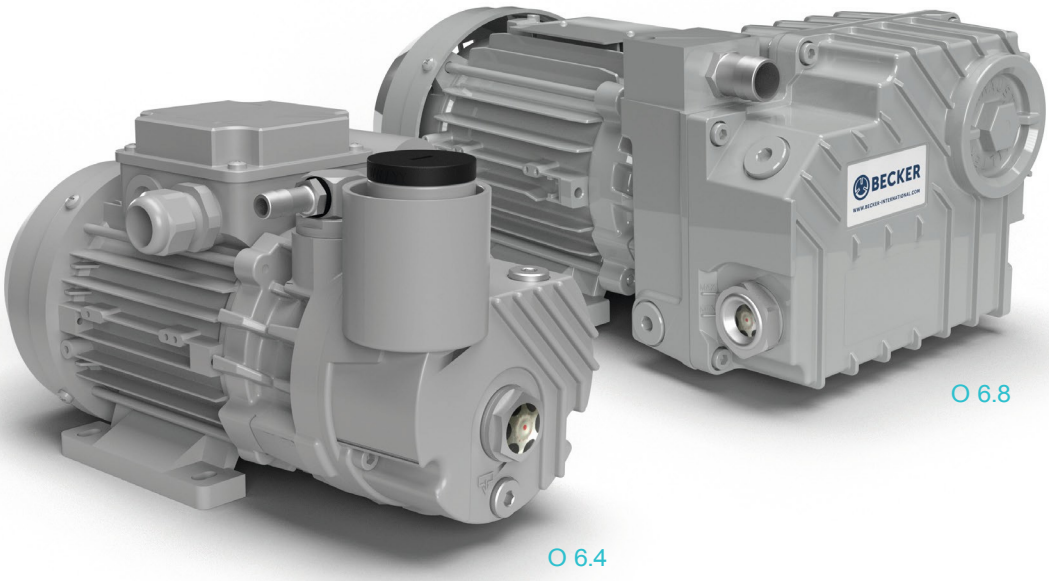
en TRANSLATION OF THE OPERATING INSTRUCTIONS

O 6.4 / O 6.8

ROTARY VANE VACUUM PUMP

oil-lubricated

MAKE IT BECKER.



O 6.8

O 6.4

BECKER

Important information for the user of the operating instructions

We reserve the right to make technical changes and additions to the operating instructions.

No liability is assumed for the content, in particular for damage caused by existing, non-existent or incorrect information.

The distribution of these operating instructions is not permitted unless expressly authorised.

Operating instructions valid for:

General designation	Rotary vane vacuum pump, hereinafter referred to as "*pump*"
Product type	oil-lubricated
Model	O 6.4 + O 6.8
Manufacturer	**Gebr. Becker GmbH** Hölker Feld 29-31 42279 Wuppertal

CONTENTS

1 TO THE OPERATING INSTRUCTIONS

1.1 GENERAL

These operating instructions are an integral part of the pump and contain the necessary information and important instructions for operating the pump safely and properly. Observing them will help:

- Avoid dangers
- Reduce repair costs and downtime
- increase the reliability and service life of the product

It is the responsibility of the operator to ensure the availability of this document. This applies in particular if the document is lost.

All persons working on the pump must have read and understood the operating manual and these operating instructions.

Pay particular attention to chap. 2 "Basic safety instructions".

1.2 STRUCTURE OF THE SAFETY INSTRUCTIONS

Safety instructions are identified by a pictogram and a signal word. The following signal words are used to indicate dangers, prohibitions and important information:

DANGER

This signal word indicates an imminent danger that could result in serious injury or even death.

WARNING

This signal word indicates a potentially imminent danger that could result in serious injury or even death.

CAUTION

This signal word indicates a potentially imminent danger that could result in minor or serious injuries.

Attention

This signal word indicates a potentially imminent danger that could result in material damage.

NOTE

This symbol indicates tips, recommendations and further information.

1.3 SAFETY SYMBOLS

The following **warning signs** are used in these operating instructions:

	General warning sign
	Warning of hot surface
	Warning of electrical voltage
	Warning of automatic start-up
	Fire hazard
	Risk of slipping
	Tripping hazard

Table 1.1: Warning signs

The following **symbols for hazardous substances** are used in these operating instructions:

	Caution, dangerous for the environment

Table 1.2: Hazardous substances

The following **mandatory symbols** are used in these operating instructions:

	Use hearing protection
	Use foot protection
	Use hand protection

Table 1.3: Command signs

1.4 ADDITIONAL DOCUMENTATION

In addition to these operating instructions, the following documents and instructions must be observed:

- Safety symbols according to chapter 1.3 on the pump and on hazardous material containers
- Regulations on accident prevention, occupational safety and environmental protection
- Operating instructions and documentation for components, assemblies and tools provided by third-party manufacturers
- Spare parts lists and data sheets

1.5 WARRANTY AND LIABILITY

Warranty and liability claims for personal injury or damage to property are invalid if

- Failure to observe the instructions for transport and installation;
- improper use (misuse) or improper operation;
- Failure to observe the operating instructions and the instructions contained therein;
- improper or non-executed maintenance and servicing work;
- incorrect installation, commissioning, maintenance, servicing and cleaning;
- Use of unauthorised operating materials, lubricants or spare parts;
- defective, incorrectly installed or dismantled protective devices;
- inadequate monitoring of pump parts subject to wear;
- Use of externally procured equipment that has not been approved by the manufacturer;
- improper disassembly;

1.6 MODIFICATIONS AND CONVERSIONS

Modifications or conversions are prohibited without written authorisation from the manufacturer and are therefore excluded.

 Description of the safety instructions ➔ Chapter 2.9

2 BASIC SAFETY INSTRUCTIONS

These operating instructions serve as a basis for the safe use and operation of the pump. The operating instructions, in particular the safety instructions and the rules and regulations applicable to the place of use, must be observed by all persons working on or with the pump.

Furthermore, the generally applicable legal and other rules and regulations for accident prevention (e.g. personal protective equipment) and environmental protection must be observed.

NOTE

Some activities on the pump require compliance with special safety regulations. These safety regulations can be found in the respective chapters of these operating instructions.

NOTE

The operating instructions must always be kept at the place of use and be freely accessible to all persons working with the pump.

The instructions of the occupational safety specialist and the instructions from the briefings must be followed at all times.

The pump is only intended for the intended use described in chapter 2.6. Use of the pump outside the

intended use is prohibited.

All work on the pump may only be carried out by qualified and trained personnel (see chapter 2.4 "Personnel qualifications").

The safety instructions given in chapter 2.9 must be observed for all work on the pump.

2.1 PREPARATION

The pump is a machine in the sense of the Machinery Directive 2006/42/EC Art 2a. The pump conforms to the health and safety requirements of the Machinery Directive 2006/42/EC.

The pump may only be used once the operator has determined that the pump is installed in accordance with the state of the art.

This is fulfilled if, among other things, the operating conditions listed in these operating instructions in accordance with Directive 2006/42/EC Annex 1 Para. 1.7.4.2.i have been fully implemented.

2.2 OBLIGATIONS OF THE OPERATOR

The operator undertakes to only allow persons to work on the pump who

- are familiar with the basic occupational safety and accident prevention regulations;
- were instructed for the activities on the pump;
- have read and understood these operating instructions before carrying out any work on the pump;
- have reached the legal minimum age;
- are fit for use;
- are rested and not under the influence of drugs or medication;
- reliably fulfil the work assigned.

In addition, the operator must train staff at regular intervals and inform them about the hazards.

The personnel of the operating company must be permanently committed to safe working practices and informed about the dangers and risks of the pump. This applies in particular to the safety instructions.

The operator must provide the personnel with the necessary protective equipment.

2.3 OBLIGATIONS OF THE STAFF

All persons who are commissioned to work on the pump are obliged, before starting work, to

- to observe the basic regulations on occupational safety and accident prevention and
- to read and observe these operating instructions.

NOTE

Only persons who have read and understood these operating instructions may carry out work on and with the pump!

2.4 QUALIFICATION STAFF

Certain activities require the personnel carrying out the work to have certain qualifications. The following table summarises these qualifications:

Activity	Persons	
	Instructed operating personnel	Instructed persons with specialised training
Commissioning		x
Operation	x	
Service & Maintenance		x
Dismantling		x
Symbol "x" authorised personnel		

Table 2.4: Minimum qualification of personnel

2.5 INTENDED USE

The operational safety of the pump is only guaranteed if it is used as intended. Intended use also includes observing the operating instructions for this product and any components, as well as carrying out all maintenance and service work.

