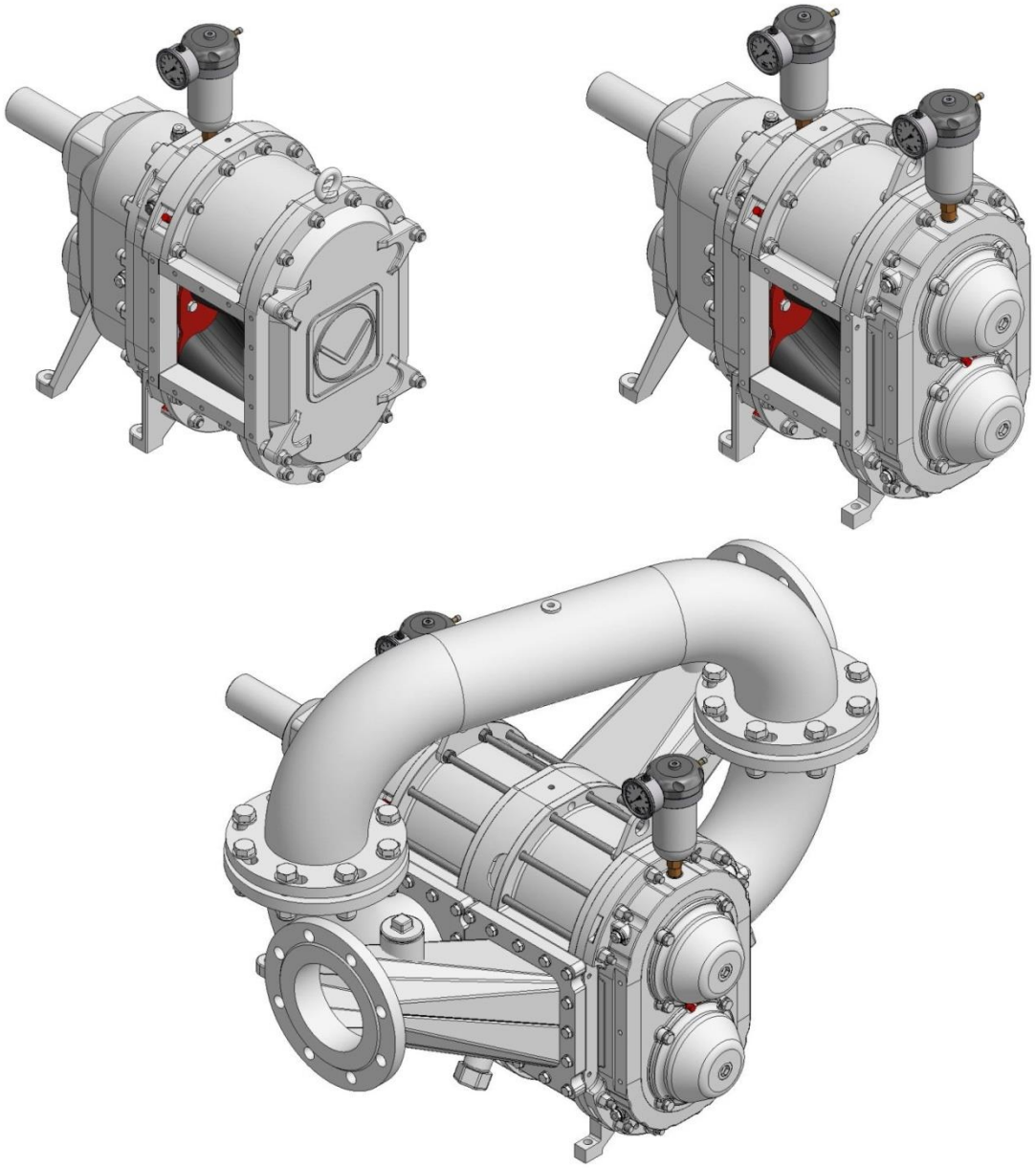
Operating instructions

Rotary lobe pump

VX100Q, VX136Q..QD..QDM2, VX186Q..QD..QDM2, VX230Q..QD

ENGINEERED TO WORK



Original operating instructions

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Contents

1 User information 5
1.1 Using the operating instructions 5
1.2 Warning signs, danger symbols, information 5
1.3 Presentation convention 5

2 Intended purpose 6

3 Safety 6
3.1 General safety notes 6
3.2 Training of persons 9
3.3 Warning and safety notes on the pump 10

4 Direction Of Flow 12
4.1 Drive units 12
4.2 PTO drive 12
4.3 Marathon pumps 13
4.4 Pump systems 14
4.5 InjectionSystem 14

5 Assembly 15
5.1 Transport 15
5.2 Pump and motor on base 18
5.3 Installation in pipe systems 19
5.4 Pipes and connectors 20
5.4.1 Suction lines 21
5.4.2 Discharge pipes 21
5.5 Notes on the control 22
5.6 Connection to the power supply 23
5.6.1 Electric drive 23
5.6.2 Hydraulic drive 23

6 Start-up 24
6.1 Check list before start-up 24

7 Maintenance 25
7.1 Buffer chamber 25
7.1.1 Buffer or quenching fluid - type 25
7.1.2 Buffer or quenching fluid - quantity 25
7.1.3 Buffer or quenching fluid - inspection and change 26
7.2 Buffer chamber assemblies 27
7.2.1 Pressurisable buffer fluid tank 27
7.2.2 Depressurised quenching fluid tank 28
7.2.3 Pressure valve 29
7.2.4 Plug 29
7.2.5 Dry buffer chamber 30
7.2.6 Circulation system on the cartridge mechanical seal 32
7.3 Draining and cleaning the buffer chamber 33
7.4 Gearbox 34
7.4.1 Gear oil - grade 34
7.4.2 Gear oil - quantity 34
7.4.3 Gear oil - inspection and change 34
7.5 Greasing of sealing prechamber 37
7.6 Oils and lubricants 38

8 Repair 41
8.1 Conversion and spare parts 41
8.2 Before opening the Q or QD cover 42
8.3 Opening the Q cover 42
8.4 Closing the Q cover 42
8.5 Opening the QD cover 43
8.6 Closing the cover plate for QD/QD Marathon-pumps 44
8.7 Rotary lobe change 45
8.7.1 Rotary lobe change - VX100Q, VX136Q, VX186Q, VX230Q series 46
8.7.2 Rotary lobe change - VX136QD, VX186QD, VX230QD series 48
8.7.3 Rotary lobe change - VX136QDM2, VX186QDM2 series 49

8.8 Change of wear plates ... 50
8.9 Change of cartridge mechanical seal ... 51
8.9.1 Change of cartridge mechanical seal on the gearbox ... 51
8.9.2 Cartridge mechanical seal change on the QD cover ... 53
8.10 Adjusting of pump housing segments ... 54
8.11 Reducing the starting torque ... 55

9 Maintenance plan ... 57

10 Service plan ... 58

11 Trouble-shooting ... 59
11.1 Troubleshooting ... 59
11.2 Help ... 60

12 Specifications ... 61
12.1 Material description for rotary lobes ... 61
12.2 VX100 – Technical data ... 62
12.3 VX100 with flanged electric motor – Technical data ... 62
12.4 VX136 – Technical data ... 63
12.5 VX186 – Technical data ... 63
12.6 VX230 – Specifications ... 64

13 Long-term storage ... 65

14 Putting out of operation and disposal ... 66

15 Declaration of Installation ... 67

Table of figures

Fig. 1: Warning and safety stickers ... 10
Fig. 2: Flow direction with motor drive ... 12
Fig. 3: Flow direction with PTO drive ... 12
Fig. 4: Flow direction with Marathon pumps ... 13
Fig. 5: Flow direction with pump units ... 14
Fig. 6: Flow direction with InjectionSystem ... 14
Fig. 7: Transport aids - pump type Q ... 15
Fig. 8: Transport aids - pump types QD and QDM2 ... 15
Fig. 9: Transport aids - pump with flange-mounted electric motor ... 16
Fig. 10: Transport aids - pump on base, type inline ... 16
Fig. 11: Transport aids - pump on base, type belt drive ... 16
Fig. 12: Orientation procedure ... 18
Fig. 13: Installation versions ... 19
Fig. 14: Tightening sequence ... 20
Fig. 15: Long suction lines ... 21
Fig. 16: Buffer chamber monitoring ... 27
Fig. 17: Pump with quenching fluid tank, without pressure valve ... 28
Fig. 18: Pump with pressure valve, without buffer fluid tank ... 29
Fig. 19: Installation example - dry buffer chamber ... 31
Fig. 20: Flushing operation ... 32
Fig. 21: Gear oil change VX100 ... 35
Fig. 22: Gear oil change VX136, VX186, VX230 ... 36
Fig. 23: Opening/Closing the Q cover ... 42
Fig. 24: Opening/Closing the QD cover ... 43
Fig. 25: Cleaning before QD cover assembly ... 44
Fig. 26: Arrangement of HiFlo *and* HiFlo*plus* ... 45
Fig. 27: Rotary lobe change, Q series ... 46
Fig. 28: Position of pressure disc and spring washer ... 47
Fig. 29: Rotary lobe change, QD series ... 48
Fig. 30: Rotary lobe change, QDM2 series ... 49
Fig. 31: Installation position of the curved wear plates ... 50
Fig. 32: Cartridge mechanical seal on the gearbox ... 52
Fig. 33: Cartridge mechanical seal on the QD cover ... 53
Fig. 34: Adjustment of pump housing segments ... 54

Dear customer,

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
If you want to know more about our company or put forward requests or suggestions, a wealth of information can be found at www.vogelsang.info

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 all of the relevant technical data.
The operating instructions are a component of the machine.
Please therefore keep the instructions ready to hand to ensure easy access to the necessary information at all times.
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 maintenance and operating instructions.

1.2 Warning signs, danger symbols, information


This warning warns you of possible hazards to the health and life of yourself and other people resulting from the handling and operation of this machine.


This warning warns you of possible hazards through electric shock.


This note warns you of possible hazards for your machine.


This information provides you with additional advice and tips.


We use this symbol to indicate measures to be observe to prevent damage to the environment.

1.3 Presentation convention

Illustration	**Meaning**
•	Listing
–	Sublisting
1. 2.	Carry out these actions in the described sequence by
→ **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

2 Intended purpose

The Vogelsang rotary lobe pump (hereinafter “pump”) 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 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.

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

The pump without connections or without drive is an incomplete machine. The pump installation instructions are provided in the "Installation" chapter.
The declaration of installation is part of these operating instructions.

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

3 Safety

3.1 General safety notes

Before assembly, commissioning, start-up, maintenance and repair of the pump, read the operating instructions completely and carefully observe the warning and safety notes.

Danger of electric shock from pumps with an electrical drive

Only qualified electricians may connect the device to the power supply.

Danger of infection due to hydraulic oil under pressure escaping on pumps with hydraulic drive

- The connection to the power supply must be done by qualified personnel.
- Leakages can occur due to seal faults.
- Wear protective goggles.

On injuries with hydraulic oil, seek out a doctor immediately!

Risk of injury from rotating parts

- Before performing any maintenance and repair work, switch off the drive and make sure that the drive cannot be unintentionally switched on again.
- Pump may only be started up if the inlet and outlet pipes are connected so that access to the pumping chamber is not possible.

