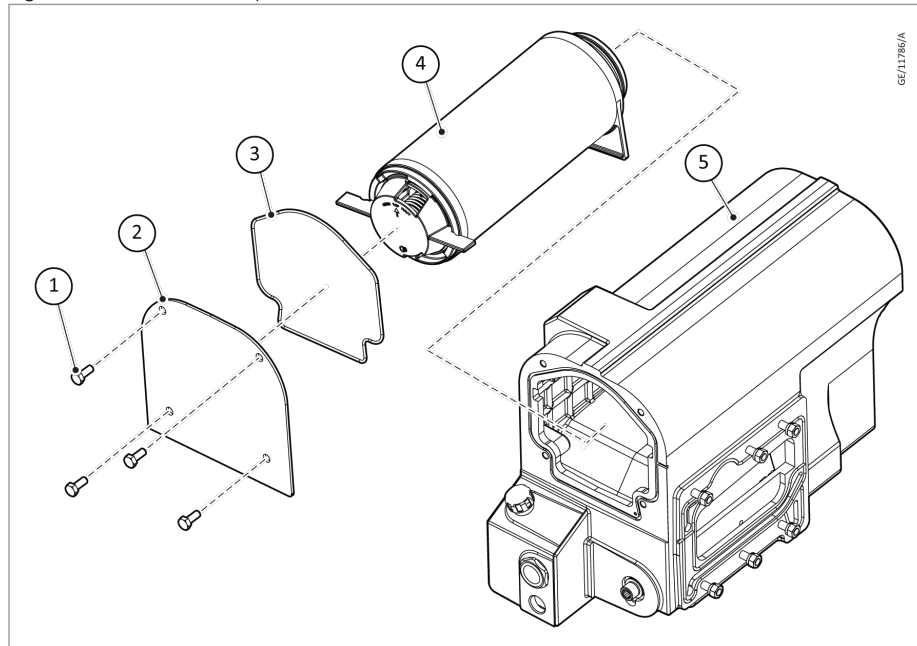
- 2. Screws

1. Remove the cooler (take care on the seal).
2. Clean the turbine and cooler with compress air and vacuum cleaner.
3. Reassemble the air oil cooler on the pump. Apply tightening torque of 47 N.m to the radiator screws.

# Maintenance

## 8.10 Exhaust filter replacement

Figure 14. Exhaust filter replacement



- |               |                   |
|---------------|-------------------|
| 1. Screws     | 2. Cover plate    |
| 3. O-ring     | 4. Exhaust Filter |
| 5. Oil casing |                   |

1. Remove the screws of the exhaust plate with a 16 mm wrench.
2. Remove the exhaust demister from the oil casing shake up and down and pull.
3. Make sure that the new exhaust filters have the O-ring (opposite side of overpressure valve) and grease them using our vacuum grease. (refer to [Table: Lubricants](#)).
4. Replace the O-ring on the casing (put vacuum grease in groove corners for O-ring retaining).
5. Insert new exhaust filter. It is guided in the oil casing.
6. Fit the screw and tight it progressively in alternation. Apply tightening torque of 34 N.m to cover plate screws.

