

oerlikon
leybold vacuum

Sogevac SV28 BI

Single-stage, oil-sealed
Rotary Vane Pump

Operating Instructions GA02331_002_01

Part Numbers

960 270 - 960 273

960 276 - 960 278



Contents

Installation and operating instructions

These installation and operating instructions are valid for the SOGEVAC pumps SV28 BI in their standard version.

Special versions to these pumps are delivered with an additive document, which prevails over the standard instructions.

The SOGEVAC vacuum pumps have been manufactured according to the latest technical standards and safety regulations. If not installed properly or not used as directed, dangerous situations or damage could occur.

It is mandatory that these operating instructions be read and understood prior to vacuum pump installation and start-up.

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General Instructions

1 General Instructions

1.1 Safety instructions

In this paragraph, the most important safety and usage instructions for the SOGEVAC pumps are listed. Ahead of each following paragraph of the manual, the numbers of the applicable safety instructions will be listed.

1.1.1

SOGEVAC pumps are not designed:

- . for pumping of aggressive, corrosive, flammable or explosive gases or gases mixtures ;
- . for pumping of oxygen or other highly reactive gases with a greater concentration than atmospheric concentration (>20%) ;
- . for working in flammable or explosive environment. For all these cases, special materials must be used. In case of doubt, please contact Oerlikon Leybold Vacuum.

See also the limits of use indicated in the EC Declaration of Conformity.

1.1.2

Liquid and solid particles must not enter the pump. Install the adequate filters, separators and/or condensers. In case of doubt consult Oerlikon Leybold Vacuum.

1.1.3

The intake line of the pump must never be connected to a device with over atmospheric pressure. Size of the exhaust line so that no pressure higher than 1,15 bar abs. (0,15 bar rel.) or depression of 15 mbar (0,15 bar rel.) can occur

1.1.4

Operating of the pump without oil or operating with incorrect sense of rotation can destroy the pump.

1.1.5

Never expose part of the body to the vacuum. There is a danger of injury. Never operate the pump with an open and thus accessible inlet. Vacuum connections as well as oil filling and oil draining openings must not be opened during operation of the pump.

1.1.6

When operating pump is hot and some surfaces could reach a temperature higher than 80°C (176°F). There is a risk of burn by touching.

Switch off the pump and let it cool down before any intervention or take appropriate precautions.

1.1.7

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

1.1.8

Observe the safety regulations !

Never use discarded seals. Always assemble using new seals.

Respect the instructions concerning environment protection when discarding used oil or exhaust filters !

Warning



General Instructions

1.2 Application range

See prescriptions chapters 1.1.1. and 1.1.2.

SOGEVAC pumps are designed for pumping of inert gases in the range of medium vacuum, between atmospheric pressure and ultimate pressure of the pump.

Indoor use up to 1000 m altitude and rel. humidity $\leq 95\%$ without condensation

When removing condensable vapours, a gas ballast valve must be installed, or opened.

1.3. Principle of operation

The SOGEVAC pumps SV28 BI are single-stage oil sealed rotary vane vacuum pumps. The rotor, having three slots in which the vanes are sliding, is eccentrically installed in a pump cylinder (stator).

The vanes separate the interior space into 3 chambers. The volume of these chambers varies with the rotation of the rotor.

The gas sucked into the inlet chamber is compressed and then pushed out at the exhaust valve.

The oil injected in the inlet chamber guarantees the air-tightness, the lubrication and cooling of the pump. It is dragged off by the compressed gases and roughly separated by gravity when entering in the oil sump. A fine separation is then operated in the exhaust filter. The exhaust filter retains $> 99,9\%$ of the aerosols. An internal transfer pushes the collected oil back into the vacuum generator, the transfer is operated by a float valve to avoid atmospheric air coming from the oil casing to the inlet of the pump when no oil is present in the recovery system.

The oil circulation functions by differential pressure.

Depending on catalog numbers, the pumps are equipped with a gas ballast valve for pumping condensable vapours.

The anti suckback valve at the inlet flange avoids oil coming back into the inlet line when the pump is stopped. This is valid for working pressures below 100 mbar and under the condition that the valve is kept clean and in good condition. The anti suck-back valve is not a safety valve. If oil back flowing is to be avoided by all means, it is necessary to mount a separate safety valve on the pump inlet

