

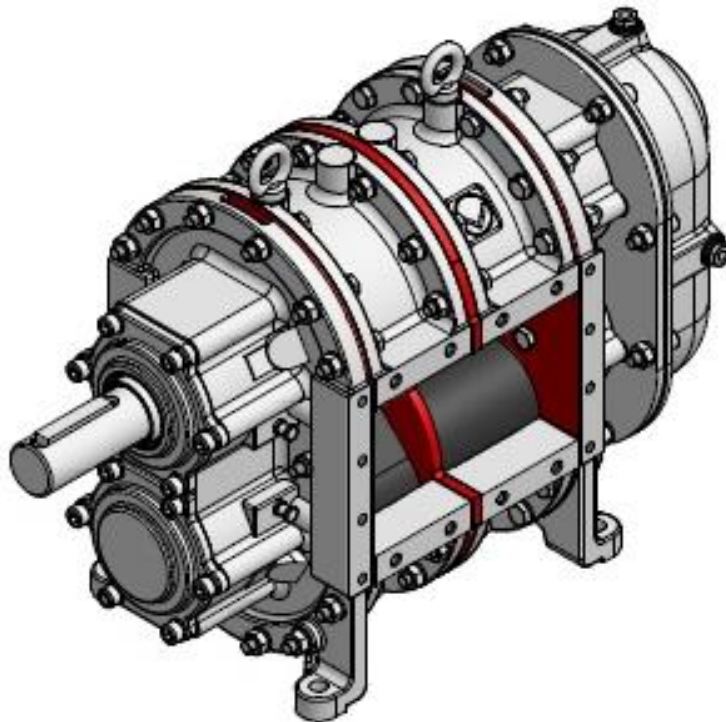


Operating Instructions

Rotary Lobe Pump

R116

ENGINEERED TO WORK



Original operating instructions

Issuer

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in every one of our products, you will see the entirety of our competence and our power of innovation at work. Each product is developed and built so that you can work more successfully.

We call it quite simply: ENGINEERED TO WORK

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1 User information

1.1 Using the operating instructions

These instructions contain all necessary information concerning the operating elements, handling, start-up and maintenance and repair work, as well as the relevant technical data.

The operating instructions are a component of the machine.



IMPORTANT READ CAREFULLY BEFORE USE

Read the operating instructions thoroughly. All of the points presented in these instructions must be understood and observed by those persons responsible for the installation, operation, maintenance and repair of the machine.




Vogelsang does not accept any liability for damage resulting from failure to comply with these operating instructions.

KEEP FOR FUTURE REFERENCE

Please keep the manual ready to hand to ensure easy access to the necessary information at all times.

Additional copies of the manual are available on request   or to download from our website.

1.2 Presentation convention

Illustration	Meaning
•	Listing
	Sublisting
1. 2.	Carry out these actions in the described sequence
→ Fig. "Caption"	Reference to a figure for additional information
→ Chapter "Chapter heading"	Reference to a chapter for additional information
→ Table "Table caption"	Reference to a table for additional information
 "Relevant Vogelsang document"	Request this document from us if you need it
  Technical support	Contact our technical support

1.3 Explanation of symbols

The following symbols and signal words are used in this manual:



CAUTION

Refers to a dangerous situation in which failure to comply with the safety note could result in light injuries.



WARNING

Refers to a dangerous situation in which failure to comply with the safety note could result in death or serious injuries.



DANGER

Refers to an (extremely) dangerous situation in which failure to comply with the safety note will result in death or serious injuries.



RISK OF ELECTRIC SHOCK

Touching live parts leads to dangerous electrocution.

This can result in electric shock, burns or death.



ATTENTION

Refers to possible damage to machinery or property as a result of failure to comply with this note.



NOTE

Refers to further information and useful notes.



ENVIRONMENTAL PROTECTION

Refers to measures to be observed to prevent damage to the environment.

Symbols for personal protective equipment

If personal protective equipment is needed to work with and on the machine, the following symbols are used:



Indicates that personal protective equipment must be worn for subsequent tasks.



Indicates that protective gloves must be worn for subsequent tasks.



Indicates that protective goggles must be worn for subsequent tasks.



Indicates that safety shoes must be worn for subsequent tasks.



Indicates that protective clothing must be worn for subsequent tasks.

1.4 Machine versions described here

The "Installation" chapter contains important assembly instructions and warning and safety notes that the operator must always comply with.

The following optional machine versions are described in the "Installation" chapter:

Machine version	Chapter reference
• With or without connectors	→ Chapter "Connectors"
• On a base or without a base	→ Chapter "Base, support surface for machine"
• With the following drive options:	→ Chapter "Drive"
– Electric drive	
– Hydraulic drive	
– PTO drive	
– Combustion engine drive	
• With or without system control	→ Chapter "System control"

The machines listed in these operating instructions correspond to the Machinery Directive (2006/42/EC), see sample printout in →**Chapter "EC declaration"**.

2 EC declaration

EC Declaration of conformity

According to Machinery Directive 2006/42/EG; annex II A

Manufacturer: Hugo Vogelsang
Maschinenbau GmbH
Holthöge 10-14
D-49632 Essen/Oldb.

We hereby declare that the machine described below meets the basic health and safety requirements of the Machinery Directive 2006/42/EC in its design and construction and in the version marketed by us. If a change is made to the machine without our agreement, this declaration loses its validity.

Product: Rotary lobe pump

Applied harmonised standards:

DIN EN ISO 12100:2011-03
DIN EN 1037:2008-11
DIN EN 349:2008-09
DIN EN ISO 13857:2008-06

Applied national standards and technical specifications:

DIN EN 62079:2001-11
DIN 4844-1:2012-06
DIN 4844-2:2012-12
DIN ISO 3864-1:2012-06
DIN EN 809:2012-10
DIN EN 12162:2010-05

The person authorized to compile the technical documentation is:
Hugo Vogelsang Maschinenbau GmbH; Holthöge 10-14; 49632 Essen (Oldb.), Germany

49632 Essen, 2013-02-11





Harald Vogelsang (Managing Director)

3 Specifications

Series and size	Theoretical capacity* $n_{max} = 650 [min^{-1}]$			Max. differential pressure*	Theoretical operating torque with max. operating pressure and water (designed for NBR elastomers)
	[l]	[l/min]	[m³/h]	[bar]	[Nm]
R116					
60	1.16	750	45	5	127
120	2.32	1500	90	5	243
180	3.48	2250	135	5	373
240	4.64	3000	180	5	481
300	5.80	3800	225	4	492
360	6.96	4500	270	3	462

* All data refer to theoretical capacity. The actual capacity is lower; it depends on the various operating conditions.

** Valid only for short operation times. For continuous operation, please contact our service department  .

The service time of the rotary lobes is reduced by high temperatures, especially in combination with high differential pressure.



Free passage


The maximum free passage is $\varnothing 48$ mm.



ATTENTION

When using the pump for a **highly viscous medium**, the pump speed must be reduced according to the material's viscosity, to prevent the intake flow from breaking off on the suction side (cavitation protection).

Weights and dimensions

For the machine's weight and dimension specifications, see  "Dimension sheet"

3.1 Material description for rotary lobes

Marking on the rotary lobe	Material	Elastomer-based	Resistant up to	Pump medium	Characteristics
NBR	NBR	Nitrile butadiene rubber	80 °C *	Sewage sludge, petrol, oil, grease, diesel oil, spindle oil	Oil-resistant
NBR	NBR, white	Nitrile butadiene rubber	80 °C *	Oil, butter, linseed and olive oil, lard	Food grade
SBR	SBR	Styrene butadiene rubber	60 °C	Liquid manure	Wear-resistant
SL	EPDM-SL (EPDM-Sewage-Line)	Ethylene propylene diene M-class rubber	80 °C *	Water, liquid manure, sewage sludge, biogas substrate	Not oil and grease resistant, water resistant, steam resistant
AL	EPDM-AL (EPDM-Aqua-Line)	Ethylene propylene diene M-class rubber	80 °C *	Drinking water	Drinking water approved **, not oil or grease-resistant, water-resistant, steam-resistant
EPDM	EPDM, white	Ethylene propylene diene M-class rubber	80 °C *	Water, mash, slightly acidic products	Food grade
PU	PU (Werobust)	Polyurethane vulcanised	50 °C	Abrasive medium	Wear-resistant
PUR	PUR	Polyurethane cast	80 °C	Abrasive medium	Highly wear-resistant
CSM	CSM (Hypalon)	Chloro-sulfonyl polyethylene rubber	80 °C *	Petrol, oil, acids, alkali solutions	Wear-resistant, acid-resistant and alkali-resistant
FPM	FPM	Fluorocarbon gum	80 °C *	Solvents, salt water, oil, petrol, acids	Acid-resistant and alkali-resistant
	Steel lobes (pure material)	1.4571	150 °C 200 °C*	Pure medium Chemistry	High temperatures, high chemical resistance
	Steel rotary lobes (pure material)	C45 nitrided	150 °C 200 °C*	Pure medium petrochemical	High temperatures, chemical resistance

Table: Material description

* consult Vogelsang in the event of the combination of "high differential pressure and high temperatures" ☎️✉️

** drinking water approvals: KTW, DVGW-Arbeitsblatt, W 270, WRAS, BELAQUA



Please consult us ☎️✉️

- If you require combinations with high differential pressure and high temperatures – (see * in → Table "Material description").
- With solid material lobes with media containing foreign matter
- If you should discover discrepancies or if precise specifications have not been provided for the medium

4 Safety

4.1 Intended use

The Vogelsang rotary lobe pump (hereinafter "pump" or "machine") is a self-priming positive displacement pump for pumping aqueous to highly viscous fluids (hereinafter "medium").