## 8.11 Clean the water cooling heat exchanger

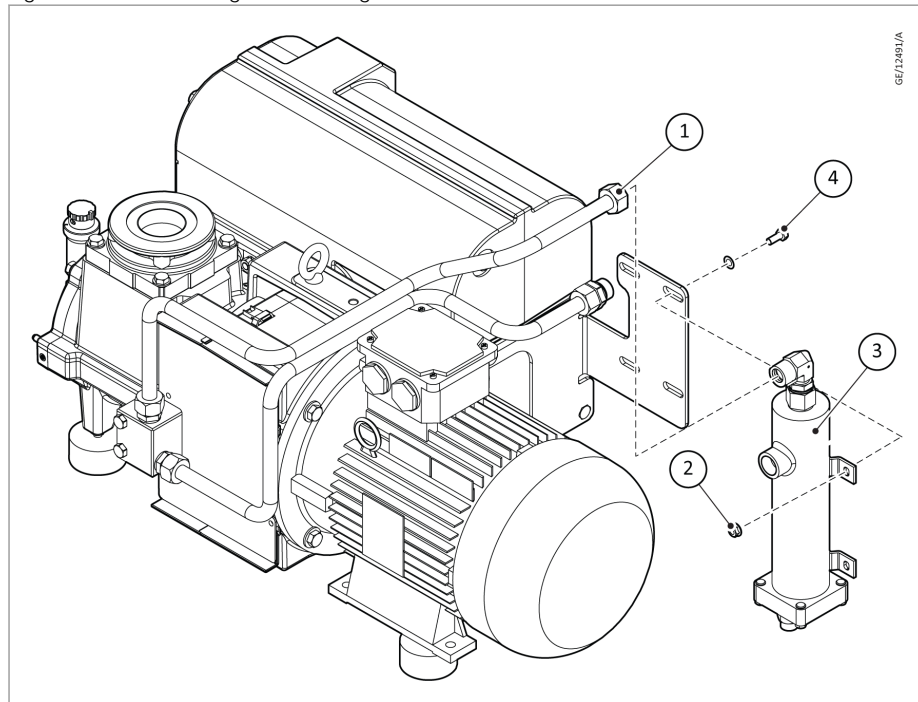


### CAUTION: HOT SURFACE

**Risk of burns. The cooling water in the heat exchanger maybe hot, take appropriate safety measures.**

- Make sure that the place is open and well ventilate.
- Perform maintenance when the pump is stopped.
- Observe the safety regulations given by the manufacturer of the product.
- Observe the local regulations for the treatment and the disposal of chemical products.

Figure 15. Water cooling heat exchanger



- |                    |   |
|--------------------|---|
| 1. Oil pipe screws | 2. Heat exchanger fasten screw            |
| 3. Heat exchanger  | 4. Heat exchanger fasten bolt with washer |

### To drain the water circuit:

1. Close the water cooling supply.
2. Put a water container (volume > 2 litre) under the heat exchanger.
3. Remove the connection plugs and drain the remaining water.
4. The remaining water maybe hot, take appropriate safety measures.

### To remove the heat exchanger:

1. Unscrew the oil pipe screws, use wrench 32 mm.
2. Disconnect the oil pipes.
3. Unscrew the fasten screws and bolts, use wrench 13 mm.
4. Remove the heat exchanger.

### To clean the heat exchanger:



### **WARNING: TOXIC MATERIALS**

**Use suitable protective gloves and eye protection when carrying out this procedure.**

We recommended to clean the water circuit at least twice a year.

1. Unscrew the oil pipe screws, use wrench 32 mm.

# Maintenance

2. Unscrew the hear exchanger fasten screws and bolts, use wrench 32 mm.
3. Remove the hear exchanger from pump.
4. Chemical cleaning is the most efficient, with dilute hydrochloric acid solution (5 to 10%) then neutralise with hexamethylethyrenetetramine at 0.2%.
5. For a 1 mm coat of scale, leave acting the acid during about 30 minutes. The system must be open during the operations, so the product gases can escape.
6. Rinse copiously with water after neutralization.

## **To reassemble the heat exchanger:**

1. Fasten screws and bolts, use wrench 13 mm.
2. Fasten the oil pipe screws, use wrench 32 mm.
3. Connect cooling water supply pipe.

## 9 Fault finding

Table 6. Fault finding

| Condition  |
|--|
| <a href="#">Pump does not start</a> on page 37                           |
| <a href="#">Pump does not reach ultimate pressure</a> on page 37         |
| <a href="#">Pumping speed is too low</a> on page 38                      |
| After switching off pump under vacuum, pressure in system rises too fast |
| <a href="#">Pump gets too hot</a> on page 39                             |
| <a href="#">Oil in intake line or in vacuum vessel</a> on page 39        |
| <a href="#">Oil is turbid</a> on page 40                                 |
| <a href="#">Pump is excessively noisy</a> on page 40                     |