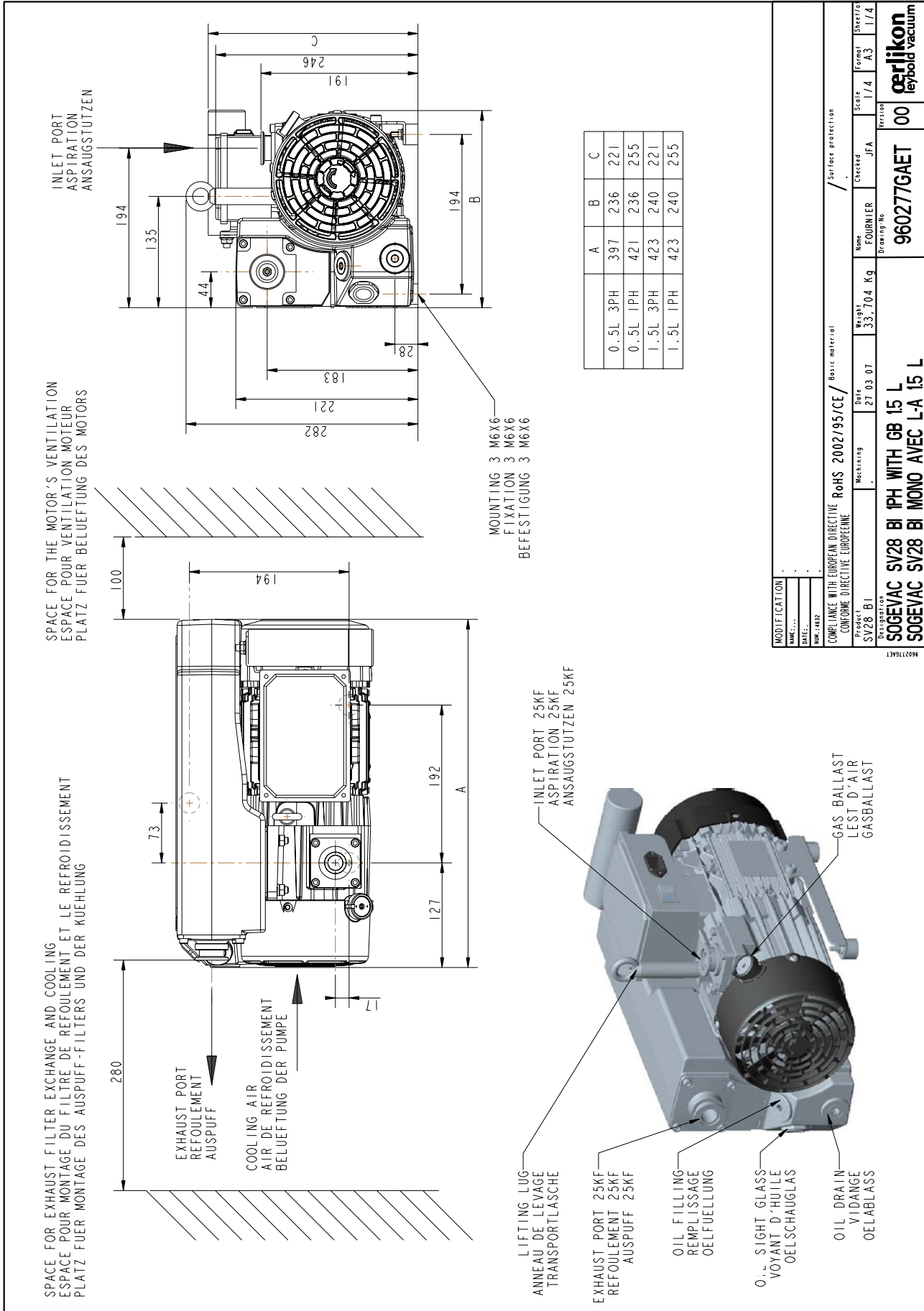
General Instructions

1.4 Technical Characteristics

| | | 50Hz | 60Hz |
|--|---------------------------------|----------------------|---|
| Nominal pumping speed | m ³ .h ⁻¹ | 25 | 30 |
| Pumping speed (according to Pneurop) | m ³ .h ⁻¹ | 23 | 27 |
| Ultimate partial pressure without gas ballast | mbar | ≤ 0,05 | ≤ 0,05 |
| Ultimate total pressure with small gas ballast | mbar | ≤ 0,5 | ≤ 0,5 |
| Water vapour tolerance with small gas ballast | mbar | 10 | 10 |
| Water vapour tolerable load with small gas ballast | kg.h ⁻¹ | 0,07 | 0,08 |
| Noise level (according to DIN 46635) | dB(A) | 54 | 57 |
| Main voltage (standard) AC ~ | V | 230/400 (+/- 10%) | 460 (+/- 10%) |
| Motor power - Rated rotational speed | kW | 0,75-1430 (3φ) | 0,9-1720 (3φ) |
| Protection - Isolation | | IP55 - F | IP55 - F <small>IP54-F for single-phase motors</small> |
| Leak rate | mbar.l.s ⁻¹ | 1.10 ³ | 1.10 ³ |
| Oil type / Capacity | l | GS32 / 0,5l or 1,8l | |
| Intake connection | | 25 KF | 25 KF |
| Exhaust connection | | 25 KF | 25 KF |

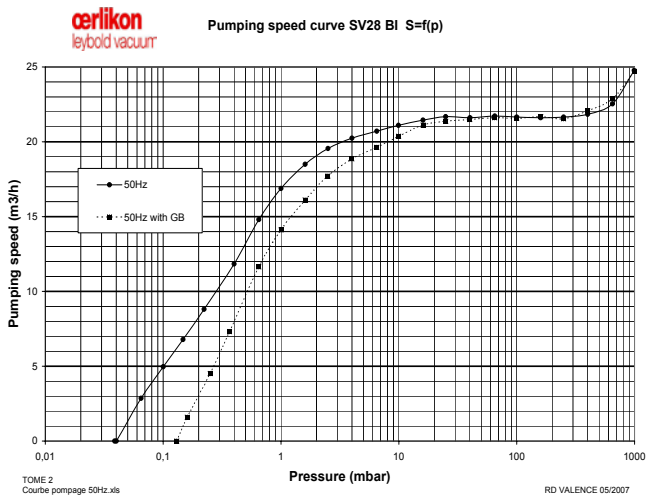
| | |
|--|---------|
| Pump with three-phase motor, without gas ballast, small oil casing 230 V/400 V, 50Hz ; 460 V, 60Hz | 960 270 |
| Pump with three-phase motor, gas ballast, small oil casing 230 V/400 V, 50Hz ; 460 V, 60Hz | 960 271 |
| Pump with three-phase motor, without gas ballast, big oil casing 230/400V, 50Hz ; 460V 60Hz | 960 272 |
| Pump with three-phase motor, gas ballast, big oil casing 400 V, 50Hz ; 230/460 V, 60Hz | 960 273 |
| Pump with single-phase motor wide range, gas ballast, small oil casing 180-264V, 50/60Hz | 960 276 |
| Pump with single-phase motor wide range, gas ballast, big oil casing 180-264V, 50/60Hz | 960 277 |
| Pump with JP and USA single-phase motor, gas ballast, big oil casing 100V -15/+10%, 50/60Hz & 115V -15/+10%, 60Hz | 960 278 |