Risk of injury from bursting components and medium spraying out under high pressure

- The maximum operating pressure must not be exceeded → **Chap.** “Technical data" .
- Observe and implement the recommendations in the → **Chap.** “Installation in pipelines".
- Protect the pump assembly against excess pressure. For example, the following **safety devices** can be used:
  - a current limiter on the motor
  - a pressure relief valve
  - cut-off with a pressure switch
  - an overload coupling

Skin and eye irritation caused by auxiliary materials, operating materials and medium

- Protective clothing (protective goggles, protective gloves) must be worn during all work involving possible contact with auxiliary materials, operating materials and medium. In certain situations these materials or the medium can enter the buffer chamber or gearbox.
- Before opening covers, connectors etc., the pump assembly must be depressurised to prevent the medium from spraying out.
- To protect against fluids spraying out, carefully and slowly open the buffer chamber, the bearing cover on the QD cover and the gearbox. Cover the valves or screws to be removed with a cloth or similar item where appropriate.

Danger of burning or scalding
by auxiliary materials, operating materials and medium starting at 60°C

is present

- when there is direct contact with hot auxiliary materials, operating materials and hot medium.
- from spraying of hold auxiliary materials, operating materials and hot medium.
- when there is inadvertent contact with hot surfaces (pump housing, pipelines).

Therefore

- before maintenance and repair work, allow the pump to cool down, wear protective gloves and protective goggles.
- avoid touching the pump and the pipelines during operation.

Danger of burning due to exposed hot surfaces when the pump is running dry

Avoid pump dry running. Prevent the pump from running dry using, for example

- a temperature monitor
- a level gauge
- a flow rate gauge

Automatic mode requires safety equipment

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

Check safety devices

Qualified personnel must connect and check safety devices on a regular basis for proper function, especially after doing maintenance and repair work, before restarting.

Risk of injury when loading and transporting the pump or the pump unit

- Use the lifting eye bolts on the pumps only for lifting the pump **without** mounted parts (for example, the motor).
- The unit may only be transported suspended or screwed to a Euro pallet. → **Fig.** “Transport aids”.
- During loading operations and when setting down the pump or the pump unit, it may be begin to swing or fall. Risk of crushing! Therefore:
  - 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.

Risk of injury from stumbling on slippery floor

- Keep work station clean and clean up any auxiliary materials, operating materials and medium residue that may be present, especially before maintenance and repair work on the pump or the pump unit.
- Caution when temperatures are below freezing - keep workplace free of ice.

Closed pipe

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 unit is optionally available from us (setting at 10 % over the nominal pressure) ☎✉.

Risk of frost

- If there is a risk of frost, drain the pump by running the pump in either direction, until all liquid is drained out of the pump. Therefore you may use the drain cocks in the connectors.
- For complete emptying, remove the Q or QD cover, → **Chap.** “Opening the Q cover" or “Opening the QD cover".
- Attention! Before start-up, refill with fluid.

High viscosity medium

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

Pumps with a mechanical seal consisting of the material combination SiC-SiC:

To avoid adhesion of the mechanical seal faces this pump needs to be rotated (at least one revolution) every two months when not in service.

3.2 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/persons	Person specially trained for the activity [1)]	Instructed person [2)]	Persons with specialised training (qualified workshop) [3)]
Transport	X	--	X
Assembly, installation	--	--	X
Start-up	--	--	X
Operation	X	X	X
Maintenance	X	X	X
Repair	--	--	X

Legend: X..allowed --..not permitted

1) A person who can take over a specific tasks and is authorized to carry it out for a company that is accordingly qualified.

2) Whoever has been instructed, and if necessary trained, about the tasks assigned to them and possible risks associated with incorrect behaviour and has been instructed about the required protective equipment and protective measures is considered a trained person.

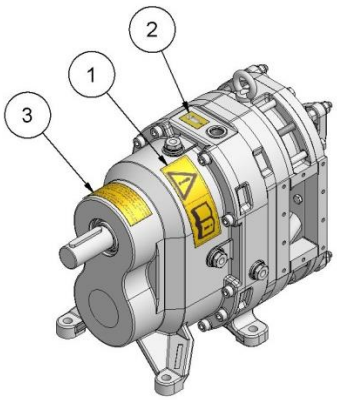
3) Persons with specialised training are considered specialists. Based on your technical training and knowledge of the relevant provisions, you can assess the tasks assigned to you and recognize possible dangers.

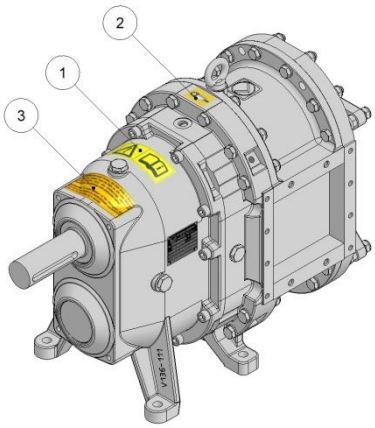
Note:
A qualification equivalent to technical training may also have been attained by many years of activity in the relevant field of work.

3.3 Warning and safety notes on the pump

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 pump.
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

<table>
<tr>
<td> 

VX100Q</td>
<td> 

VX136Q, VX186Q, VX230Q</td>
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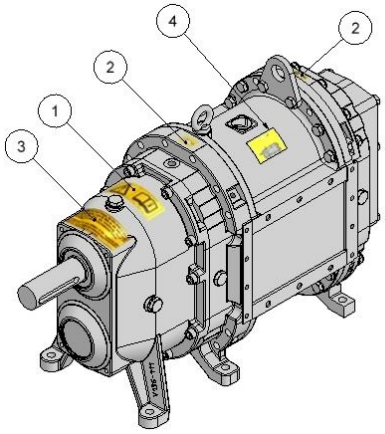
<td> 

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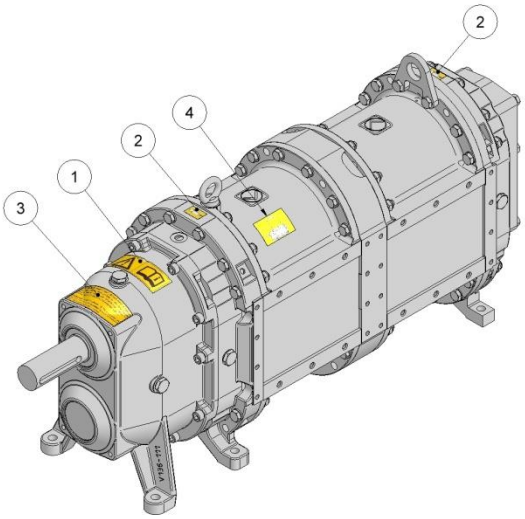
<td> 

VX136QDM2, VX186QDM2</td>
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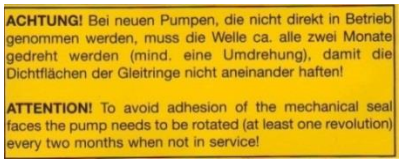
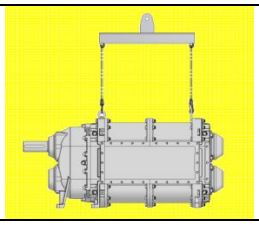
</table>

Fig. **1***: Warning and safety stickers*

The figures shown here are examples only and do not reflect the precise positioning of the stickers.
See also following key on fig. "Warning and safety stickers".

Key→ Fig. "Warning and safety stickers"

Pos.	Sticker	Part no.	Meaning
1		VAU.133	Before starting up the pump, read the operating instructions!
2		VAU.138	Buffer fluid tank or quenching fluid tank
3		VAU.115	(Only used for pumps with a mechanical seal consisting of the mating materials SiC-SiC) *Text – see sticker* *Attention! In the case of new pumps that are not started up immediately, the shaft needs to be rotated approximately every two months (at least one revolution) to prevent the sealing surfaces on the mechanical seal rings from adhering to one another.*
4		VAU0050	Lifting with cross-beam on the following series: VX136-420QDM2, VX186QD/VX86QDM2 as of chamber length 368, VX230QD

4 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:

- Marathon pumps VX136QDM2, VX186QDM2 → **Chapter** “Marathon pump".
- Installation in pipes with automatic check valves →**Chapter** "Pump units".
- Injection A → **Chapter** "InjectionSystem".

4.1 Drive units

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

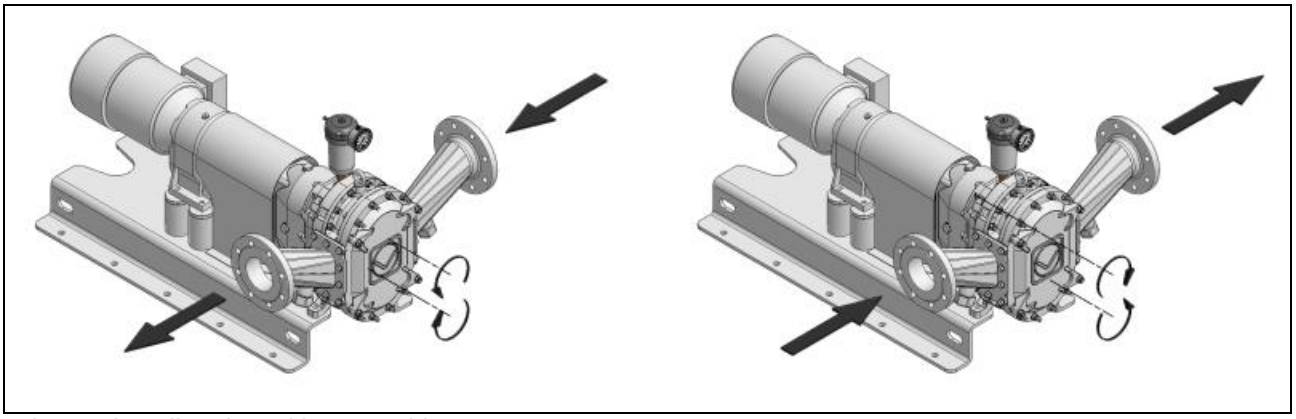


*Fig. **2**: Flow direction with motor drive*

4.2 PTO drive

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

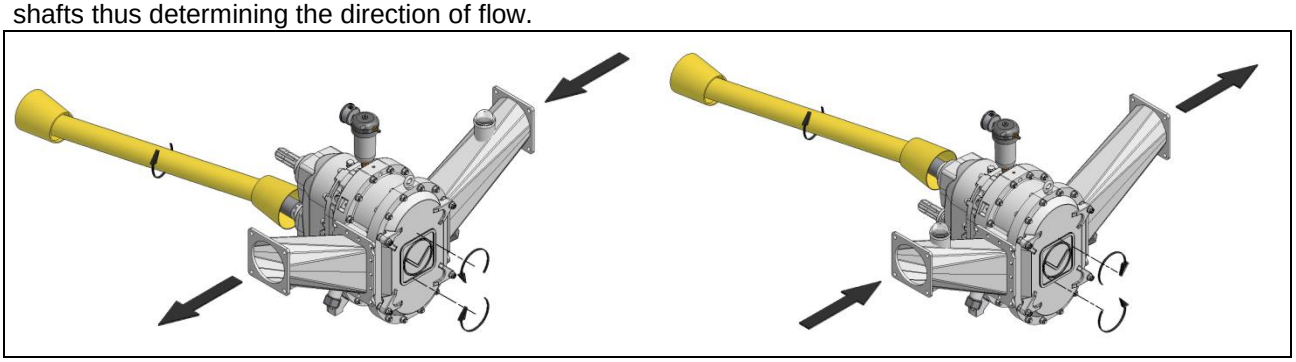


*Fig. **3**: Flow direction with PTO drive*

Risk of noise and vibration due to incorrect connection and orientation of the cardan shafts

Generation of noise and vibrations can cause impairment of communication and discomfort. Therefore please read the operating instructions of the cardan shaft manufacturer and follow the instructions. Observe permissible flex angle and minimum profile overlapping of the cardan shafts.