The pump may only be used in accordance with the machine description and the technical data.

The intended use is summarised below:

- The pump evacuates air up to a vacuum in accordance with chapter 9.2 (operating parameters).
- Conveying any other gases, in particular hazardous substances, is not permitted and prohibited.
- The permissible technical parameters according to the product data sheet (chapter 9.2) must be observed.
- The pump must not be operated in potentially explosive atmospheres.
- The pump must be protected from the weather.
- The manufacturer must be consulted for any operation outside the technical parameters specified in the product data sheet.

Attention

Only use the pump for its intended purpose and in a technically safe condition! This is the only way to ensure the operational safety of the pump!

2.6 UNAUTHORISED USE

- the evacuation of hazardous substances, in particular flammable, explosive or toxic gases
- use in potentially explosive environments (explosive gas/vapour/mist/air mixtures or dust/air mixtures or hybrid mixtures of air and flammable substances)
- Use of the pump in non-commercial applications
- operating the pump when it is not fully assembled
- operation with back pressures on the outlet side above the permissible parameters according to the product data sheet (chapter 9.2)

2.7 PROTECTIVE MEASURES FOR USERS

Personal protective equipment must be worn when working on the pump in order to minimise health hazards.

The protective equipment required for the respective work must always be worn during work.

Instructions on personal protective equipment displayed in the work area must be followed.

WARNING

Risk of injury to hands due to crushing, cutting and high temperatures

Hand protection in accordance with the glove plan must be worn during all work on the pump.

WARNING

Risk of injury to feet from crushing and falling objects

Foot protection must be worn during all work on the pump.

WARNING

Hearing damage due to high volume

Hearing protection must be worn during activities that must be carried out while the pump is running.

The hand protection must be provided by the operator and must be suitable for the activities to be carried out and comply with the applicable standards (e.g. EN 388:201903).

The foot protection must be provided by the operator and must be suitable for the activities to be carried out and comply with the applicable standards (e.g. DIN EN ISO 20345:202006).

Hearing protection must be provided by the operator and must be suitable for the noise levels generated and comply with the applicable standards (e.g. DIN EN 3527:200304).

2.8 INFORMATION ON RESIDUAL RISKS

The pump is built in accordance with the current state of the art and recognised safety regulations. When using the pump, health hazards for persons working directly with the pump and third parties cannot be ruled out.

2.9 SAFETY INSTRUCTIONS

The dangers and risks in the respective life phases of the pump are described below. The following hazard warnings must be observed.

DANGER

Danger to life due to electric shock

Personnel qualification

Work and tasks on the electrical system may only be carried out by qualified electricians who can provide evidence of successfully completed and recognised training in the relevant specialist area and who have been instructed in the special technical features of the pump.

The performance of electrical work, including the simplest auxiliary activities, is prohibited without exception for persons who do not fulfil the above conditions.

To carry out tasks and activities on the electrical system of the pump, work must be carried out in accordance with the five safety regulations as per DIN VDE 0105.

DANGER

Danger to life due to electric shock

Measures in the event of damage to the electrical installation

Damage to the electrical installation and contact with live parts can be life-threatening.

The following measures are therefore mandatory:

- In the event of damage to the electrical installation, switch off the pump immediately and inform the responsible organisation.
- Repairs must be carried out by a qualified electrician.

DANGER

Danger to life due to unexpected start-up Countermeasures

The following steps must be followed when preparing for servicing and maintenance work:

1. Switch off the pump and all attached assemblies.
2. Disconnect the pump from the supply voltage and proceed in accordance with the five safety rules (VDE105).
3. Disconnect the pump from the air supply.

DANGER

Fire and danger to life due to insufficient distance to neighbouring parts

If the pump is enclosed, minimum distances to the product must be maintained to prevent potential fires.

Information on minimum distances can be found in chapter 6 "Installation and commissioning".

DANGER

Danger to life due to arcing and creepage distance when disconnecting plug connections

Always switch off the power supply before disconnecting plug connections.

DANGER

Danger to life due to defective, dismantled and manipulated protective devices

The pump may only be operated if all safety and protective devices are in place and fully functional!

Faulty safety and protective equipment can lead to dangerous situations! For this reason:

1. Switch off the pump immediately,
2. Secure against restarting and
3. Disconnect from air supply and electrical power!

WARNING

Risk of injury! Risk of crushing in the hand and arm area due to product assembly

If assembly work is carried out, the employee must be trained in the use of lifting equipment and have provided proof of this. Use suitable protective equipment!

WARNING

Risk of injury due to incorrect lifting conditions

If assembly work is carried out, the employee must be trained in the use of lifting equipment and have provided proof of this.

The pump may only be lifted in accordance with the specifications (see chapter 5 "Transport").

WARNING

Stopping the pump when the operating parameters are exited

Safe operation of the pump can no longer be guaranteed outside the permitted operating parameters. The limits of the permissible operating parameters are shown in chapter 9.2.

WARNING

Safety risk due to spare parts not approved by the manufacturer

Becker spare parts have been checked by us for their technical requirements and safety. Non-approved spare parts can pose a risk to people and pumps.

WARNING

Danger from hot components and equipment

Media and pump parts can reach high temperatures during operation. Before intervening manually in the pump, it is therefore necessary to wait until it has cooled down before working safely with protective gloves to avoid burns and scalding.

WARNING

Risk of injury due to stored residual energy

The occurrence of residual mechanical, pneumatic and electrical energy on the pump after actuating the operating element for stopping in an emergency or after switching off the pump must be taken into account!

WARNING

Risk of injury due to slipping, tripping and falling

The operator of the pump is responsible for traffic safety. If operating fluids leak from the pump, the areas must be cordoned off and labelled accordingly and suitable measures must be taken.

WARNING

Environmental hazards due to hazardous substances

The operating materials (especially oils) must not be disposed of in the environment. Disposal must comply with the requirements for the disposal of hazardous substances and the Waste Oil Ordinance (AltölV).

CAUTION

Contamination and damage to the environment due to operating materials

The operating fluids used for the proper functioning of the pump and water contaminated with these operating fluids can pose a risk to the environment.

Suitable absorbents must always be kept ready to ensure the rapid absorption of leaked operating materials and contaminated water.

Used absorbents must always be disposed of in accordance with the prescribed procedures.

All environmental protection regulations must always be observed when handling and disposing of operating materials.

Operating materials and contaminated water must be disposed of in accordance with local environmental protection regulations.

NOTE

Wear safety shoes

Foot protection must be worn during all work on the pump.

NOTE

Wear protective gloves

The pump must be allowed to cool down until it is safe to carry out work with protective gloves.

If this time cannot be guaranteed, protective gloves with adequate heat protection must be used. The exact model can be found in the operator's glove plan.

NOTE

Wear chemical protective gloves

Caution: Risk of scalding from hot oil!

2.10 BEHAVIOUR IN THE EVENT OF DANGER AND ACCIDENTS

The protective measures to be taken and the responsibility for drawing up an occupational safety concept lie with the operator of the workplace.

The operator must ensure safe use through the "Operating conditions" described in chapter 3.

2.11 REQUIREMENTS FOR STABILITY

The pump must be installed horizontally on a level surface.

If the pump is installed on an inclined plane, oil circulation can no longer be guaranteed. This leads to damage to the pump.

2.12 OCCUPATIONAL PROTECTION

The pump has been set up in accordance with the Machinery Directive 2006/42/EC and the relevant health and safety and accident prevention regulations. Before starting repair work, the pump must be de-energised and depressurised to prevent accidents. Previously removed protective devices must be refitted before commissioning.

2.13 AIRBORNE NOISE EMISSIONS

According to Directive 2006/42/EC, information on the airborne noise emission of the pump must be provided. Detailed information can be found in the Machinery Directive under point 1.7.4.2.

Relevant information on the pump can be found in chapter 9.2 "Operating parameters".

2.14 ERGONOMICS

With regard to maintenance and servicing, special behaviour with regard to ergonomics must be taken into account in accordance with Directive 2006/42/EC Annex i 1.1.6 "Ergonomics".

3 OPERATING CONDITIONS

The CE conformity of the product only becomes legally valid when all product safety requirements of the "operating conditions" formulated in this chapter within the meaning of Directive 2006/42/EC Annex I 1.7.4.2.i have been fully realised by the operator. Only in this case is CE conformity valid and the pump may be operated.