General Instructions

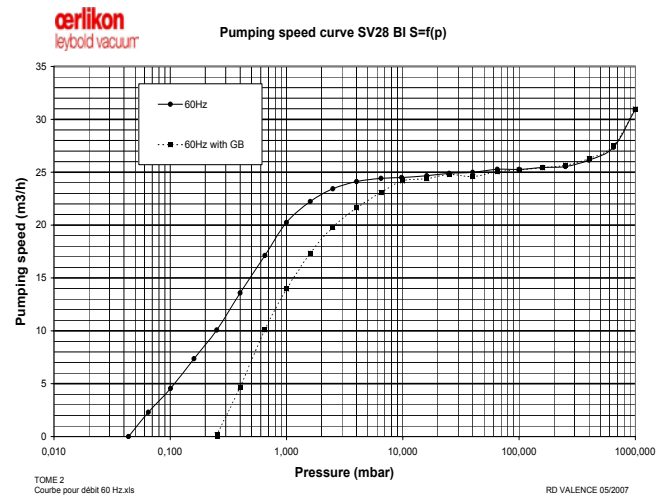


General Instructions

Pumping speed curves



at 50Hz



at 60Hz

— without gas ballast

- - with gas ballast

1.5 Accessories

For the accessories, please refer to the Oerlikon Leybold Vacuum General Catalogue chapters C01 and C13.

| | |
|------------------------------------|--------------------------------------|
| Kit anti suck back valve | 9 714 62 600 |
| Gas ballast kit | 9 714 62 640 |
| Set of seals | 9 714 62 670 |
| Float valve kit | 9 714 62 660 |
| Rubber feet kit | 9 714 62 650 |
| 3 phase motor flange kit | 9 714 62 630 |
| Stator kit | 9 714 62 620 |
| Complete oil casing 0.5 l | 9 714 49 400 |
| Complete oil casing 1.5 l | 9 701 54 140 |
| Repair kit | 9 714 62 690 |
| Vacuum generator three phase pump | 9 714 62 620 |
| Vacuum generator single phase pump | 9 714 62 630 |
| Oil level switch | upon request no retrofit possible |

1.6 Transport and Packing

SOGEVAC vacuum pumps pass a rigorous operating test in our factory and are packed to avoid transport damages.

Please check packing on delivery for transport damages.

The outer package bears a shock indicator, turning red at 50 g. Should the shock indicator have reacted, a transportation damage may have occurred and the freight forwarder must be advised.

Packing materials should be disposed off according to local environmental laws or re-used.

Installation

These operating instructions are part of the consignment. The connection ports are blanked off by plastic protective caps or self-adhesives. Take these caps or self-adhesives away before turning on the pump.

The necessary oil is supplied in a can beside the pump.

1.7 Mounting orientation and storage

1.7.1 Mounting orientation :

See required space on chart in paragraph 1.4. Pumps which have been filled with operating oil must only be moved in the upright position (horizontally). Otherwise oil may escape. The angle of slope may not be over 10° max. Avoid any other orientations while moving the pump.

1.7.2 Storage

Before stocking the pump for a long time put it back in its original condition (blank off inlet and exhaust ports with the shipping seals, drain the oil sump) and store the pump in a dry place at room temperature. A storage period exceeding one year requires a pump maintenance. Please contact Oerlikon Leybold Vacuum's customer service.

Storage temp. : - 15°C to + 60°C.

1.8 Lubricants

The SOGEVAC SV28 BI pumps should be run with mineral oils for vacuum pumps with low viscosity according to ISO category VG32. The Oerlikon Leybold Vacuum oil GS32 corresponds to these prescriptions.

GS32 Oil

| Conditioning | Reference |
|--------------|------------|
| 1l | 711 17 772 |
| 2l | 711 17 723 |
| 5l | 711 17 724 |
| 20l | 711 17 725 |

You may use other special lubricants adapted to the applications. Please consult us.

2 Installation (see chapter 1.1)

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

2.1 Setting-up

The pump must be set up or mounted horizontally on a flat surface. Special mounting is not required.

The following ambient operating environment must be observed :

. Ambient temperature: 15°C to 40°C (59°F to 104°F),

. Ambient pressure = Atmospheric pressure.

In order to avoid over-heating of the pump, an undisturbed fresh airflow to the pump is necessary.

2.2 Inlet connection (see chapter 1.1)

The inlet flange can be connected with a vacuum-tight flexible hose and/or pipe. The pipes should cause no stresses on the pump's flanges. If necessary, compensators must be installed.

Restriction of the pipes must be avoided in order not to decrease the pumping speed of the pump. The nominal diameter of the pipes has to be at least the same as the diameter of pump's inlet flange.

When removing condensable vapours, a gas ballast valve must be installed or opened.

The inlet pressure must not be above atm. pressure.

2.3 Connection to exhaust side

No isolation or restricting devices should be installed in the exhaust line of the pump. If an exhaust line is installed, it must at least have the same diameter as the exhaust flange. It should be installed in a manner so that no condensate can enter the pump (siphon, slope).

Warning: The maximum exhaust pressure must neither exceed 1.15 bar absolute (0.15 bar relative), nor fall under atmosphere pressure minus 15 mbar.

2.4 Oil filling (see chapter 1.1.4)

The necessary oil is supplied in a can beside the pump. To fill in the oil, unscrew the oil fill plug and fill in until the oil level reaches the "MAX" mark beside the oil sight glass.

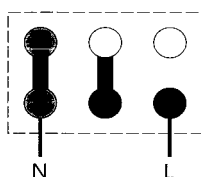
2.5. Electrical connection (see chapters 1.1.4 and 1.1.5)

The electrical installation may only be conducted by a specialist. Local regulations have to be followed.

. Voltage and frequency mentioned on the motor nameplate must correspond with the supply voltage and frequency.

. The drive motor must be protected against overloads according to local regulations and IEC 60204-1.

. To check the direction of rotation of pumps, flick pump on. If the direction of rotation is not identical with the one indicated by the arrow sticking on the motor hood, then inverse any two of the 3 electrical phases in the terminal box. Looking at the motor fan cover, the direction of rotation has to be counter-clockwise.

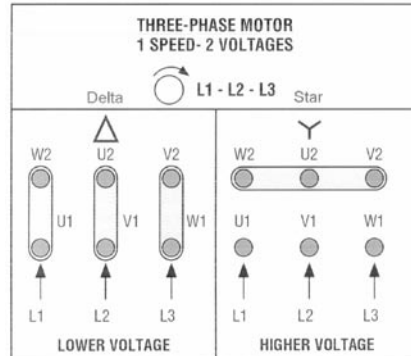


single-phase connection diagram

Warning



Installation



3-phase connection diagram

2.6 Operating advices (See chapters 1.1.1, 1.1.2, 1.1.3 and 1.2)

When removing condensable vapours, a gas ballast valve must be installed or opened.