Risk of crushing due to seized couplings of the cardan shafts

- In order to prevent the coupling from seizing, make sure assembly is clean and make sure that the PTO shaft is in flawless condition.
- Wear protective gloves.

Danger from rotating shaft end

In order to prevent the hands or the work clothing from getting caught on the rotating shaft end (without cardan shaft), the pump may only be operated with a suitable PTO shaft guard. Please contact us☎✉.

Operating torque limitation for PTO drive

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

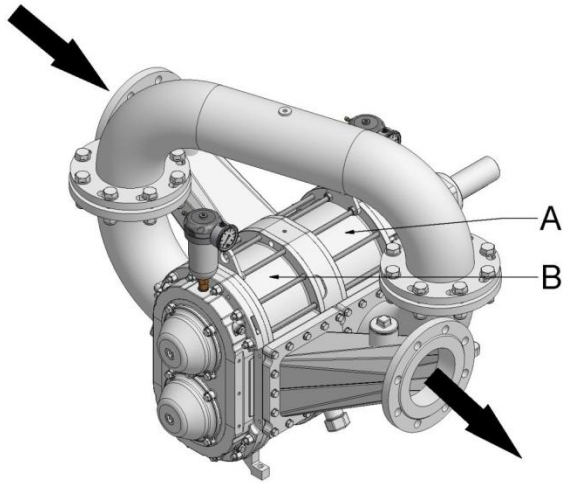
With cardan shafts with a profile	**Operating torque limited to**
1 3/8", 6-part	1.600 Nm
1 3/4", 6-part	3.200 Nm
1 3/4", 20-part	3.200 Nm

No overpressure protection via operating torque limitation

This operating torque limitation is not a safety device to prevent pump overpressure. (see 'Theoretical operating torque' in the → **chapter** "Technical data".

4.3 Marathon pumps

The marathon pump (VX136QDM2, VX186QDM2) is a 2-stage pump with defined suction side and discharge side. Therefore, the direction of flow is not variable.



A Suction side 1st stage
B Discharge side 2nd stage

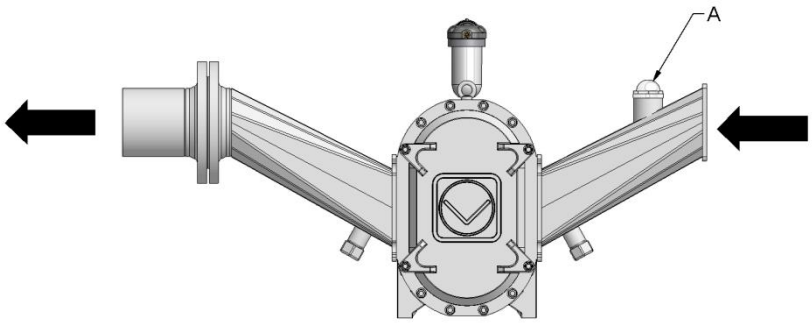
Fig. **4***: Flow direction with Marathon pumps*

4.4 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 pumping direction is not possible if the pipelines are protected by automatic check valves/return valves.

Risk of injury from bursting components and medium spraying out under high pressure

A connection **with sight glass** has to be installed on the suction side. If the sight glass is on the pressure side (when pumping backwards), the pressure may not exceed 2 bars (29 psi).



A Sight glass

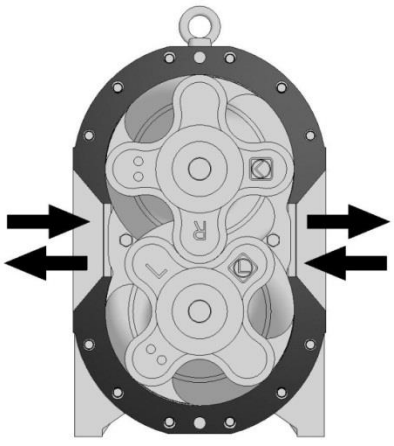
Fig. **5***: Flow direction with pump units*

4.5 InjectionSystem

Injection S
The direction of transport is variable.

Injection A
The constructive filling optimisation is located only on the suction side. Therefore, the direction of flow is set in advance. A brief reverse operation is possible.

Injection S



Injection A

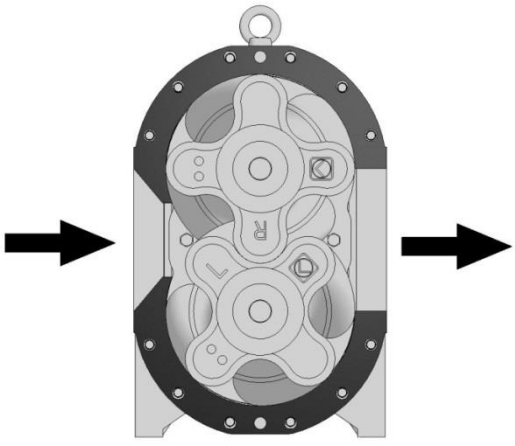
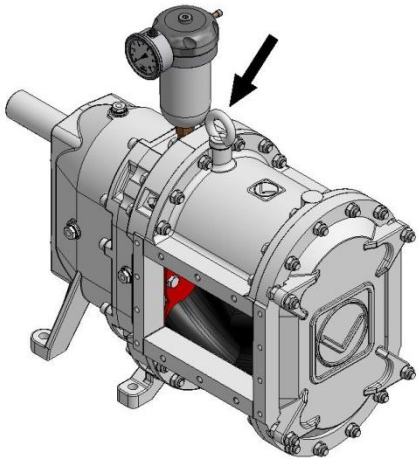


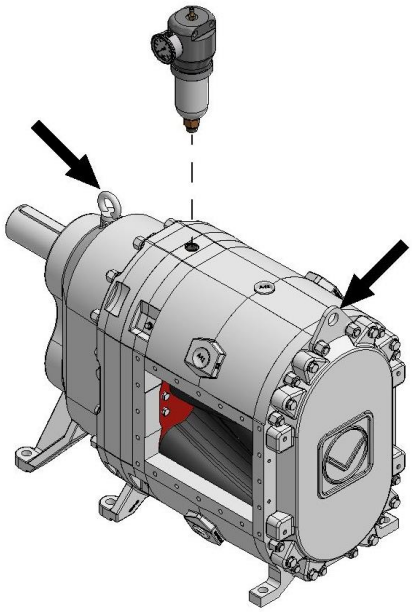
Fig. **6***: Flow direction with InjectionSystem*

5 Assembly

5.1 Transport



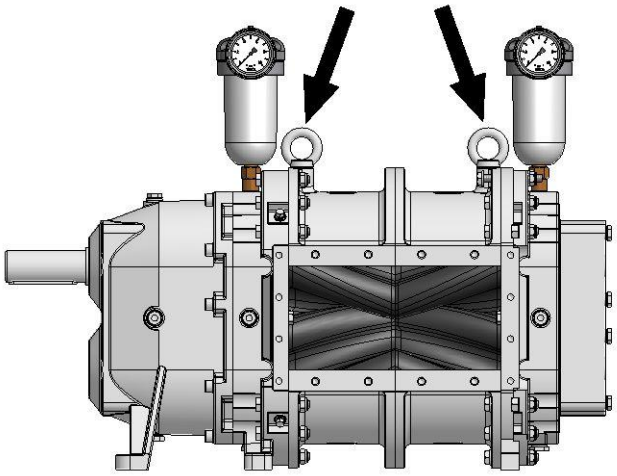
VX100Q, VX136Q, VX186Q



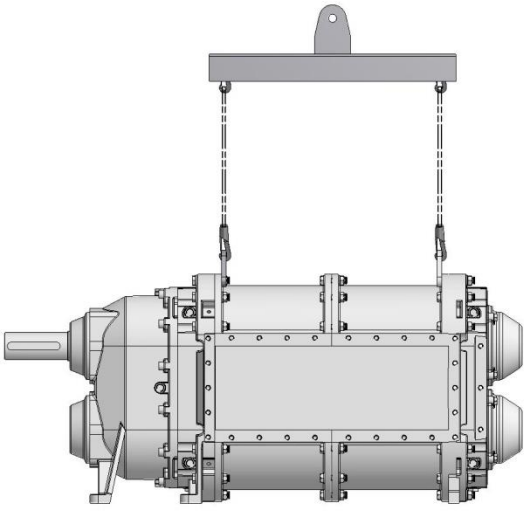
VX230Q

Dismount buffer fluid tank prior to transport and then screw back in again.