The medium can be chemically neutral, acidic or alkaline. It can be loaded with solid particles and/or gas.

The maximum free passage specified in → **Chapter** "Specifications" must not be exceeded.

The pump is designed for the medium to be pumped in accordance with customer specifications.

For a different medium or when the pump is not designed for a particular application, it has to be checked whether the materials of the pump which come into contact with the medium are suitable. In some cases the pump must be reconfigured.

The pumps described in these operating instructions are not intended for use in potentially explosive atmospheres.

Any other use is contrary to the intended use. Vogelsang is not liable for any damage resulting from incorrect use.

4.2 General safety notes

Before assembly, start-up, maintenance and repair of the machine, read the operating instructions in full and carefully observe the warning and safety notes.



WARNING

Risk of injury (catching, crushing, collision) due to rotating rotary lobes if the machine starts up unexpectedly!

Before starting maintenance and repair work (opening covers, disassembling connectors) and before trouble-shooting, switch the machine off and secure it against being switched on again.



WARNING

Risk of injury from medium escaping under high pressure!

If the maximum differential pressure is exceeded, machine parts may burst and medium may spray out.

- The maximum differential pressure must not be exceeded → **Chapter** "Specifications".
- Observe and implement the recommendations in → **Chapter** "Installation in pipes".
- Protect the machine or system against overpressure. For example, the following **safety devices** can be used:
 - A current limiter on the motor
 - A pressure relief valve
 - Cut-off with a pressure control switch
 - An overload coupling



WARNING

Skin and eye irritation caused by contact with hazardous working materials or media!

All work on the machine can lead to contact with working materials or media.



- Personnel must wear suitable protective clothing.
- The operator must inform his or her staff about any potentially hazardous substances in working materials or media.



CAUTION

Risk of burning due to exposed host surfaces!

If the medium temperature is greater than 60 °C or the pump experiences dry running, the pump housing, the connectors or the pipes can become very hot.

- Avoid (accidental) contact with hot surfaces.
- Avoid dry running of the pump, e.g. by means of dry running protection via
 - Temperature monitor
 - Level measurement
 - Flow measurement



ATTENTION

Risk of frost!

To protect the pump against damage caused by frozen medium, drain it when there is a risk of frost.

- Drain the pump by running the pump in either direction (forward or reverse), until all liquid is drained out of the pump. You can use drain cocks in the connectors to do this.
- To completely drain the pump chamber, remove the bearing housing.
- Before start-up, refill with fluid.

4.3 Training of persons

Only trained and instructed persons may work with and on the pumps. The operator must clearly define the responsibilities of the persons for operating, servicing and maintaining equipment.

A person to be trained may only work with and on the pump under the supervision of an experienced person.

Activity	Person specially trained for the activity ¹⁾	Instructed person ²⁾	Persons with specialised training (qualified workshop) ³⁾
Transport	X	--	X
Installation	--	--	X
Start-up	--	--	X
Operation	X	X	X
Checking safety devices	--	--	X
Electrical work	--	--	X
Maintenance	X	X	X
Repair	--	--	X
Trouble-shooting	X	X	X
Putting out of operation	X	--	X

Key: X..allowed --..not allowed

- 1) A person who can take on a specific task and who is authorised to carry it out for a company that is suitably qualified.
- 2) Whoever has been instructed, and if necessary trained, in the tasks assigned to them and in the possible risks associated with incorrect behaviour and has been instructed in the required protective equipment and protective measures is considered a trained person.
- 3) Persons with specialised training are considered specialists. Based on their technical training and knowledge of the relevant provisions, they can assess the tasks assigned to them and recognise possible risks.

Note:

A qualification equivalent to technical training may also have been attained by many years of activity in the relevant field of work.

4.4 Warning and safety stickers on the machine

Warning and safety stickers on the machine provide important information for safe operation. Heeding the stickers promotes the safety of persons who work with and on the machine.

The warning and safety stickers must not be removed and must be replaced immediately if damaged or lost.