The vacuum pump must be run for 30 minutes prior to operation with the inlet connection closed, in order to reach the operating temperature of about 75°C. Only up from this operating temperature, condensable vapours can be transported. After use, the pump has to be left running for an additional 30 minutes with the inlet connection closed and open gas ballast, to clear the oil of condensate.

2.7 Shutdown

The inlet flange of the SOGEVAC pumps contains an anti-suck back valve. It closes the inlet flange when the pump is voluntarily or accidentally shut down, thus maintaining the vacuum in the connected system and preventing oil from being sucked back into the system.

Except the indications in chapter 2.6 (operating advices) there are no particular precautions for the shutdown of the pump.

If the pump must be stopped for a longer period, see chapter 1.7.

3 Maintenance (see chapter 1.1)

The vacuum pump must be switched off and secured against accidental switch-on for all maintenance jobs. All work must be done by suitably trained personnel.

The following maintenance-schedule shows the regular maintenance periods for an average use of the pump.

Unfavourable ambient conditions and/or aggressive media may significantly reduce the maintenance intervals.

On the other hand, favorable conditions may allow longer operating periods or to skip the first oil change.

| Maintenance job | Frequency | Section |
|--|--|---------|
| Check the oil level | daily | 3.1 |
| Subsequent oil changes | Every 2000 h of operation or 6 months (depending on application) | 3.2 |
| Replace the exhaust filter | If oil mist at exhaust or annualy | 3.3 |
| Gas ballast valve | Monthly | 3.4 |
| Clean the inlet flange sifter | 6 months | 3.5 |
| Check the anti-suckback valve | 6 months | 3.6 |
| Clean the fan cover | 6 months | 3.7 |
| Check the electrical connection (only by a specialist) | 6 months | |

To simplify the maintenance work we recommend combining several jobs.

3.1 Oil level

The oil level shall be checked at least once a day and must be, while the pump is in operation, close to the MAX mark. Should the oil level be below the MIN mark switch off the pump, check it (see chapter 4) and add the required amount of oil.

3.2 Oil change

Oil changes, depending on operating conditions (products, vapours, ambient temperature...) must be done every 500 to 2000 operating hours or at least every 6 months.

If there is considerable pollution, it could be necessary to change the oil more frequently. Special oils allow to extend the oil changing period.

Oil changing must be done with a switched off and still warm pump. Open the oil drain plug and let run out the used oil into an appropriate container. Refasten the oil drain plug when oil runs slower, start up the pump briefly (5 sec. max) and switch off immediately. Re-open the oil drain plug and drain the rest of the oil.

Maintenance

Before refastening the oil drain plug, control the O-ring and if necessary replace it. Open the oil fill plug and pour in clean oil ; refasten the oil fill plug. The pump has to be rinsed out if there is considerable pollution. Therefore pour in clean oil up to the low edge of the oil-level glass, let the pump run briefly (for a few minutes) then drain the oil again.

3.3 Exhaust filters replacement (see chapters 1.1.6 and 1.1.8)

Oil mist escaping from the exhaust during operation indicates that the filter is probably clogged. Increased energy intake by the motor could also be the result of a soiled exhaust filter. Open the exhaust hood, take out the filter and replace it. Also check the gasket of the exhaust flange and change it if necessary.

3.4 Gas ballast valve cleaning (see safety prescriptions chapter)

Consult OLV

3.5 Inlet flange sifter cleaning

See safety prescriptions chapters 1.1.2., 1.1.6. and 1.1.8.

To clean the inlet flange sifter, disconnect the inlet connection and clean the sifter with blast air or an appropriate solvent.

3.6 Anti-suck back valve checking

See safety prescriptions chapter s1.1.2., 1.1.6. and 1.1.8.

The anti-suck back valve should be checked at the same time as the inlet flange sifter and if dirty, be cleaned with an appropriate solvent. Remove the inlet flange, check if there is no damage on the sealing part of the valve.

3.7 Fan cover cleaning

Soiling of the fan cover may lead to overheating of the motor and the pump. Put off the cover and clean it with blast air. Before starting the pump again, be sure that the cover has been reassembled.

3.8 Checking the float valve (see chapters 1.1.6 and 1.1.8)

When replacing the exhaust filter, check the cleanliness and the proper operation of the float valve. After having disassembled the exhaust flange and fan cover, remove the screw using a 4mm Allen Key. Pull on the float valve , clean the nozzle and check that the float itself oscillates free around its axle and that the valve is tight. Clean the float chamber of the oil casing. Reassemble in the reverse sequence.

4 Breakdown analysis

If you have a breakdown, please contact the Oerlikon Leybold Vacuum service station and/or ask us, to send you the guide: "breakdown analysis".

5 Spare parts

To guarantee safe operation of the Oerlikon Leybold Vacuum vacuum pump, only original spare parts and accessories should be used. When ordering spare parts and accessories, always state pump type and serial number. You can find part numbers in the spare parts list.

Consumables and main spare parts kits for SOGEVAC pumps are usually available on stock at Oerlikon Leybold Vacuum's service centers. The list of these parts is given hereafter and in the spare parts table where the contents of each kit is detailed.

- . Exhaust demisters
- . Oil GS32 (Special oils please refer to the specific notice of the pump or contact Oerlikon Leybold Vacuum).
- . Service kit
- . Set of seals
- . Repair kit

We recommend to use these kits which have been defined to allow an optimal maintenance or repair. Individual spare parts may need longer delivery time.

Return to Oerlikon Leybold Vacuum service station

If the pump has to be returned to Oerlikon Leybold Vacuum service station for repairing, you have to attach the form "Declaration of Contamination of Vacuum Equipment and Components".

The Service of Oerlikon Leybold Vacuum will send it to you on simple request (specimen on the end of this manual).

Oerlikon Leybold Vacuum will return to the sender's address any material received without this declaration.

For the transport, the pump and its components must be packaged in such a way, that it will not be damaged during shipping, and that no harmful substances can escape from the package.