Fig. **7***: Transport aids - pump type Q*

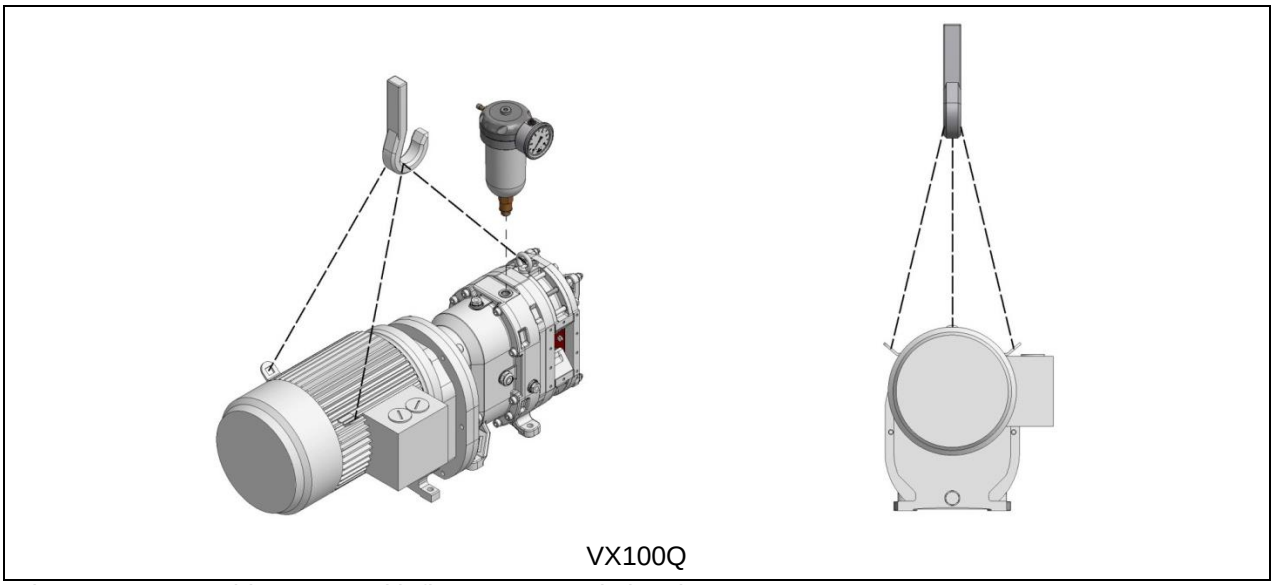


VX136QD
VX136QDM2 up to size 280



VX136QDM2 size 420
VX186QD,VX186QDM2, VX230QD

Fig. **8***: Transport aids - pump types QD and QDM2*



VX100Q

Fig. **9***: Transport aids - pump with flange-mounted electric motor*

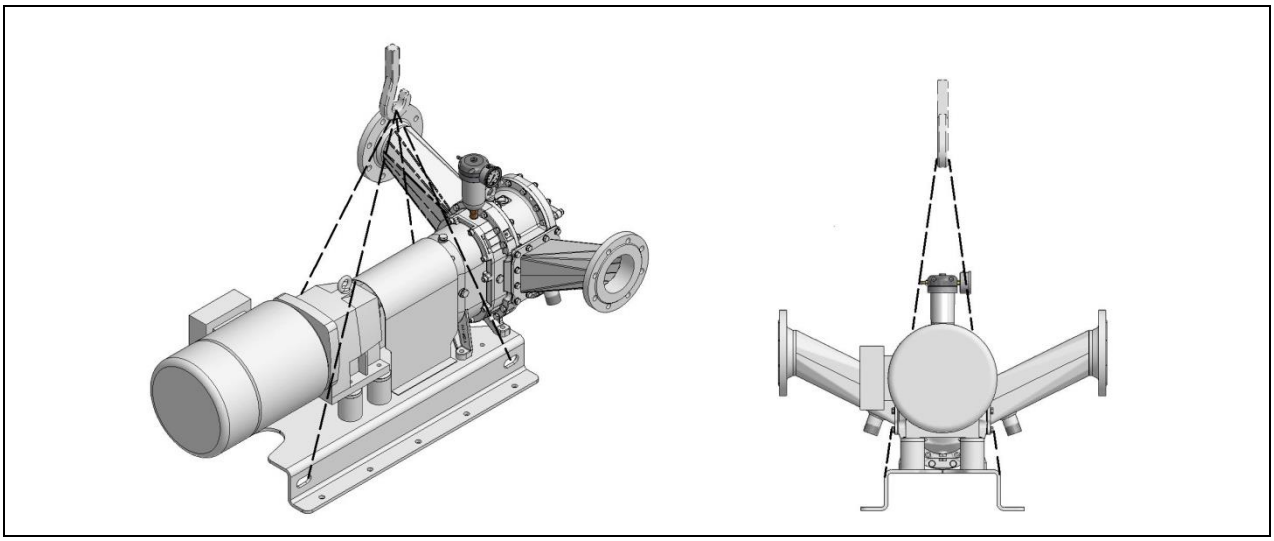


Fig. **10***: Transport aids - pump on base, type inline*

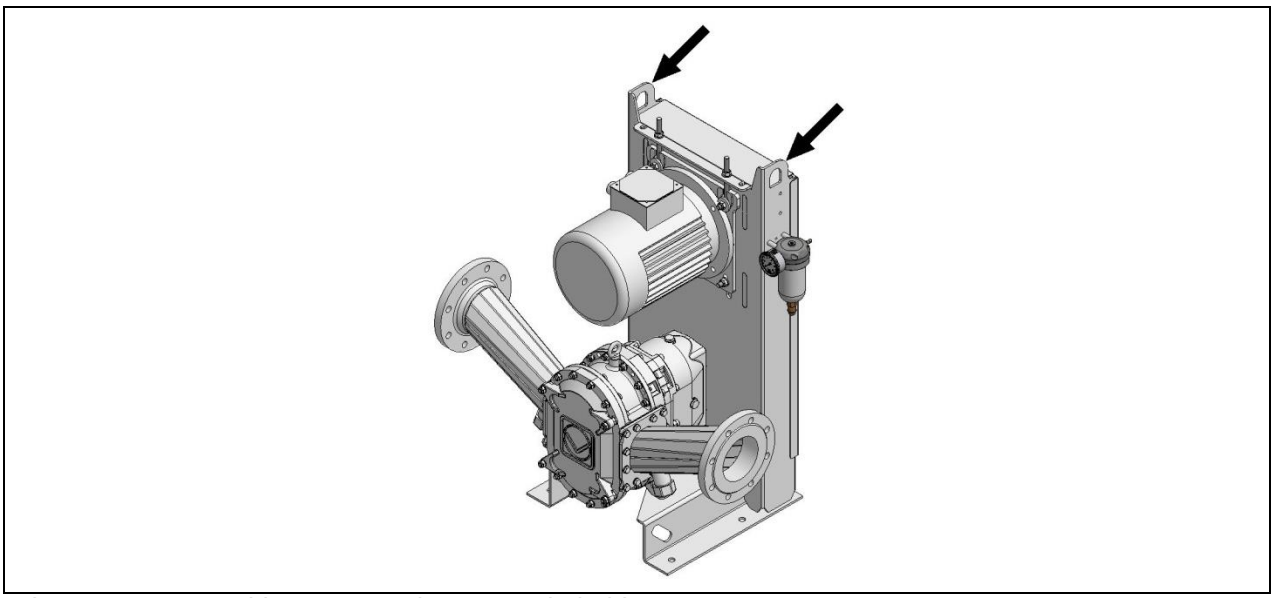


Fig. **11***: Transport aids - pump on base, type belt drive*

Risk of injury when loading and transporting the pump or the pump unit

- Use the lifting eye bolts on the pumps only for lifting the pump **without** mounted parts (for example, the motor).
- The unit may only be transported suspended or screwed to a Euro pallet. → **Fig.** “Transport aids”.
- During loading operations and when setting down the pump or the pump unit, it may be begin to swing or fall. Risk of crushing! Therefore:
  - 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.

Suspended transport
If the pump is transported in suspension, use the fitted suspension points for hoisting gear,
→ **Fig.** "Transport aids" (indicated with arrows).

Lifting eye bolts
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	M8	140 kg
1	M12	340 kg
2	M12	240 kg per lifting eye bolt (*with an angle of attack of up to max 45°)*
1	M16	700 kg

Table of lifting eye bolts

Lifting with a cross-beam
Attention! With these series, use a cross-beam for lifting → **Fig.** "Transport aids":
VX136-420QDM2
VX186QD/VX86QDM2 as of chamber length 368
VX230QD

5.2 Pump and motor on base

Noise and vibration hazard

Wear

Noise, vibrations and oscillations can cause impairment of communication and discomfort.
To avoid wear, vibration and generation of noise:

- the base for the pump and motor must not be tensioned during installation.
- the **orientation of the coupling must be checked and, if necessary, corrected before start-up**, → **Fig.** "Orientation procedure".

Retighten all motor and pump mounting screws on the base **after 20 operating hours.**

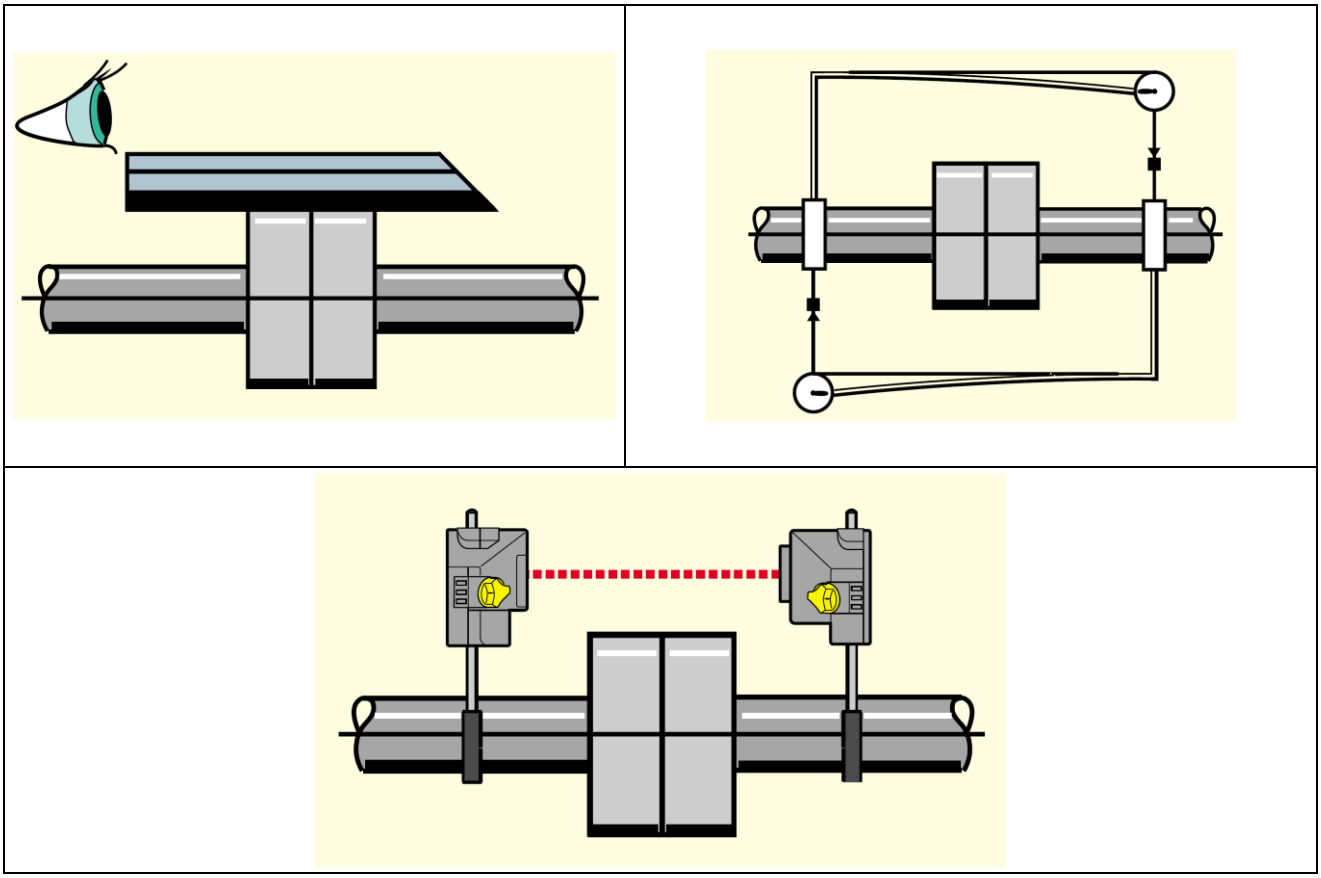


Fig. **12***: Orientation procedure*

"Technical Information TINF.PU.020.xx, accompanying sheet for belt drives"

For pumps with belt drive check the belt tension acc. to the accompanying sheet:

- At start up
- before and after longer out-of-service periods
- After the first 10 operating hours
- every 2000 operating hours, once per year minimum

→ **Chap.** "Maintenance plan"

5.3 Installation in pipe systems

- The pump can be installed upright, horizontal, vertical or suspended → **Fig.** "Installation variants".
  - With a horizontal installation, the inlet should be on the bottom and the outlet on the top.
  - In the case of a vertical installation, please request our "Technical Information TINF.PU.019.xx", in which the filling and emptying of the gearbox and the buffer chamber are described.
  - 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 and buffer or quenching fluid are not easy to reach, drain hoses may be used (part nos. PBT.013 and/or PBT.014).
- Ensure that the pump is tension-free upon installation and also during operating.