| Fault        | Pump does not start  |
|--------------|--|
| <b>Cause</b> | <b>Pump is connected incorrectly.</b>  |
| Remedy       | Connect the pump correctly. Refer to <a href="#">Electrical connections</a> on page 21.                |
| <b>Cause</b> | <b>Motor protection switch set incorrectly.</b>  |
| Remedy       | Set motor protection switch properly. Refer to <a href="#">Electrical connections</a> on page 21.      |
| <b>Cause</b> | <b>Operating voltage does not match motor.</b>   |
| Remedy       | Replace the motor.   |
| <b>Cause</b> | <b>Motor is malfunctioning.</b>  |
| Remedy       | Replace the motor.   |
| <b>Cause</b> | <b>Oil temperature is below 12 °C (54 °F).</b>   |
| Remedy       | Heat the pump and pump oil or use different oil.   |
| <b>Cause</b> | <b>Oil is too viscous.</b>   |
| Remedy       | Use appropriate oil grade. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29.  |
| <b>Cause</b> | <b>Exhaust filter or exhaust line is clogged.</b>  |
| Remedy       | Replace the filter or clean the exhaust line. Refer to <a href="#">Clean the dirt trap</a> on page 30. |
| <b>Cause</b> | <b>Pump is seized up (pump is jammed).</b>   |
| Remedy       | Repair the pump.   |

| Fault        | Pump does not reach ultimate pressure  |
|--------------|--|
| <b>Cause</b> | <b>Measuring technique or gauge is not suitable.</b>   |
| Remedy       | Use correct measuring technique and gauge. Refer to <a href="#">Pump ultimate pressure</a> on page 25. |

# Fault finding

|              |  |
|--------------|--|
| <b>Cause</b> | <b>External leak, piping fittings loose.</b>   |
| Remedy       | Repair the pump. Re-tighten the piping fittings.   |
| <b>Cause</b> | <b>Float valve does not close.</b>   |
| Remedy       | Repair the valve. Refer to <a href="#">Exhaust filter replacement</a> .  |
| <b>Cause</b> | <b>Anti-suckback valve is malfunctioning.</b>  |
| Remedy       | Repair the valve. Refer to Check the anti-suckback valve <a href="#">Check the anti-suck back valve</a> on page 31.    |
| <b>Cause</b> | <b>Exhaust valve is malfunctioning.</b>  |
| Remedy       | Repair the valve. Refer to Clean the heat exchanger <a href="#">Clean the water cooling heat exchanger</a> on page 34. |
| <b>Cause</b> | <b>Inadequate lubrication due to unsuitable or contaminated oil.</b>   |
| Remedy       | Change the oil. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29.                             |
| <b>Cause</b> | <b>Inadequate lubrication due to clogged oil filter.</b>   |
| Remedy       | Replace the oil filter. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29.                     |
| <b>Cause</b> | <b>Inadequate lubrication due to clogged oil lines.</b>  |
| Remedy       | Clean the oil lines and oil case.  |
| <b>Cause</b> | <b>Vacuum lines are dirty.</b>   |
| Remedy       | Clean vacuum lines.  |
| <b>Cause</b> | <b>Pump is too small.</b>  |
| Remedy       | Check the process date, replace the pump, if necessary.  |

| <b>Fault</b> | <b>Pumping speed is too low</b>  |
|--------------|--|
| <b>Cause</b> | <b>Dirt trap in the intake port is clogged.</b>  |
| Remedy       | Clean the dirt trap. Refer to <a href="#">Clean the dirt trap</a> on page 30.<br>Install a dust filter in intake line. Refer to <a href="#">Intake side</a> on page 19 and <a href="#">Connection fittings</a> on page 16. |
| <b>Cause</b> | <b>Exhaust filter is clogged.</b>  |
| Remedy       | Install new filter elements. Refer to <a href="#">Clean the dirt trap</a> on page 30.  |
| <b>Cause</b> | <b>Connecting lines are too narrow or too long.</b>  |
| Remedy       | Use adequately wide and short connecting lines. Refer to <a href="#">Connection to system</a> on page 19.  |
| <b>Cause</b> | <b>Anti-suckback valve is hard to open.</b>  |
| Remedy       | Check spring free length and clean.  |