6 Information

We would be happy to supply further information as required:

Available are :

- . Technical description of the SOGEVAC vacuum pumps
- . Technical description of special oil types for vacuum pumps
- . Declaration of Contamination of Vacuum Equipment and Components.

EC Conformance Declaration



We, the Oerlikon Leybold Vacuum France, declare herewith that the products listed below, in the embodiment which we have placed on the market, comply with the applicable EC guidelines.

This declaration becomes invalid if modifications are made to the product without prior consultation with use.

Maintaining the EMC guideline assumes an EMC compliant installation of the component within the plant or machine.

Product type: SOGEVAC

Model designation: SV16, SV25, SV40, SV65, SV10B, SV16B, SV16BI, SV28BI, SV40BI, SV25B, SV40B, SV65B, SV100B, SV100, SV200, SV300, SV300B, SV500, SV630, SV750, SV1200, SV630B, SV750B
and their variants, excepted the pumps delivered without motor and the pumps delivered with EEx... motors

The products comply to the following guidelines :

- EC Directive on machines (98/37/EC)
- EC Low-Voltage Equipment Guidelines (73/23/EEC)+(93/68/EEC)
- EC Directive on Electromagnetic Compatibility (89/336/EEC) / (92/31/EEC) / (93/68/EEC)

Related, harmonized standards:

- EN 1012, 1996
Compressors and vacuum pumps, safety requirements
Part 2: Vacuum pumps
- EN 60204-1, 1997
Safety of machinery - Electrical equipment of machines
Part 1: General requirements

Limits of use:

- The pump and its accessories are not designed for pumping aggressive, flammable, explosive gases or vapors or substances, phyrophoric gases or oxidizing agents.
- The pump and its accessories are not designed for working in aggressive, flammable, or explosive ambiance.
- For pumping oxygen in concentrations greater than atmospheric concentration (>20%) or other highly reactive gases, a special pump must be used. This pump must be modified and an inert oil (such as PFPE) must be used.

Contact Oerlikon Leybold Vacuum France for important safety precautions relative to these applications.

Other safety precautions and restrictions:

Refer to the manual delivered with the pumps. In any case, take adequate safety precautions.

Valence, July 4th 2007

Joseph Schott
Plant Manager

Valence, July 4th 2007

Jean-Luc Abraham
Vane pumps R&D Manager

Oerlikon Leybold Vacuum France
640, rue Aristide Berges – BP107
F-26501 BOURG-LES-VALENCE cédex
Tel.: +33-(0)4.75.82.33.00
Fax: +33-(0)4.75.82.92.69

Declaration of contamination



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: Material description : _____ Catalog number: _____ Serial number: _____ Type of oil (ForeVacuum-Pumps) : _____ | Failure description: _____ Additional parts: _____ Application-Tool: _____ Application- Process: _____ |
|--|---|

| | | | |
|--|--|--|---------------------------------|
| B. Condition of the equipment | No ¹⁾ Yes No ↓ ← → | | |
| 1. Has the equipment been used <input type="checkbox"/> 2. Drained (Product/service fluid) <input type="checkbox"/> 3. All openings sealed airtight <input type="checkbox"/> 4. Purged <input type="checkbox"/> If yes, which cleaning agent _____ and which method of cleaning _____ | | Contamination : toxic <input type="checkbox"/> corrosive <input type="checkbox"/> flammable <input type="checkbox"/> explosive ²⁾ <input type="checkbox"/> radioactive ²⁾ <input type="checkbox"/> microbiological ²⁾ <input type="checkbox"/> other harmful substances <input type="checkbox"/> | No ¹⁾ Yes ↓ → |
| ¹⁾ If answered with "No", go to D. ← | | | ↓ |

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

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

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

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

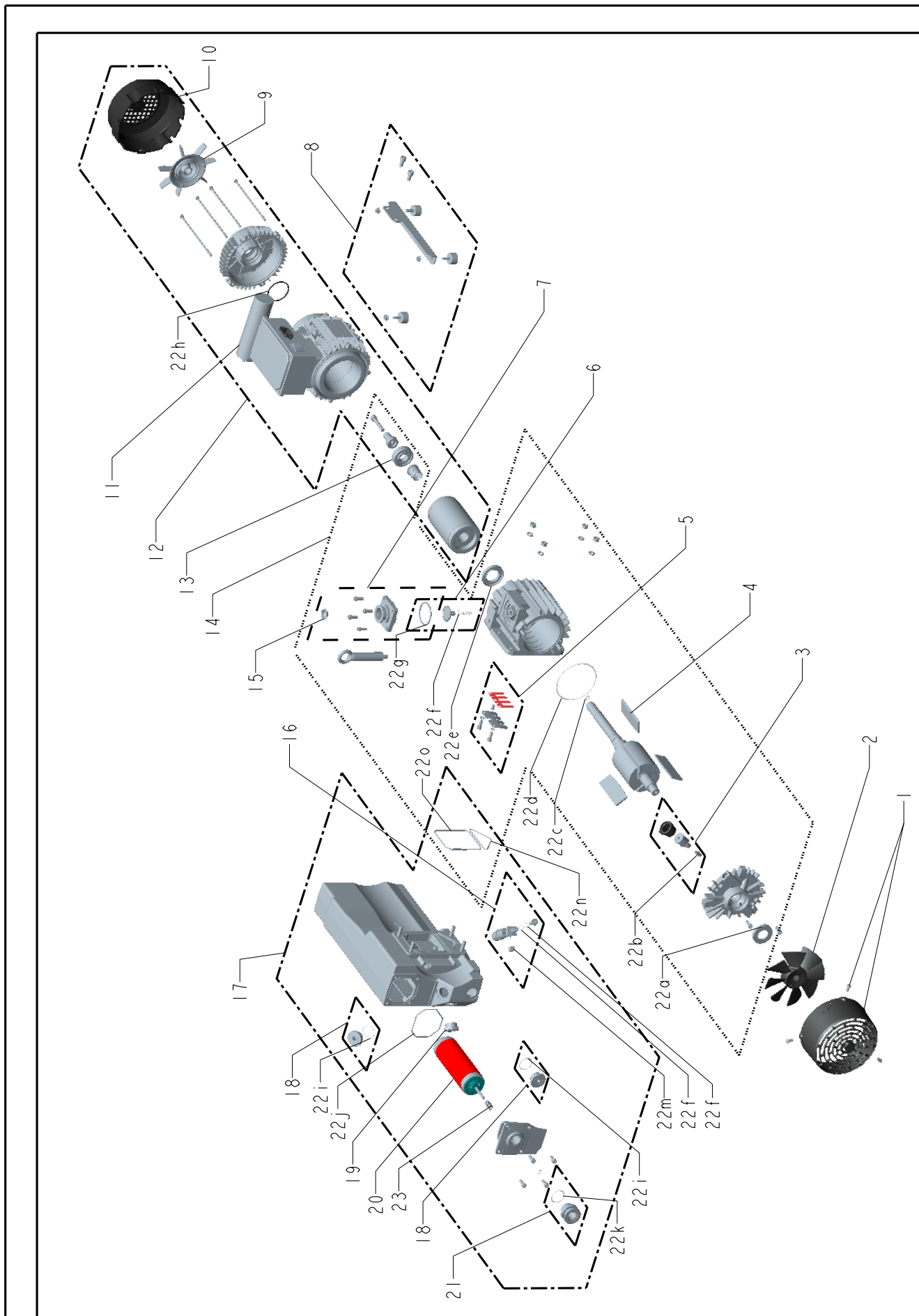
Name of authorized person (block letters) : _____