Positioning of the warning and safety stickers

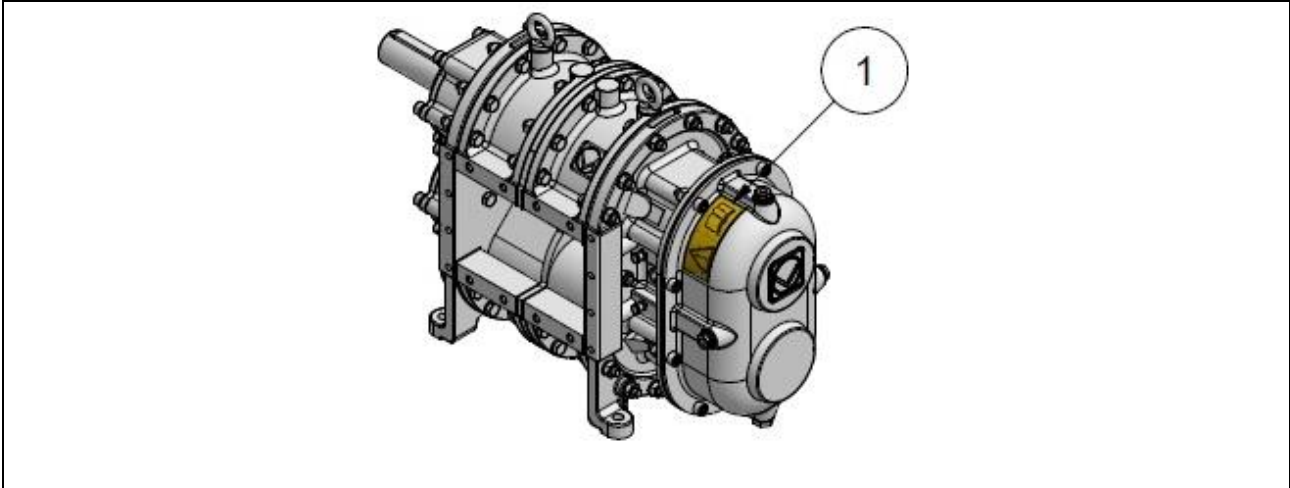

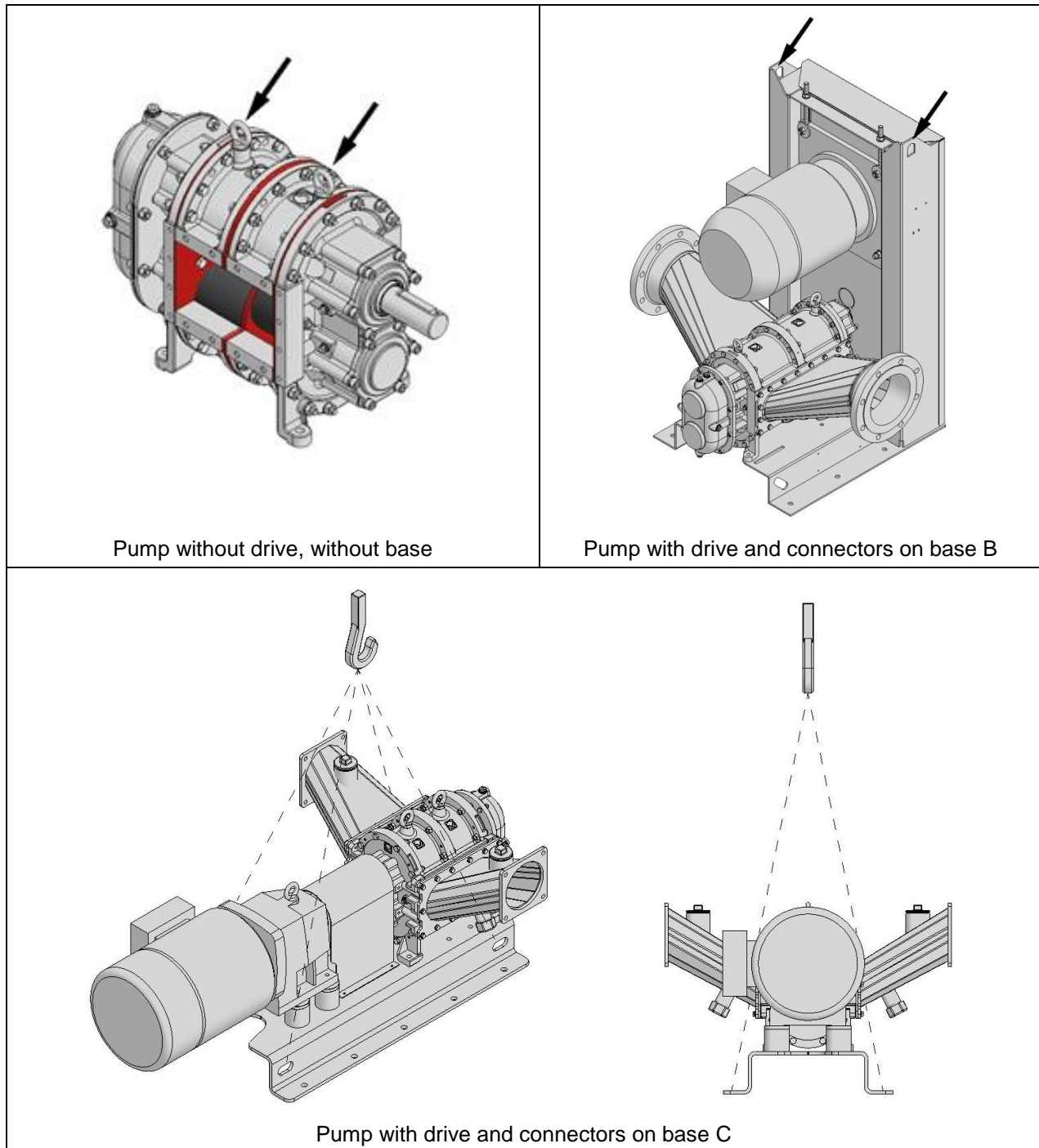


Fig. 1: Warning and safety stickers

Item	Sticker	Part no.	Meaning
1		VAU.133	Before start-up of the pump, read the operating instructions!

5 Transport, storage

5.1 Transport



Pump without drive, without base

Pump with drive and connectors on base B

Pump with drive and connectors on base C

Fig. 2: Transport aids



WARNING

Risk of crushing or concussion due to falling machine!

The machine may start to sway or topple when it is transported, loaded or set down. To ensure safe transport, take note of the following:

- The loading and transporting may only be carried out by specially trained persons.
- Standing under raised loads is prohibited. Direct persons out of the danger area.
- The unit may only be transported suspended or screwed to a Euro pallet → Fig. "Transport aids".
- If the machine is transported in suspension, use the fitted suspension points for hoisting gear, → Fig. "Transport aids" (indicated by arrows).
- Securely fasten the lifting tackle for lifting gear.
- Use the lifting eye bolts on the machine only for lifting the machine **without** mounted parts (for example, the motor). Note load capacity and lifting capacity of the lifting eye bolts → Table "Lifting eye bolts".

Quantity of lifting eye bolts	Thread	Max. permissible weight
1	M12	340 kg
2	M12	240 kg per lifting eye bolt (<i>with an angle of attack of up to max 45°</i>)

Table: Lifting eye bolts

5.2 Storage

Long-term storage

of complete pumps, individual O-rings and seal components

If not stored and handled properly, the physical characteristics of products made of rubber may change. Possible consequences include excessive hardening, softening, lasting deformation, peeling, cracking or other surface damage.

Long-term storage is possible under the following conditions (longer than 6 months to a maximum of 5 years):

- The storage area should be dry (relative humidity under 65%) and the temperature should be between 5 °C and 30 °C.
- The pump chamber can be sealed with a preservative that is suitable for the lobe and sealing material.
- The products should be protected against light, especially direct sunlight and strong artificial light with a high proportion of ultraviolet.

After a storage period of five years or more and before start-up we recommend:

- Checking and renewing (if necessary) all wetted gaskets and rotary lobes
- Changing the gear oil

6 Assembly

6.1 Installation in pipe systems

- The pump may be installed in the standing, horizontal or suspended position → Fig. "Installation variants".

With a horizontal installation, the inlet should be on the bottom and the outlet on the top.

If the pump is to be suspended, please contact us ☎️✉️.

- When installing the pump, ensure that there is easy access for maintenance work. If the hexagon head screw plugs for draining the gear oil are not easy to reach, drain hoses may be used (part no. PBT.013 and/or PBT.014).
- Ensure that the pump is tension-free upon installation and also during operating.

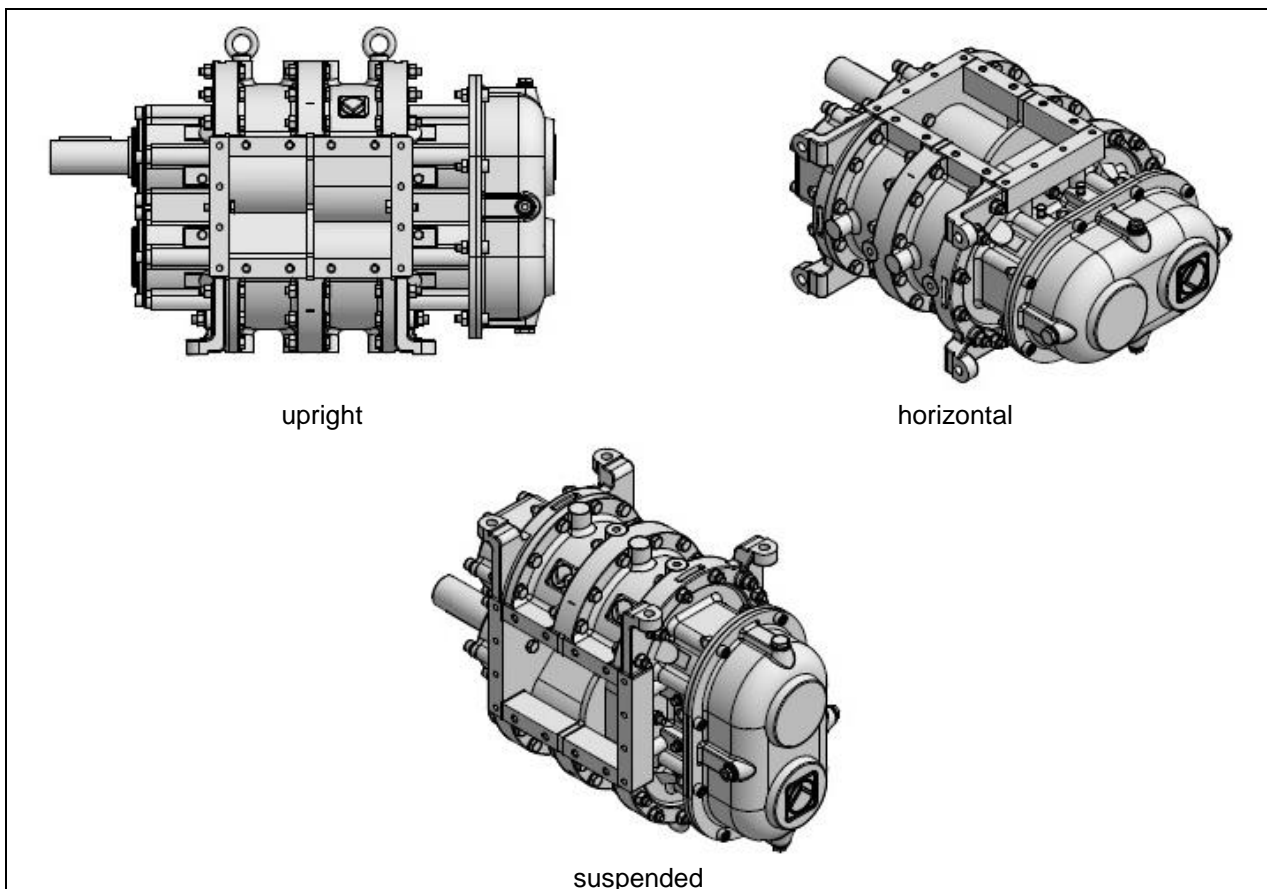


Fig. 3: Installation variants

6.2 Pipes and connectors

- Only use the pipe diameters, wall thicknesses and materials recommended by us or by our representatives. The sealing material must be compatible with the medium.
- Position the pressure and suction connections pointing upwards. This will ensure that the fluid remains in the pump after it is switched off.
- Keep the pipeline as free as possible from foreign matter (stones, wood residues, etc.) in order to prevent wear on rotary lobe and housing.

Recommended connector diameters:

Size	Connector diameter
60	DN 100
--	--
120	DN 125
180	DN 150
240	DN 150
300	DN 150
360	DN 150



ATTENTION

Hazard due to closed pipes!

Pumping must not take place against a closed pipe. The pump shaft seals or even the pump housing or the pipe may be damaged or destroyed by the resulting high pressure. A pressure monitoring system is optionally available from us (setting at 10% over the nominal pressure of the pipe) ☎️✉️.



WARNING

Risk of injury from medium escaping under high pressure!

If the maximum operating pressure is exceeded, parts may burst and medium may spray out.

- Follow recommendations for pipes. Only use high-pressure pipes on the discharge side:
 - **Up to** nominal diameter DN 150 - PN 16 (bar) pipes
 - **From** nominal diameter 200 - PN 10 (bar) pipes, except when the outlet pressure of the pump unit is ≥ 10 bar

If you are uncertain about anything, please contact us ☎️✉️.