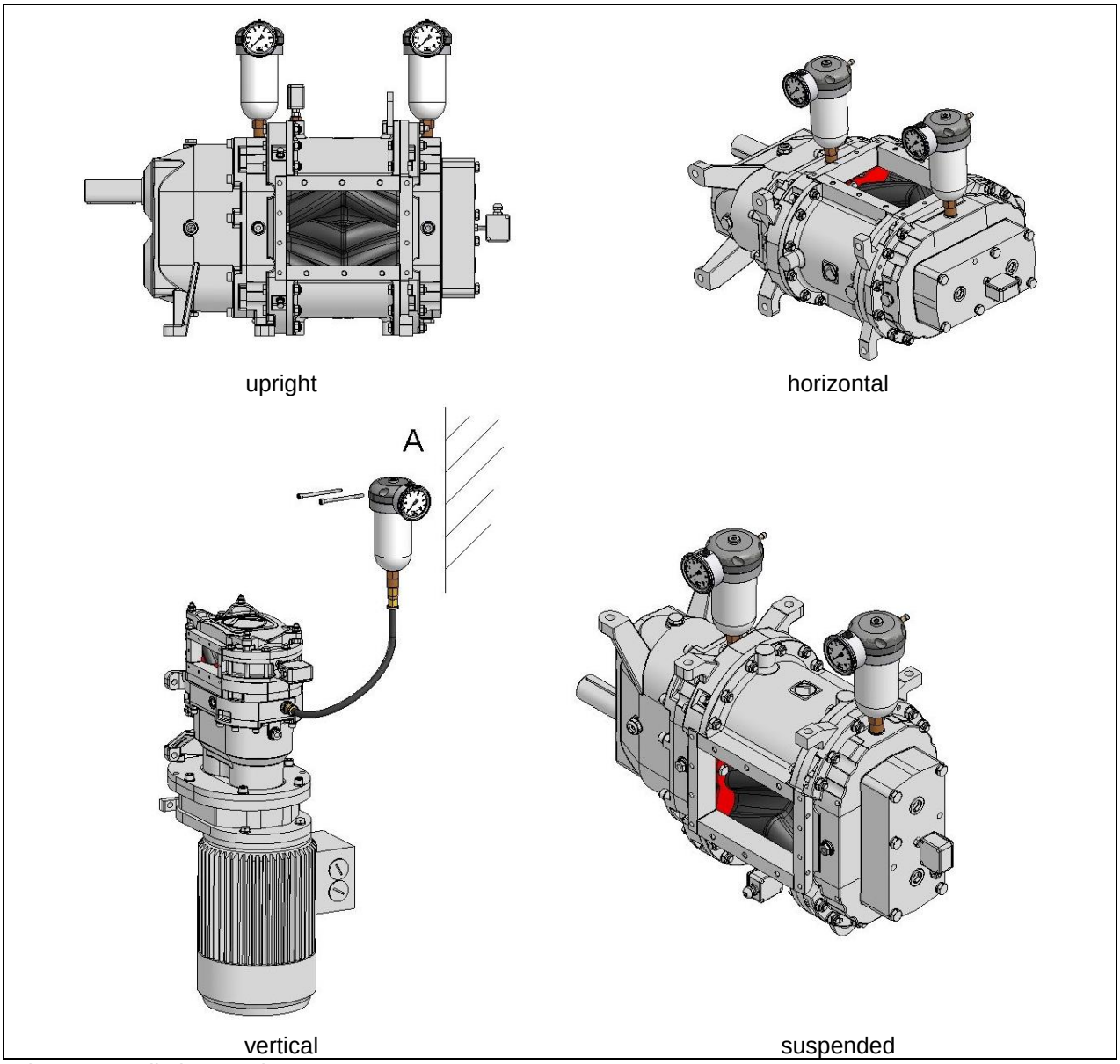


Fig. **13***: Installation versions*

A Fix the buffer fluid tank in place pointing upwards and above the buffer chamber

5.4 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.

! Danger of breakage! Note on installation of connections

Flange connections can exert excessive forces on the unit. Risk of breakage. The connectors must therefore be mounted free of stress, i.e. the connectors must be mounted exactly one in front of the other before they are bolted together.
Note the tightening sequence when mounting the connectors.

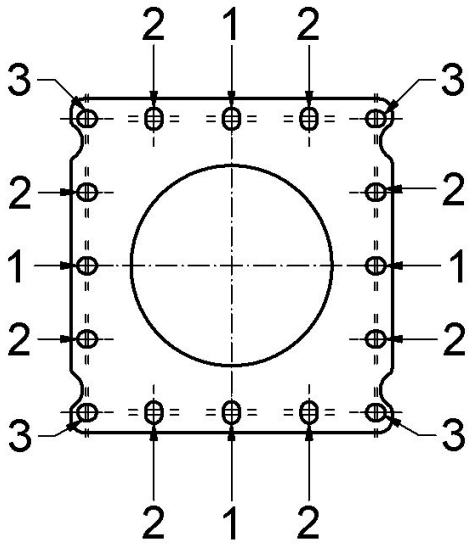


Fig. **14***: Tightening sequence*

5.4.1 Suction lines

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 cavitation hazard!
  - 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 x pipe diameter in the direction of flow, ensuring that the pipeline can never run dry → **Fig.** "Long suction lines".

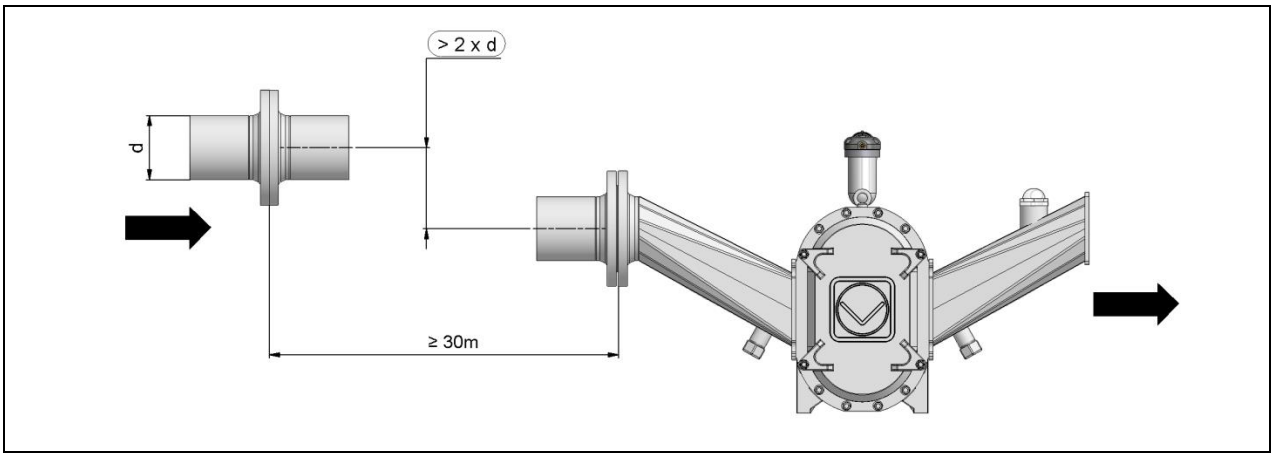


Fig. **15***: Long suction lines*

5.4.2 Discharge pipes

Risk of injury from bursting parts and medium spraying out under high pressure

- 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 permissible operating 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 injury. Therefore, ensure that no medium is left in the pump.
- A connection **with sight glass** has to be installed on the suction side. If the sight glass is on the discharge side (during reverse pumping), the pressure may not exceed 2 bar → **Fig.** "Flow direction with pump units".

5.5 Notes on the 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 ☎✉.

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 static characteristic line is to be used.
The starting torque / nominal torque ratio must be > 1.3.

5.6 Connection to the power supply

Connection to the energy supply may only be established **following** installation in the pipe.

5.6.1 Electric drive

Danger of electric shock from pumps with an electrical drive

Only qualified electricians may connect the device to the power supply.

Connecting the geared motor (electric motor with gearbox)

Before connecting

- check that the power supply is correct for the motor.
- Be sure to follow the cable layout diagram on the inside of the motor terminal box cover.
- note that the PTC temperature sensor of the geared motor must be connected to the terminals provided on the pump control, to a PTC actuation unit or to a variable-frequency drive with a PTC input (each available as an option).
- install a repair switch near to the machine (recommendation).

Before start-up or long-term storage

- the seal in the bleed screw must be removed in order to prevent excessive pressure build-up in the gearbox and thus leaks (see the accompanying documentation "Operating instructions – geared motor").

5.6.2 Hydraulic drive

Danger of infection due to hydraulic oil under pressure escaping on pumps with hydraulic drive

- The connection to the power supply must be done by qualified personnel.
- Leakages can occur due to seal faults.
- Wear protective goggles.

On injuries with hydraulic oil, seek out a doctor immediately!

Hydraulic motors and 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.

Installation of hydraulic motor

- 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 pump 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 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.

6.1 Check list before start-up

- ☐ Are the inlet and outlet lines connected?
- ☐ Is the coupling, if present, correctly aligned?
- ☐ Are the cardan shafts, if present, correctly aligned?
- ☐ Is the belt tension OK?
- ☐ Are the optional buffer chamber assemblies correctly installed? Are they correctly adjusted? Is the buffer chamber pressure OK?
- ☐ Are the oil grade and oil level in the gearbox of the pump OK?
- ☐ Is the type of buffer or quenching fluid OK? Is the fluid level in the buffer chamber 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 motor connected correctly to the power supply (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 hydraulically correctly connected?
- ☐ 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 free flow within the pipe system ensured?
  Positive displacement pumps may never pump medium into 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 Maintenance

Risk of injury from stumbling on slippery floor

- Keep work station clean and clean up any auxiliary materials, operating materials and medium residue that may be present, especially before maintenance and repair work on the pump or the pump unit.
- Caution when temperatures are below freezing - keep workplace free of ice.

Skin and eye irritation caused by auxiliary materials, operating materials and medium

Protective clothing (protective goggles, protective gloves) must be worn during all work involving possible contact with auxiliary materials, operating materials and medium. In certain situations these materials or the medium can enter the buffer chamber or gearbox.

7.1 Buffer chamber

7.1.1 Buffer or quenching fluid - type

For optimum functioning of the mechanical seal, we recommend for standard pumps the oils listed in → **Chapter** “Oils and lubricants".
Please check your order confirmation to see whether the buffer chamber of your pump is filled with a buffer or quenching fluid differing from this chapter. In that case use only the oil specified on your order confirmation.

Health hazard from contamination

Attention! In order to avoid contamination of the pump medium on pumps with a dry buffer chamber as a sealing system, **no fluid** may be added into the buffer chamber.

O-rings from the EPDM material

In order to prevent damage to the seal, no oils for the buffer chamber other than silicone oil may be used with O-ring pumps made of EPDM.

7.1.2 Buffer or quenching fluid - quantity

Series	Litres [l] per buffer chamber
VX100	0.3*
VX136	1.5*
VX136VVA	1.2*
VX186	2.4*
VX186VVA	2*
VX230	5*

Buffer or quenching fluid table
**Reference value, depends on the buffer chamber assembly*

7.1.3 Buffer or quenching fluid - inspection and change

Buffer fluid or quenching fluid

- Check:
  - After the first 20 operating hours
  - Every 200 operating hours

  Electronic buffer chamber monitoring is possible. Ask us ☎✉.
- replace:
  - Every 2000 operating hours
  - When there is severe contamination

When there is intense leakage, replace the cartridge mechanical seal → **Chap.** “Changing cartridge mechanical seal"

→ **Chap.** “Maintenance plan"

Buffer/Quenching fluid

A slight contamination of buffer/quenching fluid as well as a slight rise or fall of buffer/quenching fluid level is determined by the hydrodynamic lubrication-film of mechanical seal and temperature fluctuations.