Date

signature of authorized person

firm stamp

Spare parts list



Spare parts list

| Pos. | Stück. Qty Qté | BENENNUNG | SPECIFICATION | DESIGNATION | Werkstoff Material Matière | Bestell-Nr Ref, No, N° de réf. | Bemerkungen Notes Remarques |
|------|----------------------|-------------------------------|----------------------------|--------------------------------|----------------------------------|--------------------------------------|---|
| 1 | 1 | TURBINENHAUBE | FAN COVER | CAPOT TURBINE ENS. | | 971447860 | |
| 2 | 1 | TURBINE | FAN | TURBINE | | 971447870 | |
| 3 | 1 | GAS BALLAST KIT | GAS BALLAST KIT | KIT LEST AIR | | 971462640 | |
| 4 | 1 | SCHIEBERSATZ 3 STÜCK | SET OF 3 VANES | JEU DE 3 PALETTES | | 971447220 | |
| 5 | 1 | VENTILPLATTE UND ANSCHLAG KIT | VALVE AND VALVE STOP KIT | KIT LAME ET CONTRE LAME | | 971462750 | |
| 6 | 1 | SAUGSTUTZEN KIT | ANTI SUCK BACK KIT | KIT CLAPET ASPIRATION | | 971462600 | Incl. 22f, 22g |
| 7 | 1 | ANSAUGFLANSCH KIT | INTAKE FLANGE KIT | KIT BRIDE ASPI | | 971454300 | Incl. 15, 22g |
| 8 | 1 | GUMMIFUSS KIT | RUBBER FEET KIT | KIT AMORTISSEURS | | 971462650 | |
| 9 | 1 | MOTOR LUEFTER | MOTOR FAN | VENTILATEUR MOTEUR | | 971462760 | |
| 10 | 1 | MOTOR LUEFTERHAUBE | MOTOR FAN COVER | CAPOT MOTEUR | | 971462770 | |
| 11 | 1 | KONDENSATOREN 1 PH 230 V | CAPACITORS 1 PH 230 V | CONDENSATEURS MONO 230 V | | 971462780 | |
| 11 | 1 | KONDENSATOREN 1 PH 115 V | CAPACITORS 1 PH 115 V | CONDENSATEURS MONO 115 V | | 971462790 | |
| 12 | 1 | DREHSTROM MOTOR | THREE PHASE MOTOR | MOTEUR TRI | | 971457650 | |
| 12 | 1 | WECHSELSTROM MOTOR 230 V | SINGLE PHASE MOTOR 230 V | MOTEUR MONO 230V | | 971457670 | |
| 12 | 1 | WECHSELSTROM MOTOR 115 V | SINGLE PHASE MOTOR 115 V | MOTEUR MONO 115V | | 971457680 | |
| 13 | 1 | DREHSTROM MOTOR KUGELLAGER | BEARING THREE PHASE MOTOR | ROULEMENT MOTEUR TRI | | 971464740 | |
| 13 | 1 | WECHSELSTROM MOTOR KUGELLAGER | BEARING SINGLE PHASE MOTOR | ROULEMENT MOTEUR MONO | | 971440330 | |
| 14 | 1 | GENERATOR MODUL DREHSTROM | GENERATOR THREE PHASE | GENERATEUR ENS. TRI | | 971462620 | Incl. 22a,b,c,d,e,f,g,n,o |
| 14 | 1 | GENERATOR MODUL WECHSELSTROM | GENERATOR SINGLE PHASE | GENERATEUR ENS. MONO | | 971462630 | Incl. 22a,b,c,d,e,f,g,n,o |
| 15 | 1 | EINLASS FILTER | INLET FILTER | FILTRE ASPIRATION | | 71413440 | |
| 16 | 1 | SCHWIMMVENTIL | FLOAT VALVE | FLOTTEUR ENS. | | 971462660 | Incl. 22f, 22m |
| 17 | 1 | OELKASTEN 0.5 L | OIL CASING 0.5 L | CARTER 0.5L ENS. | | 971449400 | Incl. 16, 18, 19, 20, 21, 22j, n, o, 23 |
| 17 | 1 | OELKASTEN 1.5 L | OIL CASING 1.5 L | CARTER 1.5L ENS. | | 971454140 | Incl. 16, 18, 19, 20, 21, 22j, n, o, 23 |
| 18 | 1 | STOPFEN G 3/4 | PLUG G 3/4 | BOUCHON G 3/4 | | 71256380 | Incl. 22i |
| 19 | 1 | OELSCHAUGLASS | OIL SIGHT GLASS | VOYANT HUILE | | 71212420 | |
| 20 | 1 | AUSLASSFILTER | EXHAUST FILTER | CARTOUCHE REFOUL. AVEC BY-PASS | | 71416340 | |
| 21 | 1 | AUSLASS 25 KF ANSCHLUSS | EXHAUST 25 KF FITTING | RACCORD 25KF | | 71404530 | Incl. 22k |
| 22 | | DICHTUNGS KIT | KIT OF SEALS | JEU DE JOINTS | FKM | 971462670 | All 22 |
| | | REPARATUR KIT | REPAIR KIT | KIT REPARTION | | 971462690 | Incl. 4, 5, 19, 20, 22, 23 |
| | | WARTUNGS KIT | MAINTENANCE KIT | KIT DE MAINTENANCE | | 971462810 | Incl. 18, 20, 22k, 23 |
| | | SCHRAUBEN KIT | NUTS AND BOLTS KIT | KIT VISSERIE | | 971462800 | |