- During periods of inactivity and periods of hot weather, fermentation may occur in closed pipelines. The resulting gas can result in a large pressure increase that can damage the pump or pump unit and cause the injuries specified above. Therefore, ensure that no medium is left in the pump.
- Attention – if a connector **with a sight glass** is installed on the suction side: The pressure may not exceed **max. 2 bar** during reverse pumping → Fig. "Flow direction with pump units".



ATTENTION

To protect from high pressure losses and cavitation, heed the advice for laying the suction lines:

- The maximum suction height is 8 m. This is the maximum distance between the lowest and highest points of the suction pipe. Observe NPSH.
- Suction lines whose diameter is too small may restrict the suction capability of the pump. Caution, risk of cavitation!
If the diameter of the suction pipe is too small, the maximum suction height will be reduced by the loss of pressure due to pipe friction. Contact us for a calculation ☎️✉️.
- Suction lines over 30 m must be laid with a slope of at least $2 \times$ pipe diameter in the direction of flow, ensuring that the pipeline can never run dry → **Fig.** "Long suction lines".

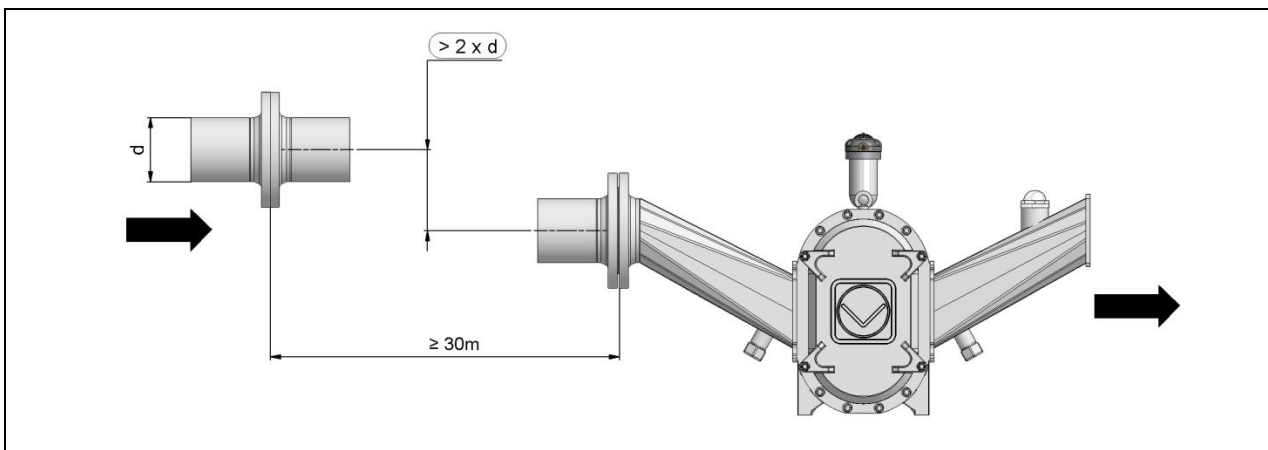


Fig. 4: Long suction lines

6.3 Direction of flow

The pump is suited for both flow directions.

Please observe the following machine and safety technology exceptions in which the flow direction is predefined:

Installation in pipes with automatic check valves → Chapter "Pump units".

6.3.1 Pump with motor drive

If you are using motor-driven pumps with one drive shaft, the flow direction is selected by determining the direction of rotation of the drive motor, such as an electric motor or hydraulic motor.

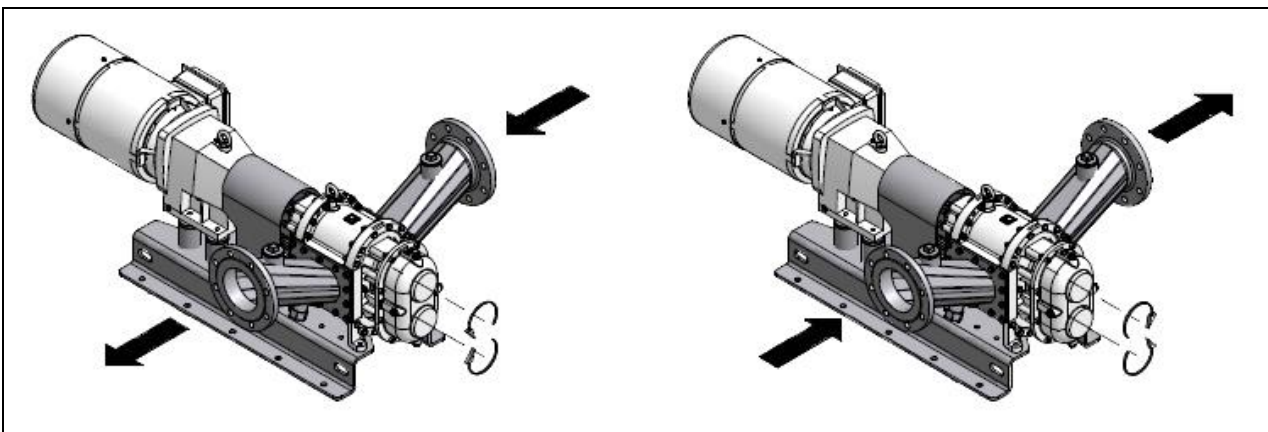


Fig. 5: Flow direction with motor drive

6.3.2 Pump with PTO drive

If you are using tractor driven pumps with two drive shafts, connect either the upper or lower cardan shafts thus determining the flow direction.

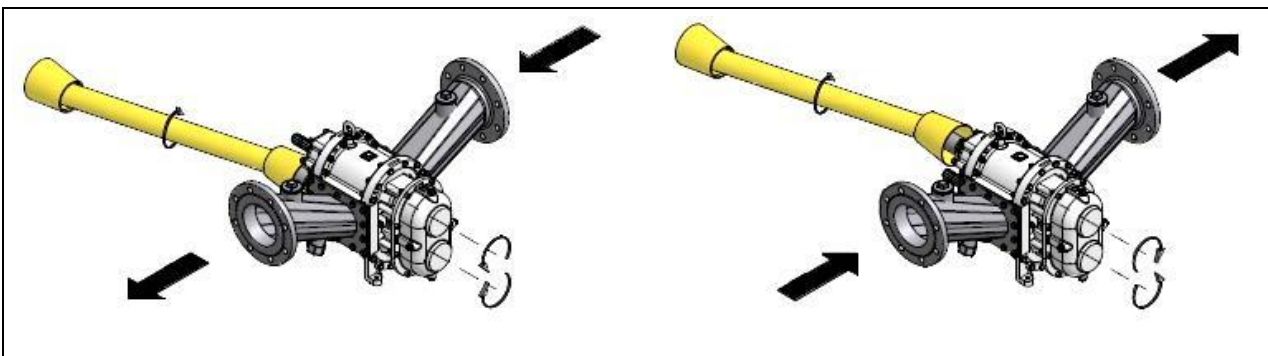


Fig. 6: Flow direction with PTO drive

6.3.3 Pump systems

The pressure and suction sides are rigidly defined by the rotation of the pumps. When there are suction difficulties, it is possible to draw in through the discharge side. A reversal of the flow direction is not possible if the pipelines are protected by automatic check valves.



WARNING

Risk of injury from medium escaping under high pressure!

If a connector has a **sight glass**, the sight glass may burst if the pressure is too high.

A connector with a sight glass must be installed **on the suction side**. The pressure may not exceed **max. 2 bar** during reverse pumping.

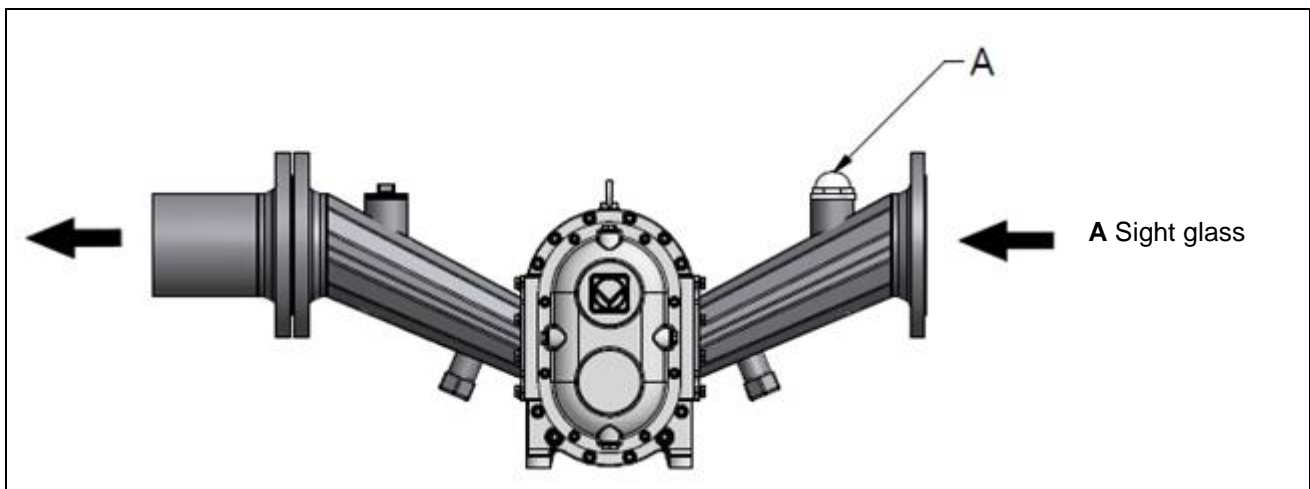


Fig. 7: Flow direction with pump units

6.4 Connectors



ATTENTION

Risk of breakage due to connectors under tension!