Operating condition 1: Safety instructions for maintenance work

1. **Standalone products - not implemented in a control system**

   Shutting down the pump for maintenance

   In the event of maintenance, work must be carried out with the protective devices removed. This work may only be carried out when the pump is at a standstill. To ensure the safe shutdown of the pump, the pump must be disconnected from the power supply and the five safety rules in accordance with DIN VDE 0105 must be observed.

2. **Implemented products - product is controlled via the operator's control system**

   If the pump is implemented in a control system by the operator, the following conditions apply for the "Maintenance" operating mode:

   - The drive must be de-energised
   - Or, in the case of a shutdown stored in the control system, meet the requirements of DIN EN 61800- 1:2018-11.

Operating condition 2: Ventilation of the operating room

The operator must ensure that the operating room of the pump is sufficiently ventilated.

Operating condition 3: Authorised equipment

The approved equipment is listed in chapter 9.3.

Operating condition 4: Electrical protection of the motor

The motor must be protected in accordance with the state of the art. As a minimum, it must be protected by a suitable protective device in accordance with DIN EN 60204-1.

The maximum permissible operating temperature may be exceeded due to a failure of the motor ventilation, soiling or other environmental influences.

Operating condition 5: Ensuring cooling

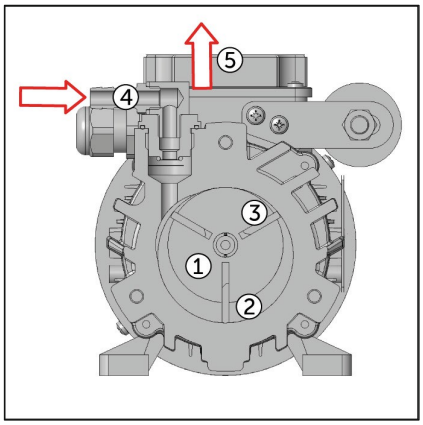
The unobstructed cooling air inlet on the intake side and the unobstructed cooling air outlet on the exhaust air side must be guaranteed.

4 PUMP DESCRIPTION

This chapter explains the assemblies and components of the pump and how they work.

The following information is intended to help you understand the operation of the pump. This information can help to avoid dangers and errors due to incorrect operation.

4.1 GENERAL DESCRIPTION OF THE PUMP



The pump is a classic oil-lubricated rotary vane vacuum pump.

It consists of a housing, the eccentrically installed rotor (1), the radially moving vanes (3) and the inlet and outlet (4+5).

When the rotor turns, gas flows into the expanding chamber (2) until it is shut off by the next slide valve. The trapped gas is then compressed until the outlet valve opens against atmospheric pressure. The vacuum generated draws oil into the scoop chamber, which lubricates and seals the vanes. The oil required for compression is then separated again via the air/oil separator.

4.2 BUILDING SIZES

Several pumps of different sizes are listed in these operating instructions, as they

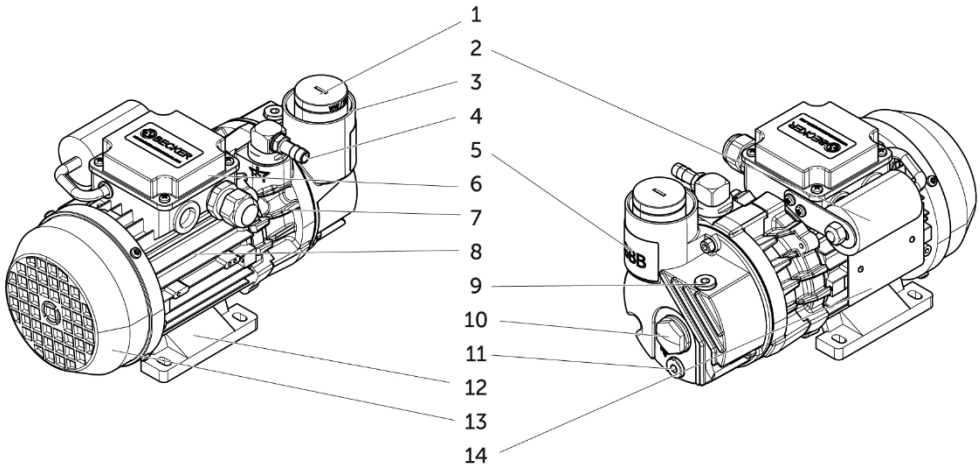
- work according to the same active principle,
- have the same intended use,
- are subject to the same legal and standardisation requirements,
- have a similar design,
- have similar physical characteristics,
- and are also very similar in terms of maintenance, service and commissioning.

Sizes	O 6.4
	O 6.8

Table 4.2: Sizes

4.3 COMPONENTS

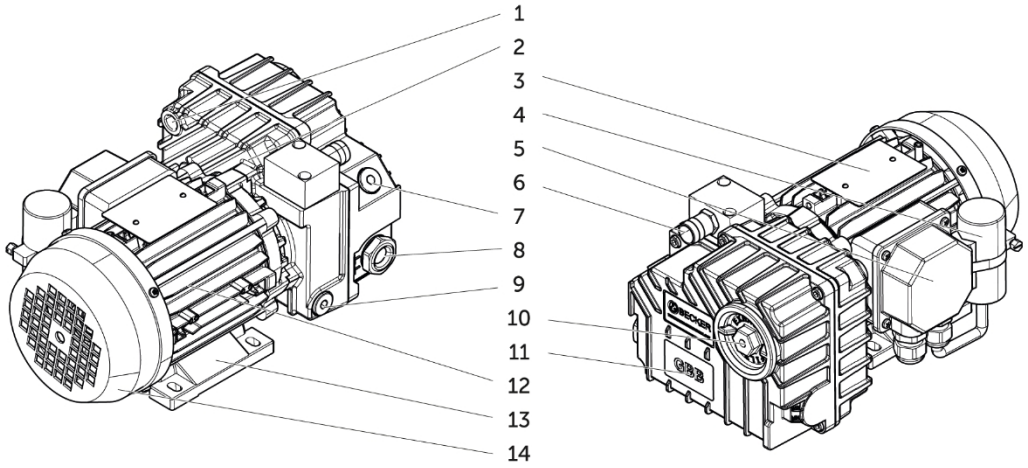
4.3.1 SIZE O 6.4



Position	Component	Function
1	Air/oil separator	Oil separation
2	Capacitor	Charge storage
3	Side cover/exhaust air socket	Air outlet
4	Connection piece with hose nozzle	Vacuum connection
5	Device rating plate	Conformity mark and technical data - Pump
6	Terminal box	Electrical connection
7	Pump unit	Vacuum generation The pump unit includes pump housing, piston and slider
8	Engine	Drive
9	Screw plug	Oil filler plug
10	Oil sight glass	Oil level indicator
11	Screw plug	Oil drain plug
12	Device base	Stable installation and fastening of the pump
13	Fan cowl	Motor fan guard
14	Motor rating plate	Conformity markings and technical data - Motor

Table 4.3.1: Components - Size O 6.4

4.3.2 SIZE O 6.8



Position	Component	Function
1	Exhaust air connection	Air outlet
2	Pump unit	Generation of the vacuum The pump unit includes pump housing, piston and slider
3	Motor rating plate	Conformity mark and technical data - Motor
4	Capacitor	Charge storage
5	Terminal	boxElectrical connection
6	Connection piece with hose nozzle	Vacuum connection
7	Screw plug	Oil filler plug
8	Oil sight glass	Oil level indicator
9	Screw plug	Oil drain plug
10	Maintenance cover	Closure for air/oil separator
11	Device rating plate	Conformity mark and technical data - Pump
12	Engine	Drive
13	Device base	Stable installation and fastening of the pump
14	Fan cowl	Motor fan guard

Table 4.3.2: Components - Size O 6.8

4.4 MOTORS

The characteristics of the motor used can be found on the motor rating plate.

4.5 SAFETY AND PROTECTIVE DEVICES

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

Description of the safety instructions ➔ Chapter 2.9

The pump's protective devices must not be dismantled, modified or put out of operation. The pump must be shut down and secured immediately if protective devices are removed, modified or taken out of operation.

Defects in protective devices must be rectified immediately. All protective devices must be undamaged, fully installed and functional. Warning and information signs must be clearly visible.

All protective devices must be checked for functionality, damage and completeness after each maintenance of the pump.