Sales and Service

Germany

Oerlikon
Leybold Vacuum GmbH
Bonner Strasse 498
D-50968 Cologne
Phone: +49-(0)221-347 1234
Fax: +49-(0)221-347 1245
sales.vacuum@oerlikon.com

Oerlikon
Leybold Vacuum GmbH
Sales Area North/East
Branch Office Berlin
Buschkrugallee 33
1. Obergeschoss
D-12359 Berlin
Phone: +49-(0)30-435 609 0
Fax: +49-(0)30-435 609 10
sales.vacuum.bn@oerlikon.com

Oerlikon
Leybold Vacuum GmbH
Sales Area South/Southwest
Branch Office Munic
Sendlinger Strasse 7
D-80331 Munic
Phone: +49-(0)89-357 33 9-10
Fax: +49-(0)89-357 33 9-33
sales.vacuum.mn@oerlikon.com
service.vacuum.mn
@oerlikon.com

Oerlikon
Leybold Vacuum GmbH
Sales Area West & Benelux
Bonner Strasse 498
D-50968 Cologne
Phone: +49-(0)221-347 1270
Fax: +49-(0)221-347 1291
sales.vacuum.kn@oerlikon.com

Oerlikon
Leybold Vacuum GmbH
Service Competence Center
Emil-Hoffmann-Strasse 43
D-50996 Cologne-Suerth
Phone: +49-(0)221-347 1439
Fax: +49-(0)221-347 1945
service.vacuum.kn@oerlikon.com

Oerlikon
Leybold Vacuum GmbH
Mobil Customer Service
Emil-Hoffmann-Strasse 43
D-50996 Cologne-Suerth
Phone: +49-(0)221-347 1765
Fax: +49-(0)221-347 1944
service.vacuum.kn@oerlikon.com

Oerlikon
Leybold Vacuum GmbH,
Dresden
Zur Wetterwarte 50, Haus 304
D-01109 Dresden
Service:
Phone: +49-(0)351-88 55 00
Fax: +49-(0)351-88 55 041
info.vacuum.dr@oerlikon.com

Oerlikon
Leybold Vacuum USA Inc.
5700 Mellon Road
Export, PA 15632
Phone: +1-724-327-5700
Fax: +1-724-325-3577
info.vacuum.ex@oerlikon.com

Europe

Belgium
Oerlikon
Leybold Vacuum Nederland B.V.
Belgisch bijkantoor
Leuvensesteenweg 542-9A
B-1930 Zaventem
Sales:
Phone: +32-2-711 00 83
Fax: +32-2-720 83 38
sales.vacuum.zv@oerlikon.com
Service:
Phone: +32-2-711 00 82
Fax: +32-2-720 83 38
service.vacuum.zv@oerlikon.com

France
Oerlikon
Leybold Vacuum France S.A.
7, Avenue du Québec
Z.A. Courtaboeuf 1 - B.P. 42
F-91942 Courtaboeuf Cedex
Sales and Service:
Phone: +33-1-69 82 48 00
Fax: +33-1-69 07 57 38
sales.vacuum.or@oerlikon.com

Oerlikon
Leybold Vacuum France S.A.
Valence Factory
640, Rue A. Bergès - B.P. 107
F-26501 Bourg-lès-Valence Cedex
Phone: +33-4-75 82 33 00
Fax: +33-4-75 82 92 69
info.vacuum.vc@oerlikon.com

Great Britain
Oerlikon
Leybold Vacuum UK LTD.
Unit 2
Silverglade Business Park
Leatherhead Road
UK-Chessington, Surrey KT9 2QL
Sales:
Phone: +44-13-7273 7300
Fax: +44-13-7273 7301
sales.vacuum.ln@oerlikon.com
Service:
Phone: +44-20-8971 7030
Fax: +44-20-8971 7003
service.vacuum.ln@oerlikon.com

Italy
Oerlikon
Leybold Vacuum Italia S.p.A.
8, Via Trasimeno
I-20128 Milano
Sales:
Phone: +39-02-27 22 31
Fax: +39-02-27 20 96 41
sales.vacuum.mi@oerlikon.com
Service:
Phone: +39-02-27 22 31
Fax: +39-02-27 22 32 17
service.vacuum.mi@oerlikon.com

Oerlikon
Leybold Vacuum Italia S.p.A.
Field Service Base
Z.I. Le Capanne
I-05021 Acquasparta (TR)
Phone: +39-0744-93 03 93
Fax: +39-0744-94 42 87
service.vacuum.mi@oerlikon.com

Netherlands
Oerlikon
Leybold Vacuum Nederland B.V.
Computerweg 7
NL-3542 DP Utrecht
Sales and Service:
Phone: +31-346-58 39 99
Fax: +31-346-58 39 90
sales.vacuum.ut@oerlikon.com
service.vacuum.ut@oerlikon.com

Spain
Oerlikon
Leybold Vacuum Spain, S.A.
C/ Huelva, 7
E-08940 Cornellà de Llobregat
(Barcelona)
Sales:
Phone: +34-93-666 46 16
Fax: +34-93-666 43 70
sales.vacuum.ba@oerlikon.com
Service:
Phone: +34-93-666 49 51
Fax: +34-93-685 40 10