Flange connections can exert excessive forces on the machine.

The connectors must be mounted stressless. In other words, the connectors have to be precisely one in front of the other, even when they are not screwed into place.

Note the **tightening sequence** when mounting the connectors:

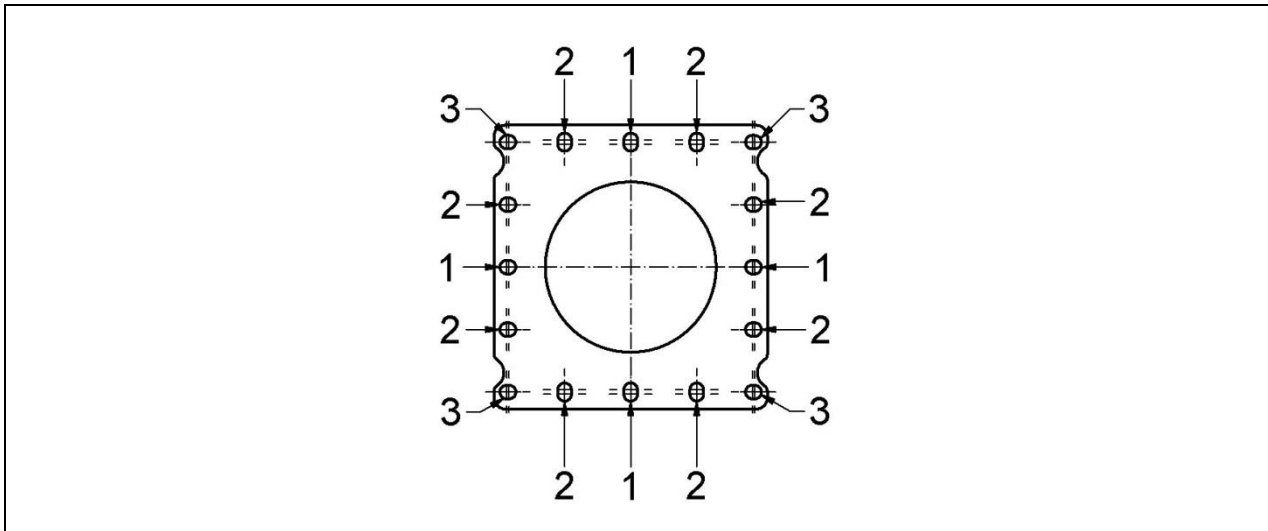


Fig. 8: Tightening sequence



Tightening torques

M 8 hexagon head screw (8.8, steel): 25 Nm

M 8 hexagon head screw (A2, stainless steel): 20 Nm



Stainless steel bolts/nuts

Before installing **stainless steel** bolts and nuts:

Clean the threads and contact surfaces. Apply Anti-Seize Paste (Part-No. BKL.014/BAS.001) evenly and in sufficient quantity to the screw head/nut contact surface and the thread using a brush or putty knife etc. to avoid seizing of stainless steel.

6.5 Base, support surface for machine

6.5.1 Machine without base



WARNING

Risk of crushing or concussion due to falling machine caused by insufficient stability!

The machine must be securely fastened to the supporting surface. The machine must never be held in position by the connected pipe because this could result in the screw connections breaking or failing.

Retighten all motor fastening screws and nuts on the base after 20 operating hours.

6.5.2 Machine and motor on base



CAUTION

Impairment of communication and discomfort due to machine vibration!

A distorted base or insufficient fastening of the machine and motor to the base can lead to machine vibration and discomfort.

- Install the base stressless on the support surface.
- Retighten all motor and machine mounting screws and nuts on the base after 20 operating hours.



WARNING

Injuries caused by friction, catching, grazing from the exposed rotating drive shaft/coupling!

If the machine starts up unexpectedly during assembly or repair work, this can result in accidental contact with the exposed rotating drive shaft/coupling.

- The coupling area must be protected by a screwed cover.
- The machine may only be started up again after maintenance, repairs or trouble-shooting once all the protective equipment has been re-installed.
- Before starting assembly and repair work on the coupling, switch the machine off and secure it against being switched on again.

6.5.2.1 Base C (coupling)

In addition, also read and note the following:  "Coupling manufacturer's operating instructions"



ATTENTION

Vibration and wear due to incorrectly oriented coupling!

To protect the machine against damage caused by vibration, you must **check the orientation of the coupling before start-up and correct it, as necessary, →Fig. "Orientation procedure"**.

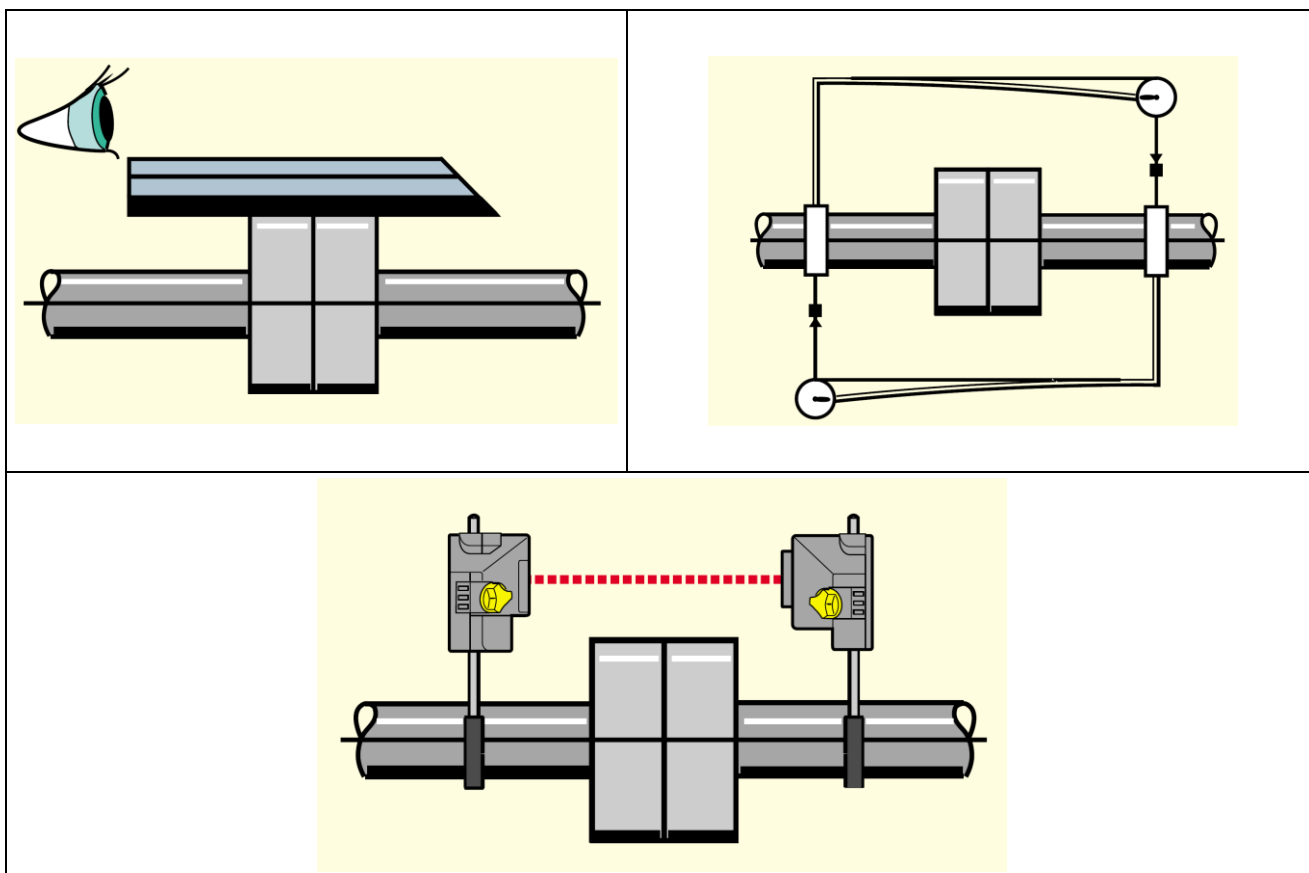



Fig. 9: Orientation procedure

6.5.2.2 Base B (belt drive)

For this type of construction, please request the document  "Technical information TINF.PU.020.xx, accompanying sheet for belt drives".

For machines with belt drive check the belt tension acc. to the accompanying sheet → **Chapter** "Maintenance plan":

- At start-up
- Before and after longer shutdowns
- After the first 10 operating hours
- Every 2000 operating hours, once per year minimum

6.5.3 Machine on hand cart



WARNING

Risk of crushing or concussion due to falling machine caused by insufficient stability!