# Fault finding

| Fault | After switching off pump under vacuum, pressure in system rises too fast |
|-------|--|
|-------|--|

|              |                           |
|--------------|---------------------------|
| <b>Cause</b> | <b>System has a leak.</b> |
|--------------|---------------------------|

|        |   |
|--------|---|
| Remedy | Check the system, clean and adjust the anti-suckback valve. |
|--------|---|

|              |   |
|--------------|---|
| <b>Cause</b> | <b>Anti-suckback is malfunctioning.</b> |
|--------------|---|

|        |  |
|--------|--|
| Remedy | Repair the valve. Refer to <a href="#">Clean the dirt trap</a> on page 30 and <a href="#">Check the anti-suck back valve</a> on page 31. |
|--------|--|

| Fault | Pump gets too hot |
|-------|-------------------|
|-------|-------------------|

|              |  |
|--------------|--|
| <b>Cause</b> | <b>Cooling air supply is obstructed.</b> |
|--------------|--|

|        |  |
|--------|--|
| Remedy | Set pump up correctly. Refer to <a href="#">Installation</a> on page 19. |
|--------|--|

|              |                         |
|--------------|-------------------------|
| <b>Cause</b> | <b>Cooler is dirty.</b> |
|--------------|-------------------------|

|        |   |
|--------|---|
| Remedy | Clean the cooler. Refer to <a href="#">Clean the radiator</a> . |
|--------|---|

|              |   |
|--------------|---|
| <b>Cause</b> | <b>Ambient temperature is too high.</b> |
|--------------|---|

|        |  |
|--------|--|
| Remedy | Set pump up correctly. Refer to <a href="#">Installation</a> on page 19. |
|--------|--|

|              |                                |
|--------------|--------------------------------|
| <b>Cause</b> | <b>Process gas is too hot.</b> |
|--------------|--------------------------------|

|        |                     |
|--------|---------------------|
| Remedy | Change the process. |
|--------|---------------------|

|              |                              |
|--------------|------------------------------|
| <b>Cause</b> | <b>Oil level is too low.</b> |
|--------------|------------------------------|

|        |  |
|--------|--|
| Remedy | Add oil to reach the correct oil level. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29. |
|--------|--|

|              |                             |
|--------------|-----------------------------|
| <b>Cause</b> | <b>Oil is not suitable.</b> |
|--------------|-----------------------------|

|        |  |
|--------|--|
| Remedy | Change the oil. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29. |
|--------|--|

|              |   |
|--------------|---|
| <b>Cause</b> | <b>Exhaust filter/exhaust line is obstructed.</b> |
|--------------|---|

|        |   |
|--------|---|
| Remedy | Replace the exhaust filter, clean the exhaust line. Refer to <a href="#">Exhaust filter replacement</a> on page 34. |
|--------|---|

| Fault | Oil in intake line or in vacuum vessel |
|-------|--|
|-------|--|

|              |  |
|--------------|--|
| <b>Cause</b> | <b>Oil comes from the vacuum system.</b> |
|--------------|--|

|        |                           |
|--------|---------------------------|
| Remedy | Check anti-suckback valve |
|--------|---------------------------|

|              |   |
|--------------|---|
| <b>Cause</b> | <b>Anti-suckback valve is obstructed.</b> |
|--------------|---|

|        |   |
|--------|---|
| Remedy | Clean or repair the valve. Refer to <a href="#">Clean the dirt trap</a> on page 30 and <a href="#">Check the anti-suck back valve</a> on page 31. |
|--------|---|

|              |  |
|--------------|--|
| <b>Cause</b> | <b>Sealing surfaces or anti-suckback valve are damaged or dirty.</b> |
|--------------|--|

|        |  |
|--------|--|
| Remedy | Clean or repair the intake port and valve. |
|--------|--|

|              |                              |
|--------------|------------------------------|
| <b>Cause</b> | <b>Oil level is too high</b> |
|--------------|------------------------------|

|        |  |
|--------|--|
| Remedy | Operate the pump with open gas ballast.<br>Drain excess oil. |
|--------|--|