Sweden
Oerlikon
Leybold Vacuum Scandinavia AB
Box 9084
SE-40092 Göteborg
Sales and Service:
Phone: +46-31-68 84 70
Fax: +46-31-68 39 39
info.vacuum.gt@oerlikon.com
Visiting/delivery address:
Datavägen 57B
SE-43632 Askim

Switzerland
Oerlikon
Leybold Vacuum Schweiz AG
Leutschenbachstrasse 55
CH-8050 Zürich
Sales:
Phone: +41-044-308 40 50
Fax: +41-044-302 43 73
sales.vacuum.zh@oerlikon.com
Service:
Phone: +41-044-308 40 62
Fax: +41-044-308 40 60

America

USA
Oerlikon
Leybold Vacuum USA Inc.
5700 Mellon Road
Export, PA 15632
Phone: +1-724-327-5700
Fax: +1-724-325-3577
info.vacuum.ex@oerlikon.com
Sales:
Eastern & Central time zones
Phone: +1-724-327-5700
Fax: +1-724-733-1217
Pacific, Mountain, Alaskan &
Hawaiian time zones
Phone: +1-480-752-9191
Fax: +1-480-752-9494
Service:
Phone: +1-724-327-5700
Fax: +1-724-733-3799

Oerlikon
Leybold Vacuum GmbH
Bonner Strasse 498
D-50968 Cologne
Phone: +49-(0)221-347 0
Fax: +49-(0)221-347 1250
info.vacuum@oerlikon.com

Asia

P.R. China
Oerlikon
Leybold Vacuum (Tianjin)
International Trade Co., Ltd.
Beichen Economic
Development Area (BEDA),
Shanghai Road
Tianjin 300400
China
Sales and Service:
Phone: +86-22-2697 0808
Fax: +86-22-2697 4061
Fax: +86-22-2697 2017
sales.vacuum.tj@oerlikon.com

Oerlikon
Leybold Vacuum
(Tianjin) Co., Ltd.
Beichen Economic
Development Area (BEDA),
Shanghai Road
Tianjin 300400
China
Sales and Service:
Phone: +86-22-2697 0808
Fax: +86-22-2697 4061
Fax: +86-22-2697 2017
info.vacuum.tj@oerlikon.com

Oerlikon
Leybold Vacuum (Tianjin)
International Trade Co., Ltd.
Shanghai Branch:
Add: No. 33
76 Futedong San Rd.
Waigaoqiao FTZ
Shanghai 200131
China
Sales and Service:
Phone: +86-21-5064-4666
Fax: +86-21-5064-4668
info.vacuum.sh@oerlikon.com

Oerlikon
Leybold Vacuum (Tianjin)
International Trade Co., Ltd.
Guangzhou Office and
Service Center
1st F, Main Building,
Science City Plaza,
No.111 Science Revenue,
Guangzhou Science City
(GZSC) 510663, Guangzhou,
China
Sales:
Phone: +86-20-22323980
Fax: +86-20-22323990
info.vacuum.gz@oerlikon.com

Oerlikon
Leybold Vacuum (Tianjin)
International Trade Co., Ltd.
Beijing Branch:
1-908, Beijing Landmark Towers
8 North Dongsanhuan Road
Chaoyang District
Beijing 100004
China
Sales:
Phone: +86-10-6590-7622
Fax: +86-10-6590-7607

India
Oerlikon
Leybold Vacuum India Pvt Ltd.
EL-22, J Block
MIDC Bhosari
Pune 411026
India
Sales:
Phone: +91-20-3061 60000
Fax: +91-20-2712 1571
sales.vacuum.pu@oerlikon.com

Japan
Oerlikon
Leybold Vacuum
Japan Co., Ltd.
Head Office
Tobu A.K. Bldg. 4th Floor
23-3, Shin-Yokohama
3-chome
Kohoku-ku, Yokohama-shi
Kanagawa-ken 222-0033
Sales:
Phone: +81-45-471-3330
Fax: +81-45-471-3323

Oerlikon
Leybold Vacuum
Japan Co., Ltd.
Osaka Sales Office
5-13, Kawagishi-cho
Suita-chi
Osaka-fu
Phone: +81-6-4860-2212
Fax: +81-45-471-3323

Oerlikon
Leybold Vacuum
Japan Co., Ltd.
Tsukuba Technical S.C.
Tsukuba Minami Daiichi
Kogyo Danchi
21, Kasumi-no-Sato,
Ami-machi, Inashiki-gun
Ibaraki-ken, 300-0315
Service:
Phone: +81-29-889-2841
Fax: +81-29-889-2838

Korea
Oerlikon
Leybold Vacuum Korea Ltd.
#761-4, Yulkeum-ri
SungHwan-eup, Cheonan-City
Choongchung-Namdo
330-807 Korea
Sales:
Phone: +82-41-580-4420
Fax: +82-41-588-3737
Service:
Phone: +82-41-580-4415
Fax: +82-41-588-3737

Singapore
Oerlikon
Leybold Vacuum
Singapore Pte Ltd.
1 Science Park Road
Singapore Science Park 2
#02-12 Capricorn Building
Singapore 117528
Sales and Service:
Phone: +65-6303 7000
Fax: +65-67730 039
info.vacuum.sg@oerlikon.com

Taiwan
Oerlikon
Leybold Vacuum Taiwan Ltd.
No 416-1, Sec. 3
Chung-Hsin Rd., Chu-Tung
Hsin-Chu, Taiwan, R.O.C.
Sales and Service:
Phone: +886-3-500 1688
Fax: +886-3-583 3999
sales.vacuum.hc@oerlikon.com

oerlikon
leybold vacuum

www.oerlikon.com

Oerlikon Leybold Vacuum GmbH
Bonner Strasse 498
D-50968 Cologne
Phone : +49 221 347 0
Fax : +49 221 347 1250
E-mail : info@oerlikon.com
www.oerlikon.com

Oerlikon Leybold Vacuum France
640, rue. A. Bergès - B.P. 107
F-26501 Bourg-lès-Valence
Phone : +33 (0)4 75 82 33 00
Fax : +33 (0) 4 75 82 92 69
E-mail : marketing.vacuum.vc@oerlikon.com