Secure the hand cart against toppling or rolling during standstill and when the pump is in operation.

6.5.4 Machine on three-point base



WARNING

Risk of crushing or concussion due to falling machine caused by insufficient stability!

Before operating the pump, ensure that the three-point base is properly attached and secured to the tractor.

6.6 Drive

The technical specifications for the drive system to be installed are determined by the machine's specifications → **Chapter** "Specifications".

In addition, also read and note the following:  "Installation instructions/operating instructions" for the drive system to be installed.



WARNING

Injuries caused by friction, catching, grazing from the exposed rotating drive shaft/coupling!

If the machine starts up unexpectedly during assembly or repair work, this can result in accidental contact with the exposed rotating drive shaft/coupling.

- The coupling area must be protected by a screwed cover.
- The machine may only be started up again after maintenance, repairs or trouble-shooting once all the protective equipment has been re-installed.
- Before starting assembly and repair work on the coupling, switch the machine off and secure it against being switched on again.

6.6.1 Electric drive

Connection to the energy supply may only be established by qualified technical personnel **following** installation in the pipe.



RISK OF ELECTRIC SHOCK

Touching live parts leads to dangerous electrocution.
This can result in electric shock, burns or death.

In addition, also read and note the following:  "Motor operating instructions"

Before connecting the geared motor (electric motor with gearbox)

- Check that the power supply is correct for the motor.
- Check that the power feed and fuse protection are adequately dimensioned to allow for multiple changes in the direction of rotation and peak loads within a short period of time.
- Be sure to follow the cable layout diagram on the inside of the motor terminal box cover.
- Note that the PTC resistor of the geared motor must be connected to the terminals provided on the pump control, to a PTC control unit or to a variable-frequency drive with a PTC input (each available as an option).
- Install a maintenance switch in close proximity to the machine (recommendation).

Before start-up or long-term storage

The seal on the vent screw must be removed in order to prevent overpressure build-up in the gearbox and thus leakage.

6.6.2 Hydraulic drive

Connection to the energy supply may only be established by qualified technical personnel **following** installation in the pipe.



WARNING

Risk of infection from hydraulic oil!

Leakages can occur due to seal faults.



- Personnel must wear suitable protective clothing.
- The connection to the power supply must be established by qualified technical personnel.

In the event of injuries with hydraulic oil, consult a doctor immediately!

In addition, also read and note the following:  "Operating instructions for hydraulic motor"

Hydraulic hose lines

- Before connecting hydraulic hoses, read and follow the manufacturer's specifications for hydraulic motors.
- Observe the permissible hydraulic pressure and the permissible delivery rate.
- Replace hydraulic hose lines that show signs of damage or ageing. Only use genuine Vogelsang hydraulic hose lines of the manufacturer.
- The date of manufacture of the hydraulic hose line is displayed on the pressing component of the connector. The period of usage for the hydraulic hose line should not exceed 6 years (although 5 years is recommended), including a possible storage period of no more than 2 years.

Installing two hydraulic motors

When two hydraulic motors are installed, they are operated parallel and the torques of both motors are added.

Control unit

In the event of high hydraulic motor speeds, never set the control unit to "lock position" suddenly so as to avoid pressure peaks. If possible also switch from "operation" to "floating position".

6.6.3 Combustion engine drive

In addition, also read and note the following:  "Operating instructions or installation instructions for combustion engine"

Before start-up

- Fill the tank with fuel. The fuel must meet the specifications in the operating instructions.
- Fill up with sufficient operating oils. The oil grade must meet the specifications in the operating instructions.



DANGER

In enclosed or poorly ventilated spaces, poisonous engine exhaust gases can lead to a loss of consciousness and death!

- Never operate the engine in enclosed or poorly ventilated spaces.
- Do not breathe in exhaust gases.



DANGER

Fire hazard due to fuel!

Leaking or spilled fuel can ignite on hot motor parts and cause serious burns.

- Only refuel when the engine is switched off.
- Never refuel in the vicinity of open flames or ignitable sparks.
- Do not smoke.
- Do not spill fuel.



WARNING

Risk of burning due to exposed host surfaces!

Parts of the exhaust system and the surface of the engine become hot during operation and must not be touched until they cool down again once the engine has been switched off.

6.6.4 PTO drive

In addition, also read and note the following:  "Cardan shaft manufacturer's operating instructions"



CAUTION

Impairment of communication and discomfort due to oscillating cardan shafts!

If cardan shafts are connected or aligned incorrectly, this can result in noise generation and vibration hazards.

- Always follow the instructions of the cardan shaft manufacturer.
- Observe permissible flex angle and minimum profile overlapping of the cardan shafts.



WARNING

Risk of crushing when assembling/disassembling stiff cardan shaft couplings!

Cardan shaft couplings may become stiff due to installation errors.





- Wear protective gloves.
- Before installation, check that the PTO shaft is in perfect condition and make sure that the components to be installed are clean.



WARNING

Risk of catching hands or work clothing in the rotating shaft end (without cardan shaft)!

There is a risk of injury due to accidental contact with the exposed rotating shaft end.

Before start-up/operation, make sure that a suitable PTO shaft guard is installed. If no suitable PTO shaft guard is present, please request one from us  .

Operating torque limitation for PTO drive

In order to prevent overloading the pump drive shaft, the operating torque must be limited.

With cardan shafts with a profile	Operating torque limited to
1 3/8", 6-part	1600 Nm
1 3/4", 6-part	3200 Nm
1 3/4", 20-part	3200 Nm

This operating torque limitation is **not** a safety device to prevent pump overpressure (see 'Theoretical operating torque' in → **Chapter** "Specifications".)

6.7 System control



Controls

We recommend our control system, which is specially designed for use with the pump in order to provide optimum service life for the pump. All connections necessary for connecting the pump to a control system are available.

If a new control is made by a switching system manufacturer, the new manufacturer must make the network connections in AC4.

Please contact us with regards to the correct programming of the control system ☎️✉️.



Automatic mode requires safety equipment

Machines that are operated in automatic mode must be equipped with a temperature and pressure monitoring system (safety devices). These safety devices can be obtained from us as options.

Variable frequency drive operation

In general, rotary lobe pumps can be designed for variable frequency drive operation.

Advantages:

- Adaptation to operating conditions (viscosity, delivery rate, NPSH_a)
- Wear compensation
- Speed-proportional delivery rate (see characteristic line)
- Increasing acceleration and deceleration times
 - Reduces pressure peaks
 - Reduces the danger that pipeline vibrations occur

A variable frequency drive with a linear torque characteristic line is to be used. The starting torque/nominal torque ratio must be > 1.3.

7 Start-up



Personnel for start-up and operation

We recommend starting up the machine in the presence of persons who are responsible for further operation of the machine.



WARNING

Risk of injury, catching by rotating rotary lobes!

The pump may only start-up if the inlet and outlet pipes are connected so that access to the rotating rotary lobes in the pumping chamber is not possible.

7.1 Check list before start-up

- Are the inlet and outlet lines connected?
- Are the oil grade and oil level in the gearbox of the pump OK?
- If equipped with a grease nipple, has the sealing prechamber been greased?
- Have all safety devices been installed and their proper functioning ensured?
- Is the coupling, if present, correctly aligned?
- Are the cardan shafts, if present, correctly aligned?
- Is the belt tension, if applicable, OK?
- Is the motor connected correctly to the power supply, if applicable, (see documents provided by the motor manufacturer)?
 - Star or delta connection, voltage, frequency (see name plate and inside of terminal box)?
 - Motor protection ensured, e.g., by a circuit breaker?
 - A short switching time should be set for star-delta starting (if present).
 - A short start ramp should be set for the soft starter, if present.
 - Is the variable-frequency drive/soft starter, if present, designed and configured correctly?
 - Units should be suitable for heavy starting
- Is the motor connected correctly hydraulically, if applicable?
- Are safety devices or maintenance switches easy to reach?
- Is the flow direction OK? Check the pump's direction of rotation.
- Is the pipe system sealed and free of leakage?
- Is unobstructed flow guaranteed in the pipe system?
Positive displacement pumps may never be operated in a sealed pipe.
- Are the drain cocks closed, and is the pump filled with fluid?
- Put the pump into operation and check inlet and outlet pressure, speed and capacity.

7.2 Checks after start-up

→ Chapter "Maintenance plan"

20 hours after start-up:

- Retighten all mounting screws of pump and motor.
- Check the tightening torques of the strain bolt or slotted nut → Table "Tightening torques". To do so, remove the gearbox housing (strain bolt) or the bearing cover on the drive end (slotted nut).



Tightening torques

Strain bolt	Slotted nut
M 16, 10.9: tighten with 200 Nm , then undo before tightening with 140 Nm .	M 45: 600 Nm

Table: Tightening torques

8 Maintenance



WARNING

Risk of injury (catching, crushing, collision) due to rotating rotary lobes if the machine starts up unexpectedly!

Before starting maintenance and repair work (opening covers, disassembling connectors) and before trouble-shooting, switch the machine off and secure it against being switched on again.