# Fault finding

| Fault      Oil is turbid |  |
|--------------------------|--|
| <b>Cause</b>             | <b>Condensation.</b>   |
| Remedy                   | Degas the oil or change the oil and clean the pump. Refer to <a href="#">Pumping of condensable gases and vapour through gas ballast</a> on page 24.<br>Open the gas ballast valve or insert a condensate trap. Refer to <a href="#">Oil condition</a> on page 28. |

| Fault      Pump is excessively noisy |   |
|--------------------------------------|---|
| <b>Cause</b>                         | <b>Oil level is very low (oil is no longer visible).</b>                            |
| Remedy                               | Add oil. Refer to <a href="#">Oil change and replace the oil filter</a> on page 29. |
| <b>Cause</b>                         | <b>Coupling element is worn.</b>  |
| Remedy                               | Install new coupling element.   |



## 10 Storage

The pump should be stored in a dry place, at room temperature (20 °C). Do not store the pump below 0 °C. Maximum storage temperature is 40 °C.

Before taking the pump out of service, disconnect it properly from the vacuum system, purge with dry nitrogen and change the oil. The inlet and exhaust ports of the pump must be blanked off with the shipping seals which are delivered with the pump. The gas ballast must be closed.

If the pump is to be stored for a longer period of time it must be sealed in a plastic bag together with a desiccant.

If the pump is to be shut down for an extended period or if the pump has to be stored, do as follows:

1. When pumping harmful substances, take adequate safety precautions.
2. Drain the oil (refer to [Oil change and replace the oil filter](#) on page 29).
3. Fill clean oil up to the bottom edge of the oil-level glass and let the pump run for a few minutes.
4. Then drain the oil and pour in clean oil up to the top edge of the oil-level glass.
5. Seal the connection ports.
6. If the pump is stored over one year, kindly contact our service organization for proper instructions.

# Disposal

## 11 Disposal

Dispose of the equipment safely in accordance with all local and national safety and environmental requirements.

Detailed disposal and recycling instructions are available, contact us for more information.

## 12 Service

### 12.1 Return the equipment or components for service

Before you send your equipment to us for service or for any other reason, you must complete a Declaration of Contamination Form. The form tells us if any substances found in the equipment are hazardous, which is important for the safety of our employees and all other people involved in the service of your equipment. The hazard information also lets us select the correct procedures to service your equipment.

If you are returning equipment note the following:

- If the equipment is configured to suit the application, make a record of the configuration before returning it. All replacement equipment will be supplied with default factory settings.
- Do not return equipment with accessories fitted. Remove all accessories and retain them for future use.
- The instruction in the returns procedure to drain all fluids does not apply to the lubricant in pump oil reservoirs.

Download the latest documents from [leybold.com/en/downloads/download-documents/declaration-of-contamination/](http://leybold.com/en/downloads/download-documents/declaration-of-contamination/), follow the procedure in HS1, fill in the electronic HS2 form, print it, sign it, and return the signed copy to us.



#### **NOTICE:**

**If we do not receive a completed form, your equipment cannot be serviced.**

---

# Accessories

## 13 Accessories

| Description   | SV220 B  |
|---------------|----------|
| Oil drain tap | G6701610 |

Consult us for retrofit. Our service department can carry out these upgrades.

Stability of pump is insured with original accessories, mounting of any other accessory will engage the responsibility of user concerning stability of pump.

**Table 7. Consumables**

| Description   | SV220 B  |
|---|----------|
| Oil filter standard   | E6537380 |
| Oil filter by-pass left thread  | G6541596 |
| Maintenance kit (Exhaust filter with O-ring to be replaced)   | EK9606M  |
| For some maintenance operation described in the manual it is necessary to add the corresponding kits: |          |
| Yearly maintenance kit  | GK9606M1 |

Exhaust filter are not sold alone they are replaced by maintenance kit.

**Table 8. Tools required**

| Tool                                  | Part number |
|---------------------------------------|-------------|
| Oil filter key - allen key male 12 mm | 71073532    |
| Anti-suck back valve adjusting ring   | E6538606    |

## EU Declaration of Conformity



Leybold GmbH  
Bonner Strasse 498  
D-50968 Köln  
Germany

**Documentation Officer**

T: +49(0) 221 347 0 [documentation@leybold.com](mailto:documentation@leybold.com)