Environmentally friendly disposal

Treat buffer fluid or quenching fluid, for example, oils and hydraulic fluids, like hazardous waste and dispose of them properly.

7.2 Buffer chamber assemblies

7.2.1 Pressurisable buffer fluid tank

The pressurisable buffer fluid tank (hereinafter “tank”) with manual air pump ensures a constant and defined buffer chamber pressure (buffer chamber pressure = tank pressure).
The tank is for safely monitoring the buffer chamber.

Installing the tank

1. Remove the plug from the buffer chamber and fill it to the maximum level.
2. Screw the tank directly into the cast body of the buffer chamber. Fill the tank about one quarter full.
3. With a manual air pump or via a compressed air supply outlet, set the desired tank pressure.

Tank pressure
The tank pressure should be about 0.5 bar higher than the average pressure in the pump.
Tank pressure = 0.5 bar + (pressure on the suction side + pressure on the discharge side) / 2

Example
One pump primes with 0.4 bar suction and presses with 2.0 bar overpressure.
Pressure on the suction side: – 0.4 bar, pressure on the discharge side: 2.0 bar

$$\text{Tank pressure} = 0.5\ \text{bar} + \frac{(-0{,}4\text{bar} + 2\text{bar})}{2} = 1.3\ \text{bar}$$

In this example, the tank pressure is 1.3 bar.

Independently of this, the tank pressure with a single mechanical seal must be max. 5 bar and max. 10 bar with a double mechanical seal.

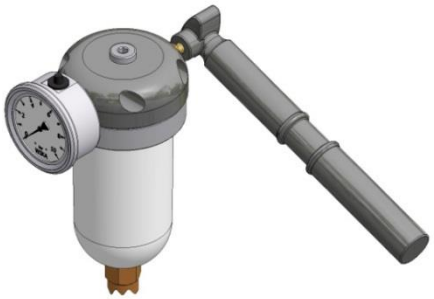
Rotary lobe change
Before changing the rotary lobes, depressurise the **tank pressure** and prime it again after changing.

Trouble indication
Trouble at the sealing system after the running-in period may be displayed:

- as a result of severe contamination of the buffer fluid in the tank
- as a result of buffer fluid escaping (tank is empty)
- as a result of increasing buffer fluid (tank is full)

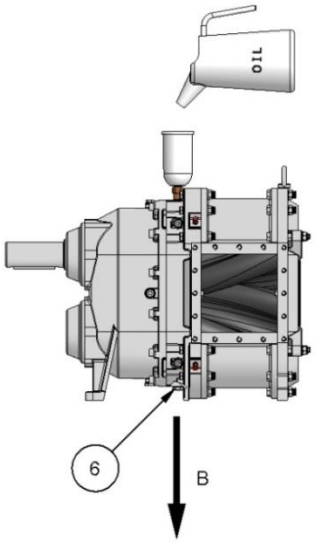
Topping up buffer fluid

1. Drain the pressure from the buffer chamber via the air valve.
2. Loosen the upper screw connection of the upper housing (hold the union nut tight so that the lower screw connection does not come loose).
3. Top up the buffer fluid in the tank
4. Readjust pressure



Buffer fluid tank with pressure gauge, filling valve and manual air pump

Open buffer fluid tank

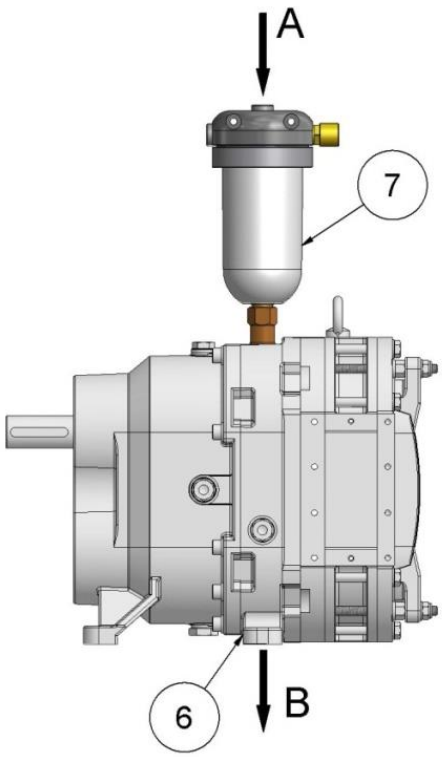


Filling/draining buffer chamber
B draining, **6** hexagon head screw plug

Fig. **16***: Buffer chamber monitoring*

7.2.2 Depressurised quenching fluid tank

The quenching fluid tank must always be a quarter full with quenching fluid to allow for thermal expansion. The level of quenching fluid in the tank can vary because of operational conditional heating of the pump. Unscrew the upper housing of the quenching fluid tank to top up the tank (hold the union nut tight so that the lower screw connection does not come loose).



6	Hexagon head screw plug (*installation tightening torque: 60 Nm*)
7	Quenching fluid tank
A	Filling
B	Emptying

Fig. **17***: Pump with quenching fluid tank, without pressure valve*

7.2.3 Pressure valve

→ **Fig.** “Pump with pressure valve, without buffer fluid tank”
Dismount pressure valve for inspection of buffer fluid and for topping up small quantities in the buffer chamber.

Skin and eye irritation caused by auxiliary materials, operating materials and medium

- To protect against fluids spraying out, carefully and slowly open the buffer chamber. Cover the valves or screws to be removed with a cloth or similar item where appropriate.

Air pocket

Only enough buffer fluid should be added that a pocket of air remains, see C → **Fig.** "Pump with pressure valve, without buffer fluid tank". The pocket of air prevents buffer chamber medium from escaping from the pressure valve due to thermal expansion.

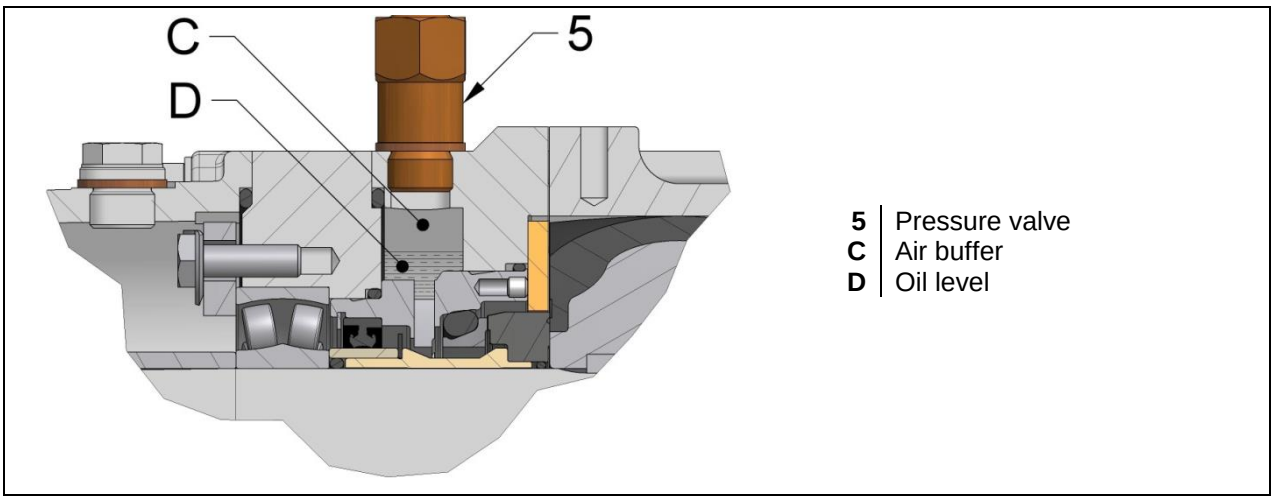


Fig. **18***: Pump with pressure valve, without buffer fluid tank*

7.2.4 Plug

(for special designs only, for example submersible pumps)
Dismount the upper plug (instead of pressure valve) to top up small quantities in the buffer chamber. Buffer fluid level → **Fig.** "Pump with pressure valve, without buffer fluid tank".

Skin and eye irritation caused by auxiliary materials, operating materials and medium

- To protect against fluids spraying out, carefully and slowly open the buffer chamber. Cover the valves or screws to be removed with a cloth or similar item where appropriate.

Air pocket

Only enough buffer fluid should be added that a pocket of air remains, see C → **Fig.** "Pump with pressure valve, without buffer fluid tank". The pocket of air prevents buffer chamber medium from building up an acceptably high pressure via thermal expansion.

7.2.5 Dry buffer chamber

This sealing system is only used if buffer chamber fluid must not get into the pump medium.
It is used for pumps that pump pure, non-abrasive media, e.g. water.

Health hazard from contamination

Attention! In order to avoid contamination of the pump medium on pumps with a dry buffer chamber as a sealing system, **no fluid** may be added into the buffer chamber.

Gearbox oil grade for dry buffer chambers

Medical white oil (part no. BSS.010) can be used as gear oil in these pumps → **Chapter** "Oils and lubricants".
Attention! BSS.010 oil is not permitted for high performance applications and continuous operation over a maximum of 50% of the permitted pump pressure. Please contact us ☎✉.

Avoid dry running

To protect against seal damage, dry running of the pump must be avoided on pumps with a dry buffer chamber. Before start-up, remove the plug from the vent screw (5) → **Fig.** "Installation example - dry buffer chamber" and completely fill the pump chamber with fluid.

Combination of mechanical seal rings in this sealing system
Type of construction: Block ring
Mating materials: AISI 304/AISI 316 Ti tungsten carbide coated/coal

Assembly
→ **Fig.** "Installation example - dry buffer chamber"
Connect the buffer chamber tank (3) with connecting pipe (4) at the bottom of the buffer chamber. The buffer chamber tank must be installed below the buffer chamber in order to collect leakage. The fluid level in the buffer chamber tank should come up no further than the bottom edge of the buffer chamber.