WARNING

Skin and eye irritation caused by contact with hazardous working materials or media!

All work on the machine can lead to contact with working materials or media.



- Personnel must wear suitable protective clothing.
- The operator must inform his or her staff about any potentially hazardous substances in working materials or media.
- To protect against fluids spraying out, carefully and slowly open the gearbox. Cover the valves or screws to be removed with a cloth or similar item where appropriate.

8.1 Gearbox

8.1.1 Gear oil - grade

We recommend the oils listed in → **Chapter** "Oils and lubricants".

8.1.2 Gear oil - quantity

1 litre

8.1.3 Gear oil - inspection and change

→ Fig. "Gear oil change"

Check gear oil:

The oil level has to reach the side seal indicator pipe. To check the oil level, unscrew one of the side hexagon head screw plugs and top up small quantities, if necessary, up to the seal indicator pipe (C) (only top up when the gearbox is at a standstill).

Inspection interval:

Every 500 operating hours, however at least every 3 months

Change gear oil:

- After the first 20 operating hours
- Every 2000 operating hours

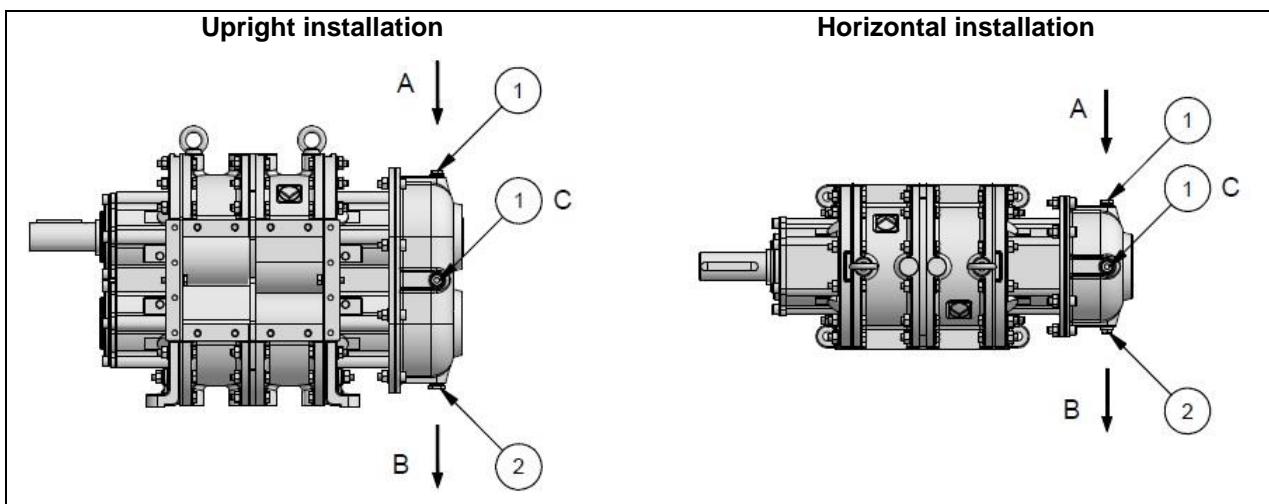


Fig. 10: Gear oil change

- | | | | | | |
|---|--|----------------------------------|---|--|-------|
| 1 | | Hexagon head screw plug | A | | Fill |
| 2 | | Magnetic hexagon head screw plug | B | | Drain |
| | | | C | | Check |



- The hexagon head screw plug **1** must always be on top of the pump, the magnetic hexagon head screw plug **2** on the bottom of the pump.
- Tightening torque for mounting the hexagon head screw plugs → 60 Nm

8.2 Greasing of sealing prechamber



ATTENTION

- A regular → **lubrication interval** prevents the lubrication channel from clogging.
- To ensure effective distribution of the lubricant, always lubricate while the machine is running and not when it is stationary.

Lubrication interval

- At start-up
- After each application
- After longer shutdowns (2-3 weeks)

Lubricating grease - type

We recommend the lubricating grease listed in → **Chapter "Oils and lubricants"**.

Lubricating grease - quantity

5 shots per grease nipple with a lube gun

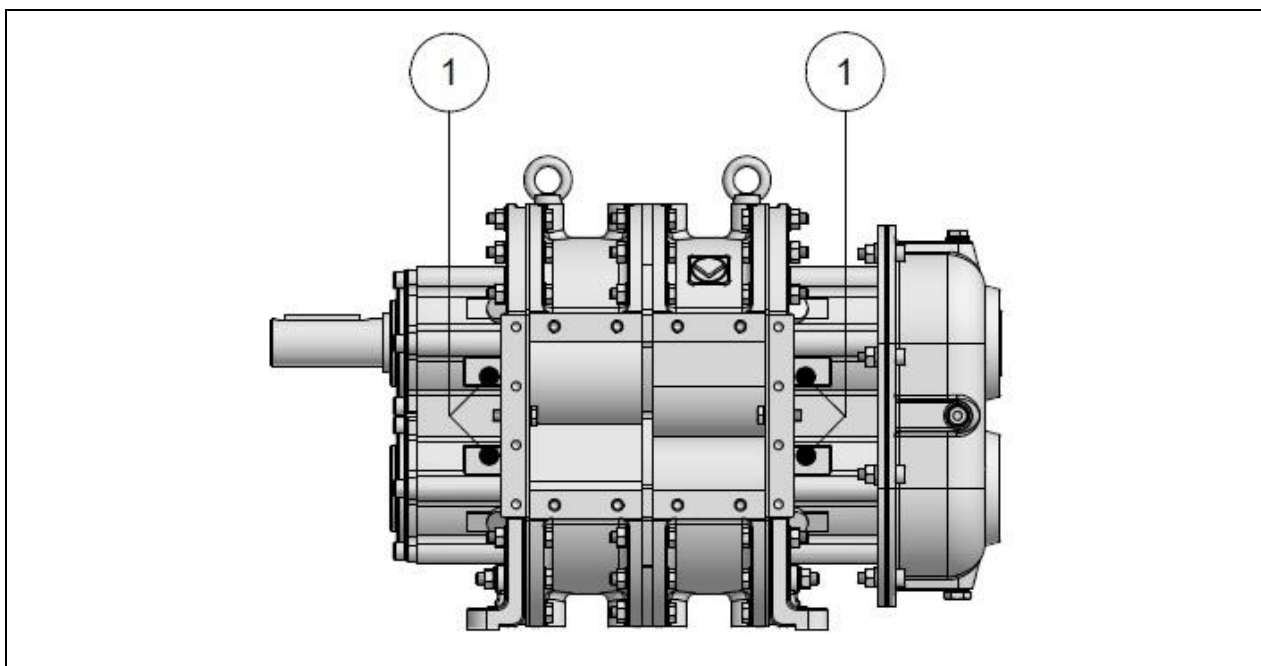


Fig. 11: Grease nipple (1)

8.3 Oils and lubricants

1 Vogelsang standard oil for the pump gearbox

Part number	BSS.006	
Description	EP (Extreme Pressure) gear oil	
Trade name (Fuchs)	Titan Gear MP 90	
Characteristics		Test acc. to
SAE class	90 (85W-90)	DIN 51512 or SAE J306c
Kinematic viscosity		DIN 51562
at 40°C	198 mm ² /s	
at 100°C	17.3 mm ² /s	
Flash point	215°C	DIN ISO 2592
Pour point	-18°C	DIN ISO 3016
Water hazard class	Slightly hazardous to waters	

2 Alternative oils for the pump gearbox

Part number	BSS0021*	
Description	Fully synthetic industrial gear oil based on poly-alpha-olefins	
Trade name (Fuchs)	Renolin Unisyn CLP	
Characteristics		Test acc. to
ISO VG	220	DIN 51519
Kinematic viscosity		DIN EN ISO 3104
at 40°C	220 mm ² /s	
at 100°C	26.7 mm ² /s	
Flash point	260°C	DIN ISO 2592
Pour point	-42°C	DIN ISO 3016
Water hazard class	Slightly hazardous to waters	

* when using BSS0021 oil for the pump gearbox, the maintenance interval for inspection and gear oil change may be doubled → **Chapter "Maintenance plan"**.

Part number	BSS.010**	
Description	Medical white oil: water-white, non-fluorescent, tasteless and odourless mixture of hydrocarbons	
Trade name (Fuchs)	White oil W 530 (PH.EUR.)	
Characteristics		Test acc. to
Kinematic viscosity		DIN 51562
at 20 °C	238 mm ² /s	
at 40 °C	68 mm ² /s	
at 100 °C	8.4 mm ² /s	
Flash point	230 °C	DIN ISO 2592
Pour point	-24 °C	DIN ISO 3016
Ambient temperature	-20°C to +40°C	
Water hazard class	Slightly hazardous to waters	

** **BSS.010** oil is not permitted for high performance applications and continuous operation over a maximum of 50% of the permitted differential pressure → **Chapter "Specifications"**. Please contact us.



Sealing system with mechanical seal ring made of Duronit

If a mechanical seal ring made of Duronit is used in the sealing system, the damage loading step for the buffer chamber oil must be ≥ 12 .