The product specified and listed below

- SOGEVAC
- SV220B Air-cooled "Europe" (4kW,50Hz / 4.8kW,60Hz)
- SV220B Air-cooled "World" (4,5kW,50Hz / 5,5kW,60Hz)
- Pump family codes:
  - SV220B: 960602Vxy, 960616Vxy, 960617Vxy,  
Where  
x can be 30 or 20  
y can be any value from 01 to 16  
defining their variants

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

|            |  |
|------------|--|
| 2006/42/EC | Machinery directive<br><i>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.</i> |
| 2014/30/EU | Electromagnetic compatibility (EMC) directive<br>Class A Emissions, Industrial Immunity  |
| 2011/65/EU | Restriction of certain hazardous substances (RoHS) directive<br>as amended by Delegated Directive (EU) 2015/863  |

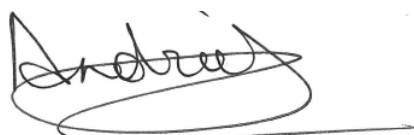
Based on the relevant requirements of harmonised standards:

|                         |  |
|-------------------------|--|
| 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       | Electromagnetic Compatibility (EMC) - Part 6-4: Generic Industrial Emission Standard |

This declaration, based on the requirements of the listed Directives and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: 2021-11-09

You must retain the signed legal declaration for future reference

This declaration becomes invalid if modifications are made to the product without prior agreement.



Andries de Bock - VP Engineering  
Industrial Vacuum Division  
Cologne



François Bouillot - General Manager  
Product Company Valence

## Declaration of Conformity

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Germany

**Documentation Officer**  
Innovation Drive  
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RH15 9TW  
[documentation@leybold.com](mailto:documentation@leybold.com)

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The product specified and listed below

- SOGEVAC
- SV220B Air-cooled "Europe" (4kW,50Hz / 4.8kW,60Hz)
- SV220B Air-cooled "World" (4,5kW,50Hz / 5,5kW,60Hz)
- Pump family codes:
  - SV220B: 960602Vxy, 960616Vxy, 960617Vxy,  
Where  
x can be 30 or 20  
y can be any value from 01 to 16  
defining their variants

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  
Class A Emissions, Industrial Immunity

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

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       | Electromagnetic Compatibility (EMC) - Part 6-4: Generic Industrial Emission Standard |

This declaration, based on the requirements of the listed Statutory Instruments and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: 2021-11-09

You must retain the signed legal declaration for future reference

This declaration becomes invalid if modifications are made to the product without prior agreement.

**Signed for and on behalf of Leybold France SAS**



Andries de Bock – VP Engineering  
Industrial Vacuum Division  
Cologne



François Bouillot - General Manager  
Product Company Valence

## 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
- 6(b) **Lead** as an alloying element in aluminium containing up to 0.4% by weight
- 6(c) Copper alloy containing up to 4% **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 / aluminium / brass components.

### Compliance Information – incorporated products and assemblies

Motors

2009/125/EC Ecodesign directive requirements for energy-related products

*To 1 July 2021:* Regulation (EC) No 640/2009 requirements for electric motors

*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

| 部件名称<br>Part name<br>  | 有害物质<br>Hazardous Substances |                      |                      |  |  |  |
|---|------------------------------|----------------------|----------------------|--|--|--|
|   | 铅<br>Lead<br>(Pb)            | 汞<br>Mercury<br>(Hg) | 镉<br>Cadmium<br>(Cd) | 六价铬<br>Hexavalent<br>Chromium<br>(Cr VI) | 多溴联苯<br>Polybrominated<br>biphenyls<br>(PBB) | 多溴二苯醚<br>Polybrominated<br>diphenyl ethers<br>(PBDE) |
| 铸铝及铝合金制品<br>Aluminium alloys  | X                            | O                    | O                    | O  | O  | O  |
| 钢合金制品<br>Steel alloys   | X                            | O                    | O                    | O  | O  | O  |
| 铜管管件<br>Brass pipe fitting  | X                            | O                    | O                    | O  | O  | O  |
| 铜接头<br>Brass connectors   | X                            | O                    | O                    | O  | O  | O  |
| 铜衬套轴承<br>Brass bush bearing   | X                            | O                    | O                    | O  | O  | O  |
| <p>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。<br/>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.</p> <p>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。<br/>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.</p> |                              |                      |                      |  |  |  |



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