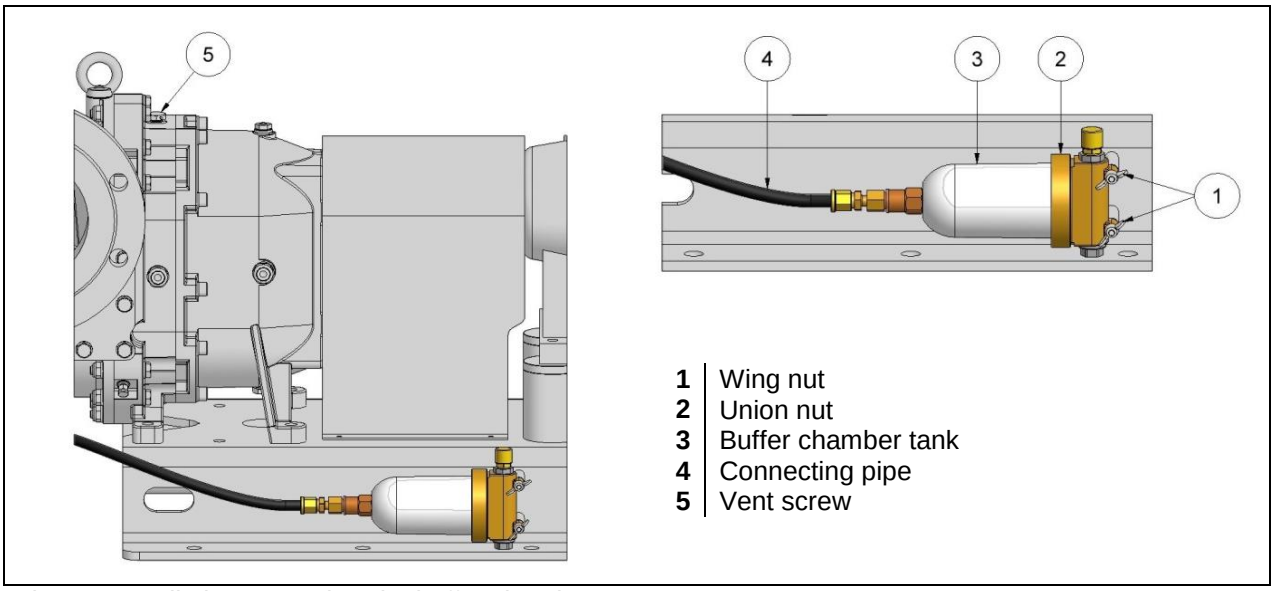


Fig. **19***: Installation example - dry buffer chamber*

Monitoring the buffer chambers
If the buffer chamber tank (3) is filled with leakage (e.g. pump medium or condensed water), loosen the wing nuts (1) unscrew the tank cover (union nut (2)) and empty the tank. If the tank is filled more than 1/2 within a month, please contact our service department ☎✉.

7.2.6 Circulation system on the cartridge mechanical seal

With a circulation system on the cartridge mechanical seal, the buffer chamber is located only in the cartridge mechanical seal housing. Only the cartridge mechanical seal is flushed. The surrounding hollow space is not a part of the buffer chamber with this circulation system. The flushing liquid (oil, water, glycerine…) must be matched with the pump medium.

Technical prerequisites for the circulation system

- Flushing connectors on the pump → **Fig.** "Flushing operation".
- Cartridge mechanical seal with the "Double mechanical seal" arrangement. The material selection of the cartridge mechanical seal depends on the flushing medium.

Flushing pressure and volumetric flow setting → Fig. "Flushing operation - connection example for flushing pressure and volumetric flow setting".

- The flushing pressure can be set and monitored with a pressure gauge.
  - The pressure setting is done as indicated in the → **Chapter** "Pump with pressurised buffer fluid tank" below heading "Tank pressure". If there is increased danger that medium will get between the sliding surfaces, the pressure should be increased accordingly.
- The volumetric flow of the flushing fluid depends on the application and the degree of contamination. The higher the volumetric flow, the better the rinsing effect.

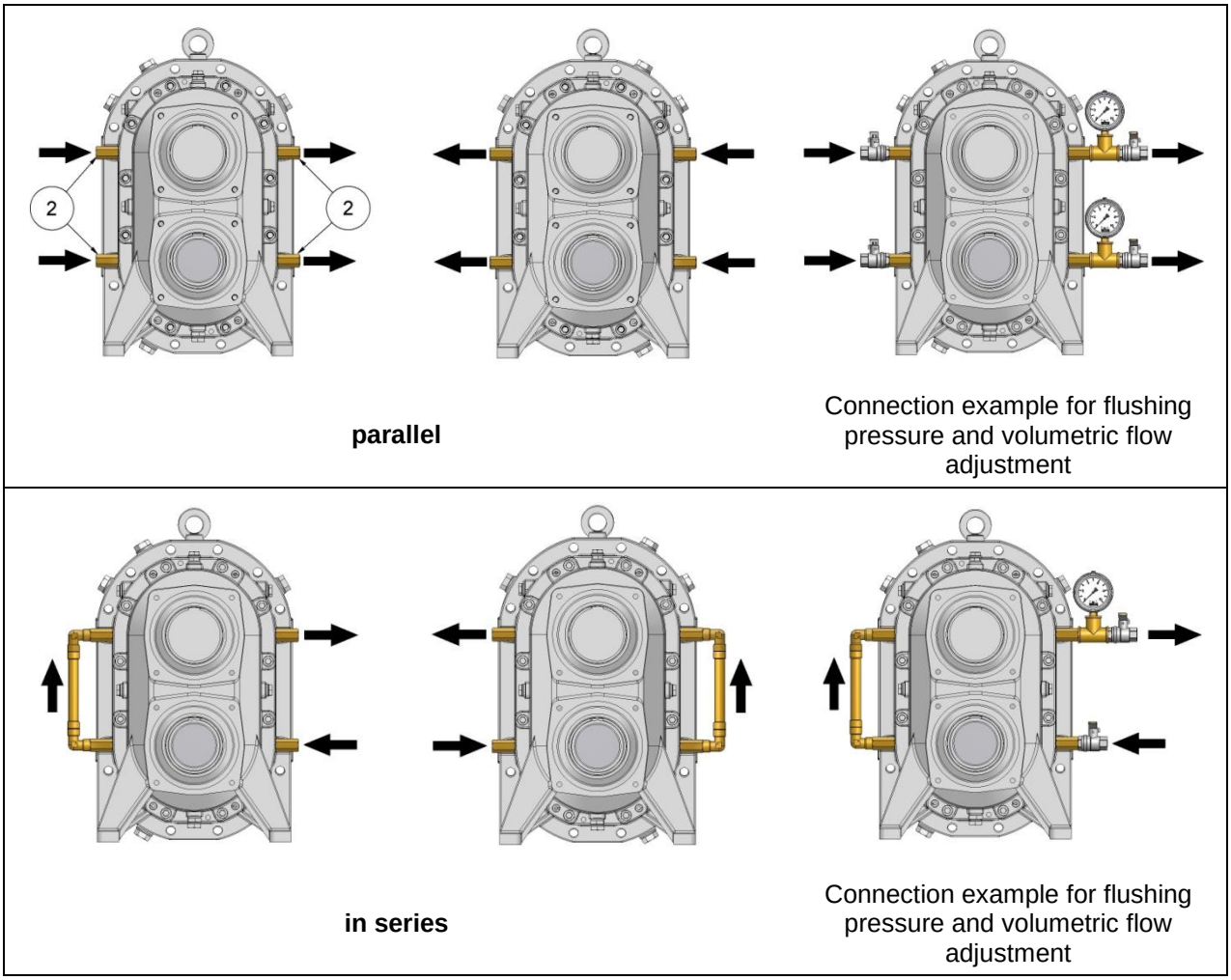


Fig. **20***: Flushing operation*
2 = Flushing connector

We recommend the flushing operation as specified in → **Fig.** “Flushing operation - parallel":

- Every cartridge mechanical seal is flushed with clean flushing fluid.
- A possible defect of the single cartridge mechanical seal is detected.

Alternatively, the flushing operation can be done as indicated in → **Fig.** “Flushing operation - in series":

- Flushing fluid is supplied only via the lower flushing inlet and reaches the upper flushing outlet via the two cartridge mechanical seals.

Note with this alternative flushing operation:

- A possible defect cannot be assigned to the single cartridge mechanical seal.
- Possible impurities of the cartridge mechanical seal rinsed for the first time can get into the subsequent mechanical seal.

7.3 Draining and cleaning the buffer chamber

- If the cartridge mechanical seal is defective, empty and clean the buffer chamber.
- Before changing a cartridge mechanical seal, drain the buffer chamber and clean it if it is contaminated severely → **Chapter** “Changing cartridge mechanical seal"

→**Chapter** "Maintenance plan"

Procedure:

1. In case of buffer chamber assemblies with a pressurised buffer fluid tank or pressure valve, depressurise the buffer chamber before draining or cleaning.
2. Remove buffer chamber assemblies → **Chapter** “Buffer chamber assemblies".
3. Loosen the hexagon head screw plug (6) → **Fig.** "Pump with quenching fluid tank, without pressure valve" and drain the buffer or quenching fluid out of the buffer chamber.
4. If there is heavy soiling, clean the buffer chamber.
5. Screw the lower hexagon head screw plug (M16 / M22) back in (tightening torque: 60 Nm) and install the various buffer chamber assemblies in reverse order.
   If the bottom hexagon head screw plug is not accessible due to the installation position, a lateral drain pipe can be installed at the side on request ☎✉.

Vertical pump installation

Our “Technical Information TINF.PU.019.xx” contains information about the filling and emptying of the gearbox and the buffer chamber when the pump is installed vertically.

7.4 Gearbox

7.4.1 Gear oil - grade

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

7.4.2 Gear oil - quantity

Series	Litres [l]
VX100	0.65*
VX100 with flange-mounted electric motor**	1.3
VX136	2
VX186	4
VX230	7

* *With vertical installation of the series VX100, the gear oil quantity is 1 litre instead of 0.65 litres.*

** *With vertical installation of the series VX100 with flange-mounted electric motor, please request our Technical information TINF.PU.019.xx".*

7.4.3 Gear oil - inspection and change

Skin and eye irritation caused by auxiliary materials, operating materials and medium

- 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.

→ **Fig.** “Gear oil change"

Inspect the gear oil and top up small quantities up to the seal indicator pipe (C) (only top up when the gearbox is at a standstill):

- every 500 operating hours, however at least every 3 months

Change gear oil:

- after the first 20 operating hours.
- every 2000 operating hours

Changing the buffer or quenching fluid has to be carried out after gear oil change → **Chapter** “Buffer chamber assembly".

Environmentally friendly disposal

Treat gearbox oils like hazardous wastes and dispose of properly.