If maintenance work requires the dismantling of protective devices, these may only be dismantled for the duration of the maintenance work. All protective devices must be removed immediately after completion of the maintenance work.

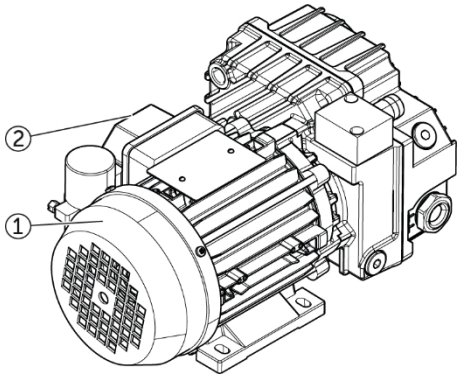
The safety devices must be fully installed at the intended location and checked for proper functioning.

The prescribed inspection intervals for protective devices must be observed and complied with. Protective devices may only be maintained, replaced and serviced by trained, instructed and authorised specialist personnel.

Unauthorised tampering with or manipulation of the safety-related parts of the pump is strictly prohibited and must be reported immediately to the responsible department.

All safety and accident prevention equipment, such as warning and information signs, covers, protective panelling, etc., must be in place. The removal or modification of these devices is prohibited. Damaged equipment must be repaired immediately.

An overview of the pump with the designations of the protective devices is shown below.



Position	Safety and protective equipment	Place
1	Fan cover of the motor	Front side of the motor
2	Terminal box cover	Front of the motor terminal box

Table 4.5: Safety and protective devices

4.6 TESTING THE SAFETY AND PROTECTIVE DEVICES

NOTE
All safety and protective equipment must be checked regularly.

The condition and function of safety and protective equipment must be checked if:

- modifications and repairs have been carried out on the pump
- Damage has occurred to the pump
- service and maintenance intervals are to be carried out

4.7 OPERATING MATERIALS AND CHEMICALS

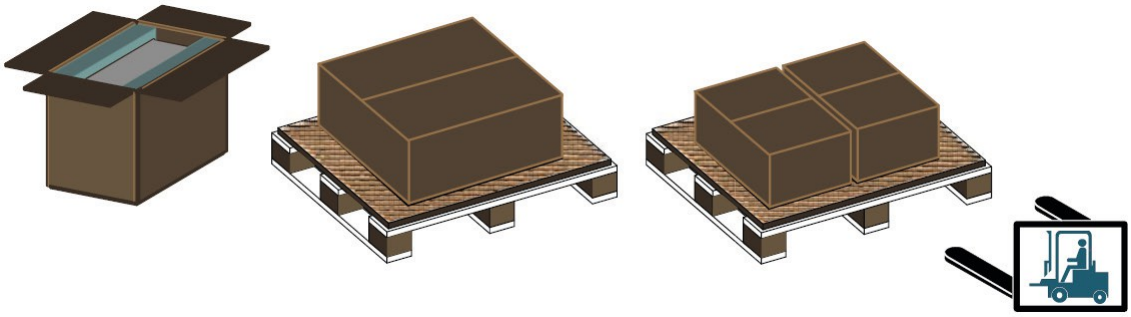
CAUTION
Contamination and damage to the environment by operating materials Description of the safety instructions ➔ Chapter 2.9

5 TRANSPORT

WARNING
Risk of injury due to incorrect lifting conditions

NOTE
Wear suitable PPE

Detailed description of the safety instructions ➔ Chapter 2.9



The pump can be lifted and moved with forklift trucks or with lifting equipment (ropes, hooks, etc.) corresponding to its weight as indicated in the table of operating parameters (see chapter 9.2). Handling and movement by hand are only permitted in compliance with the relevant local regulations.

6 INSTALLATION AND COMMISSIONING

DANGER
Fire and danger to life due to insufficient distance to neighbouring parts

NOTE
Wear suitable PPE

Detailed description of the safety instructions ➔ Chapter 2.9

6.1 GENERAL REQUIREMENTS

We recommend setting up the pump so that maintenance work can be carried out easily.

The following points must be observed when installing components and assemblies in order to avoid injury and damage to the pump:

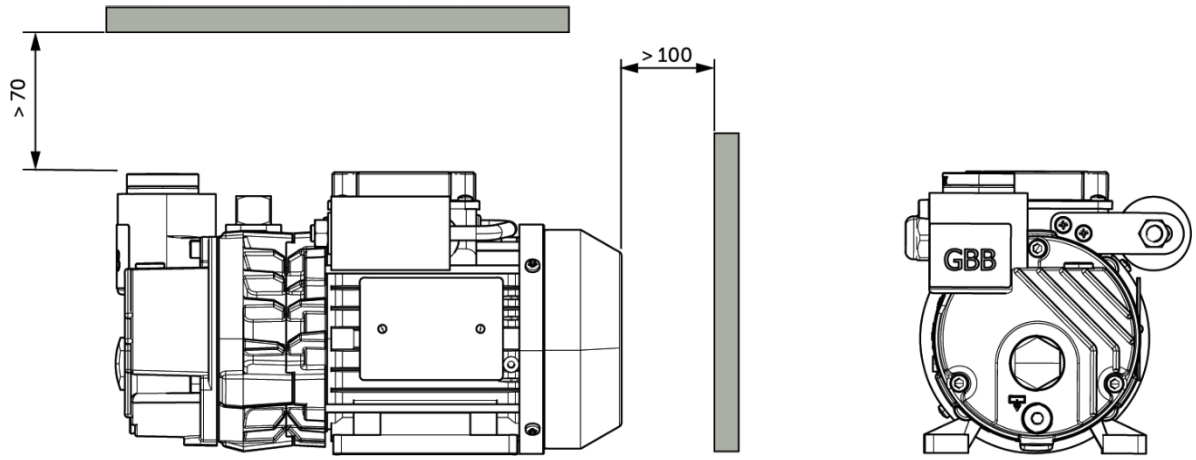
- Components from third-party manufacturers may only be installed if they have been approved by the manufacturer and comply with the directives and laws applicable in the country of use.
- Loose and non-pump parts must be removed from the pump environment after installation.
- Protruding parts (pipes, cables, etc.) must be properly installed, laid and labelled.
- Contact points of components must be clean and intact.
- Do not install the pump in an area where dust or other substances could quickly clog or cover the cooling surfaces.

Attention

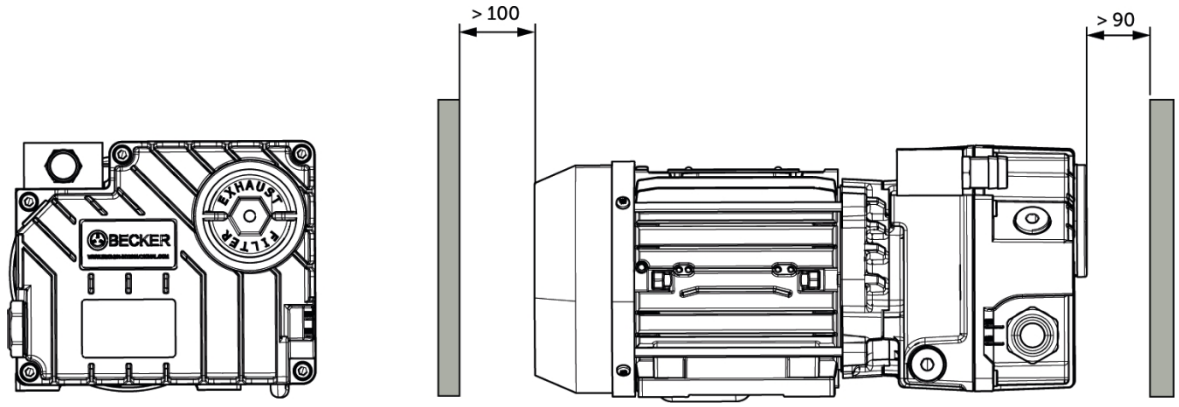
Safe operation of the pump can no longer be guaranteed outside the permitted operating parameters (for permitted operating parameters, see chapter 9.2).

6.1.1 DISTANCES

The minimum distances between the pump and all neighbouring parts must be observed. Failure to observe the minimum distances can lead to a fire risk due to the high level of heat emitted.



Distances - O 6.4



Distances - O 6.8

NOTE

FASTENING TO THE SUBSTRATE

The pump is provided with fixing points; it must be placed on a completely horizontal surface to prevent it from tipping over during transport.