3 Lubricant for pump grease nipples

Part number	BSS.002	
Description	Lithium soap grease with a mineral oil base	
Trade name (Fuchs)	Renolit GP 2	
Characteristics		Test acc. to
Identification	K2K-30 ISO-L-X-CCEA 2	DIN 51502 ISO 6743-9
Intrinsic viscosity		DIN 51562-1
at 40 °C	110 mm ² /s	
at 100 °C	9.5 mm ² /s	
Dropping point	> 180 °C	IP 396
Service temperature	-30 to +120 °C	DIN 51825
Water hazard class	Slightly hazardous to waters	

9 Repair



WARNING

Risk of injury (catching, crushing, collision) due to rotating rotary lobes if the machine starts up unexpectedly!

Before starting maintenance and repair work (opening covers, disassembling connectors) and before trouble-shooting, switch the machine off and secure it against being switched on again.



WARNING

Skin and eye irritation caused by contact with hazardous working materials or media!

All work on the machine can lead to contact with working materials or media.



- Personnel must wear suitable protective clothing.
- The operator must inform his or her staff about any potentially hazardous substances in working materials or media.

9.1 Conversion and spare parts

Modifications or changes to the machine are only permissible after consultation with Vogelsang. Only accessory parts approved by Vogelsang or genuine spare parts may be used. The use of other parts invalidates the guarantee for any resulting damage.

9.2 Installation of gears



Note on gears

The gears must be replaced in pairs only because they are manufactured and marked in pairs (one or two X markings).

The marked tooth of the first gear (A) must be inserted between the two marked teeth of the second gear (B).

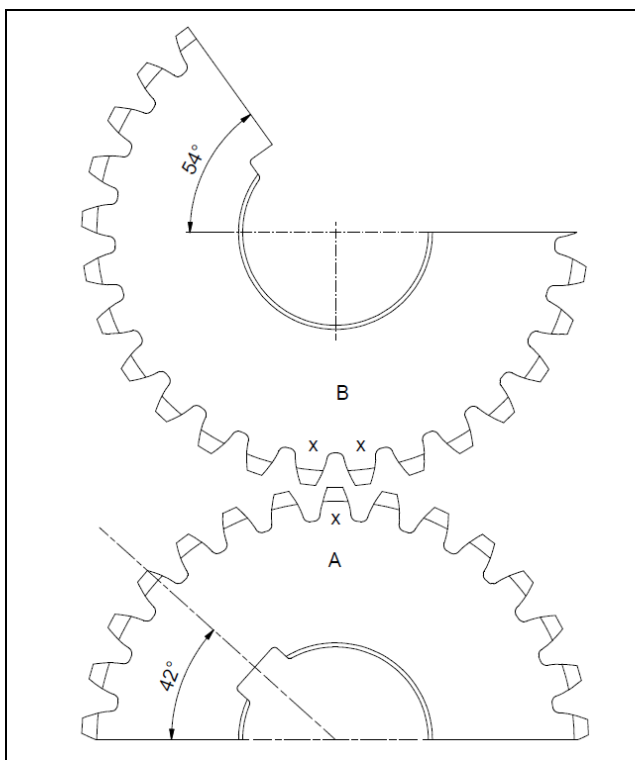


Fig. 12: Installation of gears

After assembling the gears, check the tightening torque of either the slotted nut or the strain bolt.

Tighten **either** the slotted nut **or** the strain bolt:



Tightening torque

M 45 slotted nut: **600 Nm**

M 16 strain bolt, 10.9: Tighten with **200 Nm**, then undo before tightening with **140 Nm**.

9.3 Installation of extracting rings

Make sure to install the extracting rings correctly:



Series	Extracting ring	Part no.	Installation position
R116	Without groove	PRS.021	Drive end at the fixed bearing
	With groove	PRS.022	At gearbox side at the floating bearing

9.4 Rotary lobe change



Rotary lobe change

A rotary lobe change may only be performed by a qualified workshop.

Please contact our service department  .

10 Troubleshooting



WARNING

Risk of injury (catching, crushing, collision) due to rotating rotary lobes if the machine starts up unexpectedly!

Before starting maintenance and repair work (opening covers, disassembling connectors) and before trouble-shooting, switch the machine off and secure it against being switched on again.

10.1 Troubleshooting

Troubleshooting

- No pump delivery
- Pump stops after start
- Intake flow breaks away after start
- Irregular pump delivery
- Capacity too low
- Pump blocked
- Power consumption too high
- Drive belt slips
- Leakage at the pump
- Pump too hot
- Motor too hot
- Noises & vibrations

Help → Chapter "Help"

- A, B, D, G, J, O
- J, K, M, O, P, S
- D, E, G, S, S
- D, E, G, J
- D, G, J, O, P, Q, R
- C, F, J, K, M, O, R, S
- C, M, O, P, S
- F, H, M, O, P
- C, O, R
- A, C, M, N, O, P, R
- C, K, L, M, O, P, S
- C, D, E, F, G, I, J, K, M, N, O, P



Personnel must wear appropriate protective clothing for the work listed in the following that may be necessary.

10.2 Help

	Possible cause	Possible measure	Observe notes and safety notes → Chapter
A	Pump is not priming	Fill the pump with fluid.	
B	Incorrect direction of rotation	Change the pump's direction of rotation.	"Flow direction"
C	Pipe causing pump housing warping	Check the orientation of the pipe to the pump. If necessary, provide a compensator or secure the pipe.	"Installation in pipe lines"
D	Leakage in the suction pipe	Check the suction-side pipe system for leakage.	
	Gas formation	Vent the suction pipe and pump chamber, fill with fluid.	
E	Suction pipe clogged	Check the free flow of the pipe system on the suction side.	
F	Foreign matter in medium	Clean pump unit. Install strainer in the suction pipe.	
G	NPSH _a too low (medium evaporates during feeding)	Increase the suction pipe diameter, shorten the suction pipe length, simplify suction pipe assembly, reduce the suction height, reduce the speed, adjust the medium temperature.	"Installation in pipe lines"

	Possible cause	Possible measure	Observe notes and safety notes → Chapter
H	Belt tension too low	Tighten in accordance with manufacturer's specifications.	"Installation of pump and motor on base"
I	Coupling not correctly aligned	Check the orientation and align according to manufacturer's specifications if necessary.	
J	Belt drive slips	Tighten in accordance with manufacturer's specifications.	
K	Faulty electrical connector	Check electrical equipment.	"Connection to the power supply"
	Error in the hydraulic system	Check the hydraulics.	
L	Motor speed too low during variable frequency drive operation	Install external fan, increase motor speed.	"Variable frequency drive operation"
M	Stiff running caused by swollen lobe elastomer	Check the medium resistance of the lobe elastomer.	"Material description for rotary lobes"
	Stiff running caused by accumulation of solid matter in the gaps	Clean pump chamber, adjust drive.	"Repair", "Connection to the power supply"
N	Oil level in the gearbox is not OK	→ Chapter "Gearbox"	"Maintenance"
O	Differential pressure too high	Reduce differential pressure.	"Specifications"
P	Medium viscosity above the nominal value	Reduce speed. Increase medium temperature.	"Intended use"
Q	Medium viscosity below the nominal value	Increase speed, decrease medium temperature, replace wear parts.	"Repair"
R	Medium temperature above the nominal value	Reduce medium temperature.	"Intended use", "Material description for rotary lobes"
S	Medium temperature below the nominal value	Increase medium temperature (after consulting Vogelsang).	

11 Putting out of operation and disposal

1. Disconnect pump from the power supply or the spline drive. Observe notes and safety notes → **Chapter "Installation" → Chapter "Drive"**.
2. Disconnect pump from the pipe. Observe notes and safety notes → **Chapter "Installation" → Chapter "Installation in pipes"**.



WARNING

Risk of injury by crushing or impact!

Pipes under flexural strain can spring back under spring energy.



- Personnel must wear suitable protective clothing.
 - Carefully loosen the screws.
3. Drain working materials and residual medium.
 - Empty pump gearbox: Observe notes and safety notes → **Chapter "Maintenance" → Chapter "Checking and replacing the gear oil"**.
 - Drain any residual medium: Observe notes and safety notes when opening the bearing housing cover → **Chapter "Repair" → Chapter "Rotary lobe change"**.



Environmentally friendly disposal

Treat auxiliary materials and working materials, such as oils, hydraulic fluids and dangerous media like hazardous waste, and dispose of properly.

4. Hand over pump for scrap: Observe notes and safety notes → **Chapter "Transport, storage"**.

12 Maintenance plan

	Start-up*	Before and after longer out-of-service periods	After the first 10 operating hours	After the first 20 operating hours	Every 500 operating hours, at least every three months	Every 2000 operating hours, at least once a year	After each application
Lubricate grease nipple	X	X					X
Check belt tension for pumps with belt drive acc. to accompanying sheet	X	X	X			X	
Tighten the screws for the base				X			
Check the tightening torque (slotted nut or strain bolt)				X			
Change gear oil				X		X	
Check gear oil					X		

* → Chapter "Checklist before start-up"

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