6.2 PREPARATORY ACTIVITIES

6.2.1 FILL OIL

Attention

The **pump is supplied without oil**. Oil must first be filled in before commissioning.

An oil quantity greater than that required can cause the oil separator to become blocked and damage the pump or electric motor. Operation without lubricating oil will cause serious damage to the pump.

NOTE

Notes on oil types and filling quantities ➔ Chapter 9.3

1. Unscrew the oil filler plug on the oil tank
2. Fill with oil until the level reaches half of the oil sight glass
3. Close the oil filler plug again
4. Remove any drops of oil from the pump and/or the floor

6.2.2 CONNECTING THE MEDIA LINES

When installing media lines that have a high temperature, it must be ensured that they are covered, insulated and labelled accordingly in order to prevent injuries and pump damage.

Remove the sealing plug

The suction connection is protected against the ingress of dirt and foreign bodies during transport with a sealing plug. This must be removed before commissioning.

Dimensioning of the suction/drain line

The connection to the user system (both suction and discharge) must be made using pipes with a diameter equal to or larger than the pump's suction opening. The weight of the pipes and any expansions must not bear on the pump.

It is recommended that the last connection to the pump is made using hoses or flexible connectors. It is important that all pipes and the various couplings are tight. Very long lines or lines with too small a diameter reduce the performance of the pump.

There is a hose nozzle on the connection piece. Cables with a diameter at least corresponding to the nominal connection diameter of the hose connector must be used in accordance with the following table.

Connection sizes	
O 6.4	O 6.8
Ø 9 mm	Ø 17 mm

Exhaust air

Low residual quantities of oil in the exhaust air.

Ensure adequate ventilation of the rooms to minimise a possible health risk to people.

- With the O 6.8, the exhaust air can be discharged via a connected exhaust air pipe (connection ¼"). The discharge by means of a flexible hose or fixed pipe must be installed in such a way that no mechanical stress is placed on the pump.
- It must be ensured that the exhaust air can flow out without major back pressure (see chapter 2.6).
- At high exhaust air temperatures, the exhaust air duct must be designed in such a way that it does not pose any danger.

Optional pre-filter

Attention

Penetration of foreign bodies or liquids

Depending on the application and the associated air quality, an ultra-fine or coarse filter must be installed upstream of the pump.

6.3 ELECTRICAL INSTALLATION

DANGER
Danger to life due to electric shock - **Personnel qualification**

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

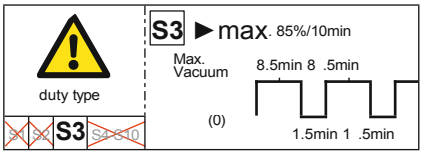
DANGER
Danger to life due to unexpected start-up

Description of the safety instructions ➔ Chapter 2.9

The electrical installation of the pump must comply with the requirements of Directive 2006/42/EC and EN 60204:2019.

The following points in particular must be observed when installing the pump:

- The permissible connection types of the motor can be found on the motor rating plate.
- The pump must be protected by overload protection. Operation without appropriate protection is prohibited.
- The pump may be operated with a maximum of 60 start/stop cycles per hour.
- The pump supply line must meet the minimum requirements of the state of the art

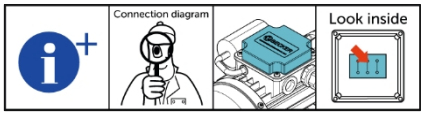


Operating mode S3

For oil return, operating mode **S3** (with periodic intermittent operation) must be maintained in accordance with the interval shown opposite.

The following requirements must be met for integration into the control system:

- The pump must not restart automatically after an unintentional voltage drop. The measures against unexpected start-up in accordance with DIN EN ISO 14118:201807 must be implemented. This also applies after a shutdown following an emergency stop.



Connecting the motor

The motor must be connected in accordance with the wiring diagram (see terminal box cover).

6.4 SWITCH ON PUMP

The pump is switched on via switching elements in the application. After switching on, the pump switches directly to normal operating mode. There are no subordinate operating modes for set-up, maintenance or troubleshooting.

The pump may only be switched on when it has been set up properly, the electrical installation has been installed correctly and the media lines have been connected.

After starting, the pump may run at a lower speed than usual if the ambient temperature is lower than that specified in the technical data table, if the oil is contaminated or if the power supply is lower than that specified on the motor plate.

If the speed does not reach the nominal value within a few seconds, the load protection system must intervene to protect the pump.

6.5 NORMAL OPERATION

In normal operation, the pump operates fully automatically within its physical limits, in accordance with the customer's control system.

6.6 SWITCH OFF PUMP

1. **Shutdown**

   To switch off, the pump must be shut down from the application and secured against being switched on again. In addition, a warning sign must be attached to the mains disconnection device.

   All electrical equipment must be disconnected individually. Maintenance during operation or when the pump is switched on is strictly prohibited.

2. **Disconnection from the power supply**

   A qualified electrician switches the motor off and disconnects it. After carrying out the 5 safety rules, non-qualified electricians may also carry out work on the pump.

After completion of the activities, the activities under the point: "Recommissioning" must be followed.

6.7 RECOMMISSIONING

After the storage and shutdown period, the pump must be checked to ensure that it is operational. If it is not operational, appropriate maintenance and servicing measures must be carried out to restore its operational capability.

The following points must be worked through in the specified order to enable the pump to be safely recommissioned:

1. The pump must be serviced, cleaned and, if necessary, repaired in accordance with the chapters "Servicing and maintenance" and "Cleaning".
2. Electrical components must be recommissioned in accordance with the installation instructions and the manufacturer's documentation. The power supply must not yet be restored.
3. All safety devices must be fitted and checked for functionality and effectiveness. Damaged parts must be replaced immediately

7 TROUBLESHOOTING / TROUBLESHOOTING

DANGER
Danger to life due to electric shock - Personnel qualification

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

DANGER
Danger to life due to unexpected start-up

WARNING
Risk of injury due to slipping, tripping

Description of the safety instructions ➔ Chapter 2.9

If troubleshooting is carried out immediately after operation, the cool-down time must be observed.

Troubleshooting on the pump is only permitted under the following conditions:

1. **Shutdown**

   For troubleshooting, the pump must be shut down and secured against being switched on again. In addition, a warning sign must be attached to the mains isolating device.

   All existing electrical equipment must be individually disconnected.

   If safety devices have to be dismantled or modified for troubleshooting purposes, they must be refitted, adjusted and tested after the maintenance and servicing work has been completed and before the pump is started.

   A qualified electrician may then carry out work on the pump.

   Once the work has been completed, the pump may be put back into operation after a visual inspection.

2. **Disconnection from the power supply**

   A qualified electrician switches the motor off and disconnects it. After carrying out the 5 safety rules, non-qualified electricians may also carry out work on the pump.

Once the work has been completed, the procedure described in the section "Recommissioning" must be followed.

When troubleshooting, check the pump for defects in particular.

- Damage, in particular to:
  - " Ventilation grilles
  - " Fittings
  - " Media lines
  - " Electrical cables
- Leaks

- Loose objects
- Loose screw connections or fastenings
- Contact protection on live parts

NOTE
Visual inspection: The pump is free of foreign objects. After initial inspection, the pump is in the damage-free condition. This also includes checking the electrical and pneumatic components and connections.

- Instruct unauthorised persons to leave the pump.
- Check the fill levels of lubricants and auxiliary materials.

If defects and hazards become apparent during the inspection, the pump must be shut down immediately. The pump may only be put into operation if it is in perfect condition.

Chapter 8 "Maintenance and servicing" must be observed.

7.1 FAULT TABLES

The following tables describe possible causes of faults and the activities required to rectify them. In the event of faults that cannot be rectified using the following instructions, please contact Gebr. Becker

The pump does not start		
Error	Cause	Troubleshooting
Power supply not switched on	e.g. emergency stop actuated, voltage not released, start conditions of the application not fulfilled	Check operating elements and customer installation Check fulfilment of the start conditions for the respective operating mode See also Table 7.1.3
Supply voltage is not present	Incorrect installation e.g. cable break, faulty connection	The pump may only be switched on after it has been checked by a qualified electrician.
Security body has triggered	e.g. fuse protection, motor circuit breaker, line protection	The pump may only be switched on after it has been checked by a qualified electrician. Check the motor circuit breaker against the rated current information on the rating plate and adjust the setting if necessary. If the adjustment is outside the setting range of the motor circuit-breaker, a suitable motor circuit-breaker must be installed. See also Table 7.1.2
Pump mechanically blocked	e.g. foreign bodies in the sealing chamber	Contact Becker Service
Leaving the specified operating parameters	Room temperature to low	Set the room temperature to a value within the permissible range.

Table 7.1.1: The pump does not start

The electrical fuse has tripped	
Cause	Troubleshooting
Power consumption too high	The pump may only be switched on again after it has been checked by a qualified electrician.
Electrical supply cross-section too small	The pump may only be switched on again after it has been checked by a qualified electrician.
Back-up fuse too small	The pump may only be switched on again after it has been checked by a qualified electrician.
Short circuit	The pump may only be switched on again after it has been checked by a qualified electrician.

Table 7.1.2: The electrical fuse has tripped

The electrical fuse has tripped	
Cause	Troubleshooting
Residual current	The pump may only be switched on again after it has been checked by a qualified electrician.

Table 7.1.2: The electrical fuse has tripped

The pump does not reach the required vacuum	
Cause	Troubleshooting
Leakage on suction line	Check fluid lines for leaks and rectify if necessary.
Media line blocked	The pump must be shut down safely or disconnected from the supply voltage by a qualified electrician. Check the media line. Remove foreign objects from the media line.
Undersized service lines	If the inlet or outlet cross-section is too small, insufficient volume can be evacuated or discharged. The cross-section must be corrected in consultation with Gebr. Becker
Condensate in the oil	Check the oil for condensate residue. Change the oil.

Table 7.1.3: The pump does not reach the required vacuum

The motor protection switch has tripped	
Cause	Troubleshooting
Power consumption too high	The pump may only be switched on again after it has been checked by a specialist.
Air/oil separator clogged	Replace air/oil separator

Table 7.1.4: The motor circuit breaker has tripped

The pump does not achieve the required performance and / or emits noise	
Cause	Troubleshooting
Foreign bodies sucked into the pump, jammed bearings or other components	If components have to be dismantled to remove foreign objects, Becker Service must be notified. Likewise, only original spare parts may be used to replace damaged or worn components.
Insufficient oil level	The oil recommended by the manufacturer must be adjusted to the correct level (see oil sight glass).

Table 7.1.5: The pump does not achieve the required performance and / or emits interference noise

The pump becomes unusually hot	
Cause	Troubleshooting
Fan damaged or blocked	Heavy soiling can cause the fan to no longer rotate correctly and therefore no longer cool the pump sufficiently. The pump must be shut down safely or disconnected from the supply voltage by a qualified electrician. The "fan cover" protective device must be removed and the fan wheel cleaned of dirt or replaced if damaged.
Temperature of the evacuated gas is too high	The intake temperature of the gas to be evacuated has been limited by the manufacturer to the maximum temperature shown in chapter 9.2. This temperature limit must be adhered to.
Incorrect motor necessary.	connectionThe motor installation must be checked by a qualified electrician and corrected if
Air/oil separator clogged	The pump must be shut down safely or disconnected from the supply voltage by a qualified electrician. The air/oil separator must be replaced at the specified interval.
Ambient temperature of the pump is too high	Sufficient ventilation and compliance with the minimum distances must be checked and ensured.

Table 7.1.6: The pump becomes unusually hot

8 MAINTENANCE, SERVICING AND DISMANTLING

DANGER
Danger to life due to electric shock

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

WARNING
Danger from hot components and equipment

CAUTION
Contamination and damage to the environment due to operating materials

NOTE
Wear suitable PPE

Description of the safety instructions ➔ Chapter 2.9

If maintenance work requires the dismantling of protective devices, these may only be dismantled for the duration of the maintenance work. Immediately after completion of the maintenance work, all protective devices must be fully installed in the designated position and checked for proper functioning. The prescribed inspection intervals for protective devices must be observed and complied with. Protective devices may only be maintained, replaced and serviced by specially trained, instructed and authorised personnel.

Safety-related parts of the pump could be damaged or disabled by unauthorised tampering or manipulation. Unauthorised tampering and manipulation of the safety-related parts of the pump, adjustable components, is strictly prohibited and must be reported immediately to the responsible body.

8.1 MAINTENANCE AND MAINTENANCE

As a prerequisite for safe and proper operation, it is essential that the pump is serviced and maintained by suitably qualified personnel at regular intervals. In addition, regular maintenance and servicing increases the availability and extends the service life of the pump. The recommended service and maintenance intervals are listed in this chapter.

8.2 PREPARATIONS

The responsibilities for installation, operation, maintenance and cleaning must be clearly regulated and defined.

For maintenance and servicing measures, it must be ensured that sufficient space is available for all work. The maintenance area must be secured.

The following steps must be observed when preparing for servicing and maintenance work:

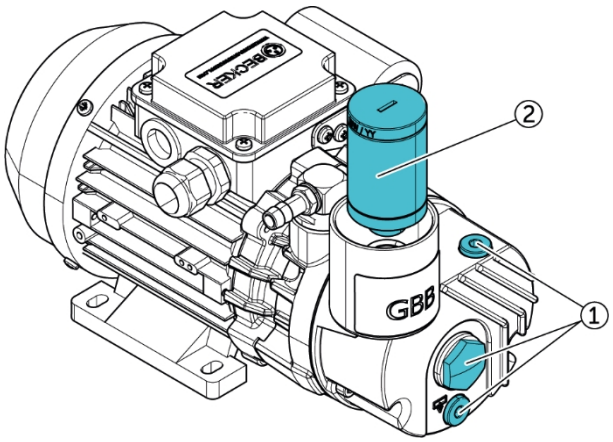
1. All existing electrical equipment must be individually disconnected. Maintenance during operation or when the pump is switched on is strictly prohibited.
2. If safety devices have to be dismantled or modified, they must be refitted, adjusted and tested immediately after completion of the maintenance and servicing work and before the pump is started.
3. After this, a qualified electrician may carry out work on the pump, taking into account the 5 safety rules.

Once the work has been completed, the pump may be put back into operation after a visual inspection.

8.3 MAINTENANCE INTERVALS

8.3.1 MAINTENANCE INTERVALS O 6.4

The maintenance intervals for the O 6.4 are shown in the following overview:

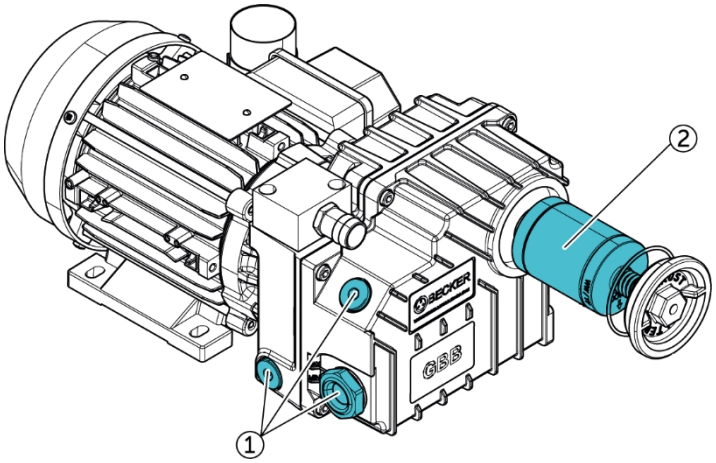


O 6.4	Interval time			
	40 h	40-200 h	500 h	2.000 h
Oil ①	check oil level		change	
Air/oil separator (LEE) ②				exchange
Pump		clean		

Table 8.3.1.1: Maintenance intervals O 6.4

8.3.2 MAINTENANCE INTERVALS O 6.8

The maintenance intervals for the O 6.8 are shown in the following overview:



O 6.8	Interval time			
	40 h	40-200 h	500 h	2.000 h
Oil ①	check oil level		change	
Air/oil separator (LEE) ②				exchange
Pump		clean		

Table 8.3.1.2: Maintenance intervals O 6.8

8.4 MAINTENANCE ACTIVITIES

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

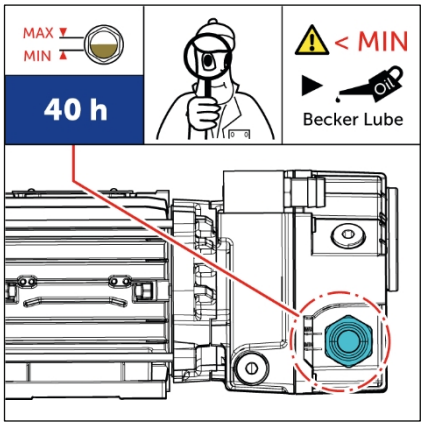
WARNING
Danger from hot components and equipment

CAUTION
Contamination and damage to the environment due to operating materials

NOTE
Wear suitable PPE

Detailed description of the safety instructions ➔ Chapter 2.9 The safety instructions must be observed:

- Use suitable tools and handle with care.
- Personal protective equipment must be used to prevent injuries caused by tools or components.
- The maintenance area must be kept clean and tidy. Objects lying around can pose a tripping hazard.
- If anything is unclear, the responsible body or the manufacturer must be consulted. The maintenance plan provides for the following activities:



Check oil level

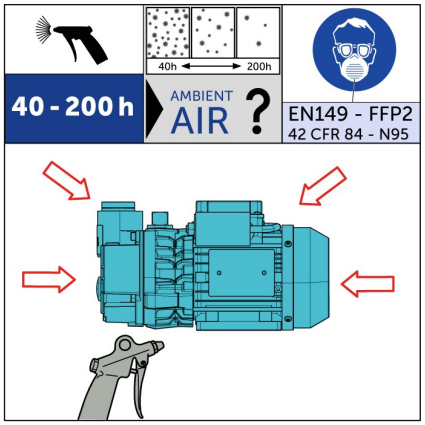
Check the oil level through the oil sight glass.

The oil sight glass only shows the exact oil level after an appropriate waiting time when the pump is at a standstill. During operation, the display does not show an exact value due to the oil turbulence.

The oil lubricates the rotary vane in the compressor chamber. The heat energy released in the process vaporises the oil into oil mist. Despite the air/oil separator (LEE) used, oil mist is pumped out of the pump. The oil level must therefore be checked and adjusted if necessary.

The condition of the oil should also be checked; if it appears dark or cloudy, this is a sign that it is contaminated by substances that have been sucked in and needs to be changed.

Notes on oil types and filling quantities ➔ Chapter 9.3



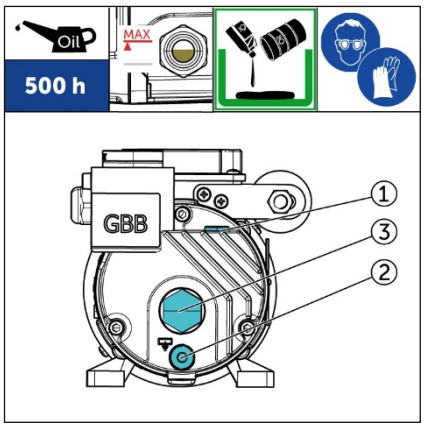
Clean the surface with compressed air

The pump must be cleaned regularly.

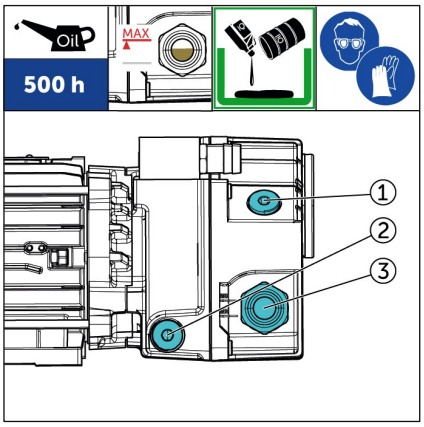
The interval depends on the degree of soiling on the housing.

Protective goggles and an FFP2 mask in accordance with EN 149:2008 must be worn when cleaning with compressed air.

Notes on cleaning ➔ Chapter 8.9



Oil change O 6.4



Oil change O 6.8

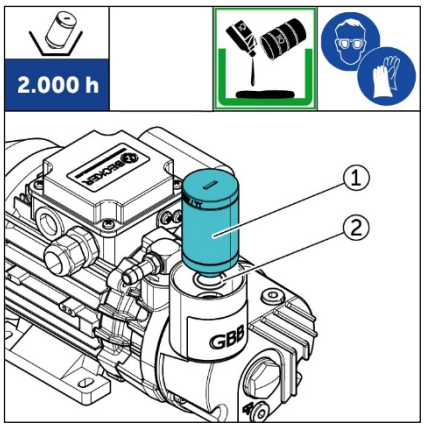
Oil change

The oil seals the pump and improves its running properties. When the oil is used in the compressor chamber, it comes into direct contact with the process gas. This contaminates the oil. The pump can no longer achieve the required performance characteristics. The oil must therefore be changed at regular intervals.

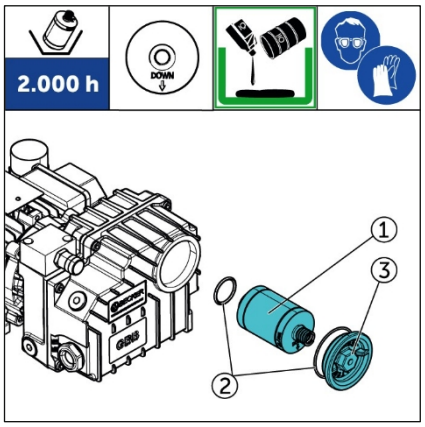
Notes on pump-dependent intervals ➔ Chapter 8.3 Notes

on oil types and filling quantities ➔ Chapter 9.3

1. Run the pump with the suction opening closed for about 10 minutes so that the oil liquefies
2. Ensure that all requirements for maintenance operation have been met
3. Place a container underneath to collect the used oil
4. Open the oil filler plug (pos. 1) for venting
5. Open the oil drain plug (item 2) and pour the used oil into the container
6. Close the oil drain plug
7. Fill with new oil
8. The oil level must not exceed the max. fill level (marking on the oil sight glass (item 3))
9. Close oil filler plug
10. Properly dispose of used oil in accordance with national regulations for the disposal of hazardous materials.
11. Reconnect the power supply and allow the pump to run for a few minutes with the suction closed. If necessary, restore the correct oil level.



LLE change O 6.4



LLE change O 6.8

Changing the air/oil separator (LEE)

The air/oil separator cleans the process gas flowing through the pump. It mainly separates the oil that the process gas has absorbed as oil mist in the compressor chamber. As the operating time increases, the LEE becomes saturated with oil.

Signs of a clogged or damaged filter are increased smoke development, higher noise level or energy consumption of the engine.

Only use original spare parts included in the pump spare parts kit for replacement.

The LEE must be replaced at intervals depending on the pump type (see Table 8.1 + 8.2).

1. Ensure that all requirements for maintenance operation have been met.
2. O 6.8 - Unscrew and remove the maintenance cover (item 3)
3. Unscrew LEE (pos. 1) (O 6.4) and/or remove
4. LEE and the associated O-rings (item 2) are part of the maintenance kit and should be replaced together.
5. Install the LEE in reverse order. With O 6.8, ensure that the LLE is installed in the correct position.
6. Properly dispose of the old LEE in accordance with the national regulations for the disposal of hazardous goods.

8.5 MEDIA LINES

WARNING
Risk of injury due to stored residual energy

Lines, hoses, pipes, valves and connections must be checked for damage (leaks) at regular intervals.

The following instructions must be observed when carrying out maintenance and repair work on media lines:

- Before starting work on the media lines, the system must be depressurised and secured against being switched on again. Residual energy must be dissipated or discharged. Residual liquids in media lines must be drained off.

8.6 CONDITIONS FOR SWITCHING ON AGAIN

The following points must be observed before restarting after maintenance and servicing work:

- Unauthorised persons must be removed from the pump.
- The proper connection between the pump and the media lines must be checked.
- The media lines must be checked for leaks and damage.
- The power supply must be checked for damage and proper functioning.
- All operating fluids must be filled to the correct level.
- All protective devices must be present, functional and tested.

8.7 SPARE PARTS AND WEAR PARTS

Warning
Safety risk due to spare parts not approved by the manufacturer

A comprehensive **spare parts list** with all spare and wear parts for the series listed here can be found on o u r homepage under the following link:

www.becker-international-shop.com

8.8 TEMPORARY DECOMMISSIONING

The following steps must be observed during a temporary shutdown:

1. Shutdown
2. To switch off the pump, it must be shut down and secured against being switched on again. In addition, a warning sign must be attached to the mains disconnection device.
3. All existing electrical equipment must be individually disconnected.
4. Disconnection from the power supply
5. A qualified electrician switches the motor off and disconnects it. After carrying out the 5 safety rules, non-qualified electricians may also carry out work on the pump.
6. After completion of the decommissioning, the activities under "Recommissioning" must be followed.

8.9 CLEANING

DANGER
Danger to life due to unexpected start-up

DANGER
Danger to life due to defective, dismantled and manipulated protective devices

WARNING
Risk of injury due to slipping, tripping and falling

WARNING
Danger from hot components and equipment

CAUTION
Contamination and damage to the environment due to operating materials

NOTE
Wear suitable PPE

Description of the safety instructions ➔ Chapter 2.9

Attention
Incorrect cleaning and the use of incorrect cleaning agents or cleaning equipment (e.g. high-pressure cleaners) can cause damage to the pump.

The entire pump must be cleaned at regular intervals depending on the amount of dust. This includes cleaning all surfaces of the pump with a compressed air gun and moistened cleaning cloth.

The cleaning instructions of the manufacturers of components and assemblies must be observed.

The use of solvents or cleaning agents containing solvents is prohibited.

The use of cleaning agents that are highly flammable or generally flammable is prohibited! The statutory environmental protection regulations must be observed during cleaning.

The pump may only be switched on again if there is no damage to the pump and no person is exposed to danger.

8.10 DISMANTLING AND DECOMMISSIONING

DANGER
Danger to life due to unexpected start-up

DANGER
Danger to life due to electric shock - Personnel qualification

WARNING
Risk of injury due to slipping, tripping and falling

WARNING
Danger from hot components and equipment

CAUTION
Contamination and damage to the environment due to operating materials

NOTE
Wear suitable PPE

Description of the safety instructions ➔ Chapter 2.9

The following steps must be observed during dismantling and decommissioning:

1. Switch off the pump and enable the drive.
2. Switch off the power supply and secure it against unintentional restarting.
3. Disconnect the supply line of the drive.
4. Shut off media lines and discharge pressure differences if necessary.
5. Disconnect the media lines from the pump.
6. Clean the pump thoroughly and remove operating fluids
7. Dismantle the pump in reverse order of assembly or according to the separate dismantling instructions. Loose parts must be secured to prevent them from tipping over or falling.
8. Protect the pump from further contamination
9. Dispose of operating materials in accordance with the applicable local regulations.

8.11 STORAGE

The following requirements for the storage location must be observed in order to store the unused pump in a proper condition over a longer period of time. If the following requirements are not observed, the pump may be damaged. Storage without oil filling is recommended. The storage location must

- be dry and clean,
- just be,
- be protected from sudden changes in temperature and humidity,
- be protected from salt spray, industrial gases, corrosive liquids, rodents and fungal attack.

8.12 DISPOSAL

CAUTION
Contamination and damage to the environment caused by operating materials

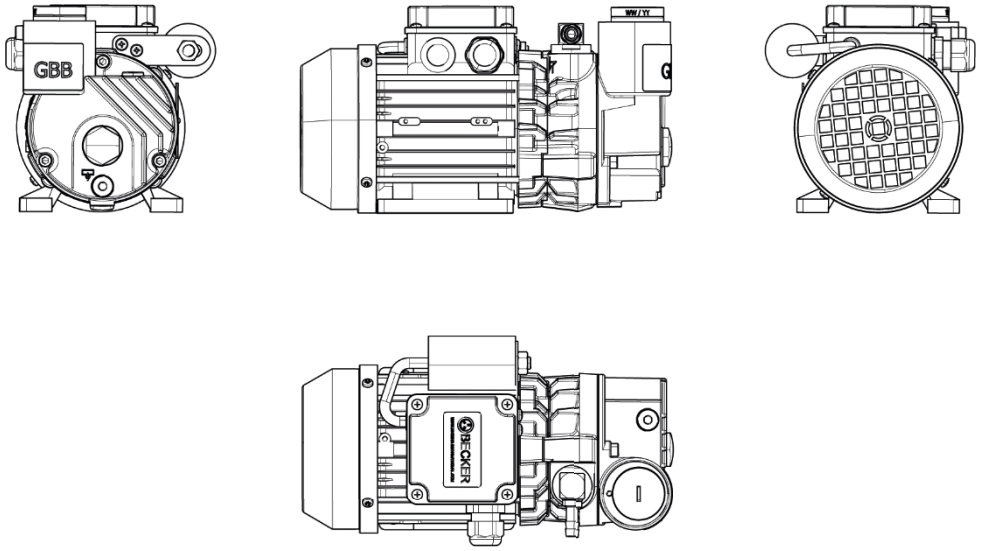
Description of the safety instructions ➔ Chapter 2.9

The pump is disposed of in a dismantled state. See chapter 8.10.

When disposing of the pump, the relevant local environmental regulations must be observed.

9 PRODUCT DATA SHEET

9.1 PRODUCT OVERVIEW



Views - O 6.4

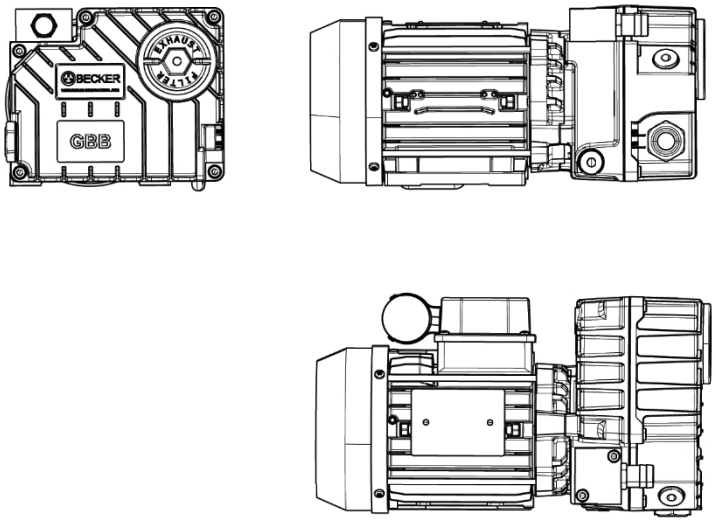
9.2 OPERATING PARAMETERS

Operating parameters	Pump
	O 6.4
Nominal pumping speed 50 Hz	4 m3/h
Nominal pumping speed 60 Hz	4.8 m3/h
Absolute vacuum	2 mbar
Weight	5.4 kg
Emission sound pressure level 50/60 H z [1)]	48/52 dB(A)
Permissible ambient temperature	5-40 °C
Intake temperature	12-40 °C
Maximum exhaust air temperature	60 °C
Maximum overpressure at the outlet	300 mbar
Maximum installation height [2)]	800 m above sea level
Maximum humidity of the intake air	90 %

1) (UNI EN ISO 2151) (K 3dB)

2) For installation heights above 800 m, please consult Gebr. Becker

Table 9.2.1: Operating parameters O 6.4



Views - O 6.8

Operating parameters	Pump
	O 6.8
Nominal pumping speed 50 Hz	8 m3/h
Nominal pumping speed 60 Hz	9 m3/h
Absolute vacuum	2 mbar
Weight	10 kg
Emission sound pressure level 50/60 H z [1)]	58/60 dB(A)
Permissible ambient temperature	5-40 °C
Intake temperature	12-40 °C
Maximum exhaust air temperature	80 °C
Maximum overpressure at the outlet	300 mbar
Maximum installation height [2)]	800 m above sea level
Maximum humidity of the intake air	90 %
1) (UNI EN ISO 2151) (K 3dB)	
2) For installation heights above 800 m, please consult Gebr. Becker	

Table 9.2.1: Operating parameters O 6.8

9.3 OPERATING FACILITIES

Operating resources		Container size	Order number
Becker Lube M 32	Mineral oil	0.25 litre	96001700025
Becker Lube S 32	Synthetic oil	0.25 litre	96000320025
		0.5 litre	96000320050
Becker Lube SL 32	H1 p u m p oil [1)]	1 litre	96002300901
Becker Lube SM 32	H1 p u m p oil [1)]	1 litre	96003700501
1) Fulfils all requirements for the lubrication of pumps in **food processing** plants.			

Table 9.3.1: Operating resources

Pump	Oil filling quantities
O 6.4	0.065 litres
O 6.8	0.20 litre

Table 9.3.2: Oil filling quantities

9.4 TECHNICAL DATA

Technical data sheets for the pumps and **safety data sheets** for the oils can be found on our homepage under the following link:

www.becker-international.com/download

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