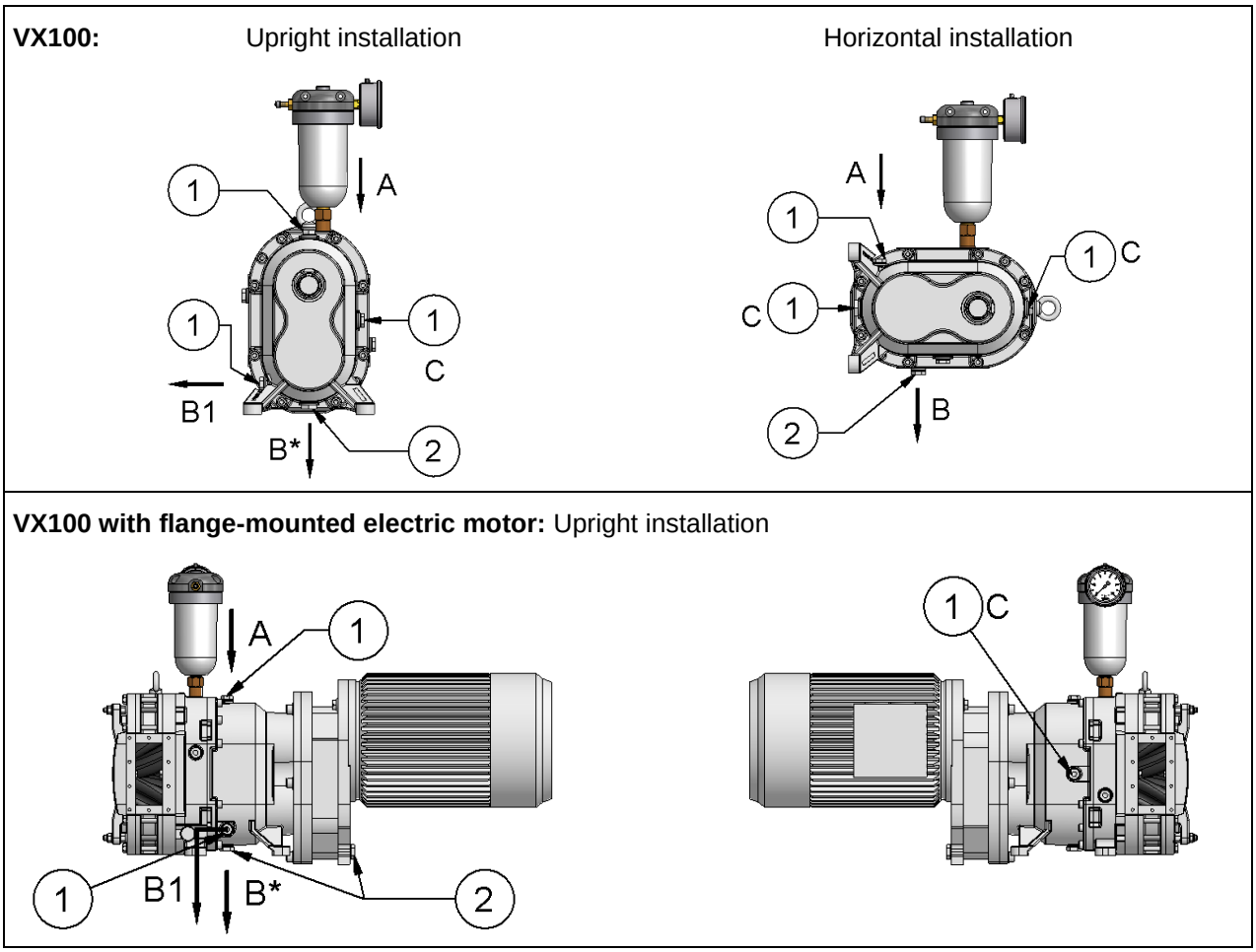


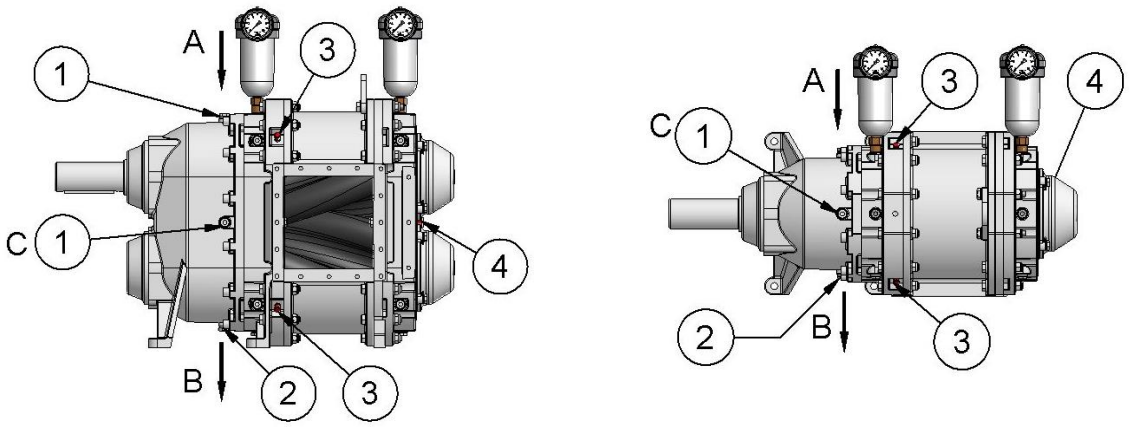
Fig. 21: Gear oil change VX100

1	Hexagon head screw plug
2	magnetic hexagon head screw plug

A	fill
B	drain
B*	alternatively empty via **B1**
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 assembling the hexagon head screw plug → 60 Nm

VX136/VX186: Upright installation Horizontal installation



VX230: Upright installation

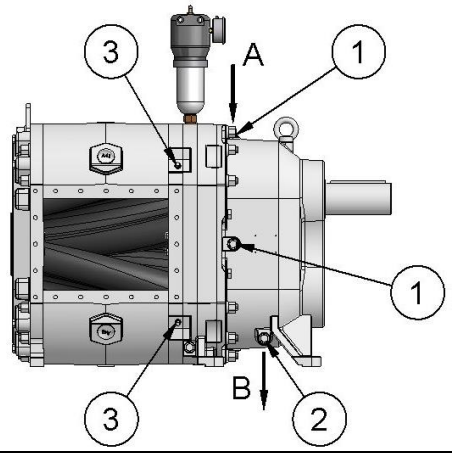


Fig. 22: Gear oil change VX136, VX186, VX230

1	Hexagon head screw plug	**A**	fill
2	magnetic hexagon head screw plug	**B**	drain
3	Grease nipple (at gearbox side)	**B***	alternatively empty via **B1**
4	Grease nipple (at the VX186QD cover)	**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

7.5 Greasing of sealing prechamber

(on VX136, VX186 and VX230 series)

Grease nipples are primarily used for long-fibred media. They can be retrofitted upon request ☎✉.
The sealing prechamber can be greased through the grease nipples (if applicable) → **Fig.** "Changing gearbox oil".
Lubrication prevents the fibrous matter from hardening and adversely affecting the function of the mechanical seal.

Lubrication

- A regular lubrication → **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.

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

Lubricating grease - quantity
Grease nipple at gearbox side

- Series VX136, VX186: 5 shots per nipple with a lube gun
- Series VX230: 8 shots per nipple with a lube gun

Grease nipple on the QD cover: 6 shots per nipple with a lube gun

Lubrication interval
→ **Fig.** "Gear oil change"

Lubricate the 4 grease nipples on the gearbox side and the 2 grease nipples on the QD cover:

- at start-up
- before and after a longer period of removing from service (2-3 weeks)

→ **Chapter** "Maintenance plan"

7.6 Oils and lubricants

1 **Standard Vogelsang oil for pump gearboxes and buffer chamber**

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 mm²/s	
at 100°C	17.3 mm²/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 pump gearboxes and buffer chamber**

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 mm²/s	
at 100°C	26.7 mm²/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 mm²/s	
at 40°C	68 mm²/s	
at 100°C	8.4 mm²/s	
Flash point	230°C	DIN ISO 2592
Pour point	-24°C	DIN ISO 3016
Ambient temperature	-20°C…+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 pump pressure. 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 Alternative oils for the buffer chamber

Part number	**BSS.014**	
Description	Mineral oil based hydraulic and lubricating oil	
Trade name (Fuchs)	Renolin B 15	
Characteristics		**Test acc. to**
ISO VG	46	DIN 51519
Viscosity index	105	DIN ISO 2909
Kinematic viscosity		DIN EN ISO 3104
at 40°C	46 mm²/s	
at 100°C	6.9 mm²/s	
Flash point	210°C	DIN ISO 2592
Pour point	-24°C	DIN ISO 3016
Water hazard class	Slightly hazardous to waters	

Part number	**BSS.016**	
Description	Biodegradable, environmentally friendly, multigrade hydraulic oil based on rape seed oil (as per ISO 15308, type HETG)	
Trade name (Fuchs)	Hydraulic oil 40 N	
Characteristics		**Test acc. to**
ISO VG	46	DIN 51519
Viscosity index	220	DIN ISO 2909
Kinematic viscosity		DIN 51562-1
at 40°C	42 mm²/s	
at 100°C	9.6 mm²/s	
Flash point	300°C	DIN ISO 2592
Pour point	-36°C	DIN ISO 3016
Water hazard class	Slightly hazardous to waters	

4 Oils for the buffer chamber with electronic buffer chamber monitoring

Part number	**BSS.021**	
Description	Fully synthetic EP industrial gear oil on the basis of selected polyglycols (PAG)	
Trade name (Fuchs)	Renolin PG 100	
Characteristics		**Test acc. to**
ISO VG	100	DIN 51519
Kinematic viscosity		DIN EN ISO 3104
at 40°C	100 mm²/s	
at 100°C	19.6 mm²/s	
Flash point	260°C	DIN ISO 2592
Pour point	-48°C	DIN ISO 3016

Part number	**BSS.017**	
Description	Fully synthetic EP industrial gear oil on the basis of selected polyglycols (PAG)	
Trade name (Fuchs)	Renolin PG 46	
Characteristics		**Test acc. to**
ISO VG	46	DIN 51519
Viscosity index	203	DIN ISO 2909
Kinematic viscosity		DIN 51562
at 40°C	46 mm²/s	
Flash point	240°C	DIN ISO 2592
Water hazard class	Slightly hazardous to waters	

5 Lubricant for pump grease nipples

Part number	**BSS.008**	
Description	Lithium soap grease having 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 mm²/s	
at 100°C	9.5 mm²/s	
Dropping point	> 180°C	IP 396
Service temperature	-30 to +120°C	DIN 51825
Water hazard class	Slightly hazardous to waters	

8 Repair

Risk of injury from stumbling on slippery floor

- Keep work station clean and clean up any auxiliary materials, operating materials and medium residue that may be present, especially before maintenance and repair work on the pump or the pump unit.
- Caution when temperatures are below freezing - keep workplace free of ice.

Skin and eye irritation caused by auxiliary materials, operating materials and medium

- Protective clothing (protective goggles, protective gloves) must be worn during all work involving possible contact with auxiliary materials, operating materials and medium. In certain situations these materials or the medium can enter the buffer chamber or gearbox.
- Before opening covers, connectors etc., the pump assembly must be depressurised to prevent the medium from spraying out.
- To protect against fluids spraying out, carefully and slowly open the buffer chamber, the bearing cover on the QD cover and the gearbox. Cover the valves or screws to be removed with a cloth or similar item where appropriate.

Tools

Tools for removing and installing the rotary lobes and the cartridge mechanical seal are available in the corresponding spare parts lists for rotary lobe pumps.

“Spare parts list ETL.PU.xxx.xx"

8.1 Conversion and spare parts

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

8.2 Before opening the Q or QD cover

Before opening the Q and QD cover:

- Depressurise the pump assembly.
- Shut off the connected pipes.
- Empty the pipe as much as possible using drain cocks.
  Attention! The remaining liquid flows out of the pump when the cover is opened.

8.3 Opening the Q cover

→ **Fig.** "Opening/Closing the Q cover"

1. Depressurise buffer chamber (if rotary lobes are to be dismounted).
2. Loosen hexagon nuts (1) (or hexagon head screws (1) on VX230 series) on the Q cover (5).
3. Remove Q cover and remove the O-ring (6).

8.4 Closing the Q cover

→ **Fig.** "Opening/Closing the Q cover"

1. Thoroughly clean the contact surfaces before installing the Q cover (5).
2. Pull the O-ring (6) onto the Q cover.
3. Set the Q cover in place.
4. Screw four hexagon nuts (1) onto the threaded rod and tighten, or on VX230 series attach the Q cover with 8 hexagon head screws (1).
   Attention! When doing so, ensure that you do not tilt the Q cover, evenly tighten by hand!
   Ensure correct seating of the O-ring.

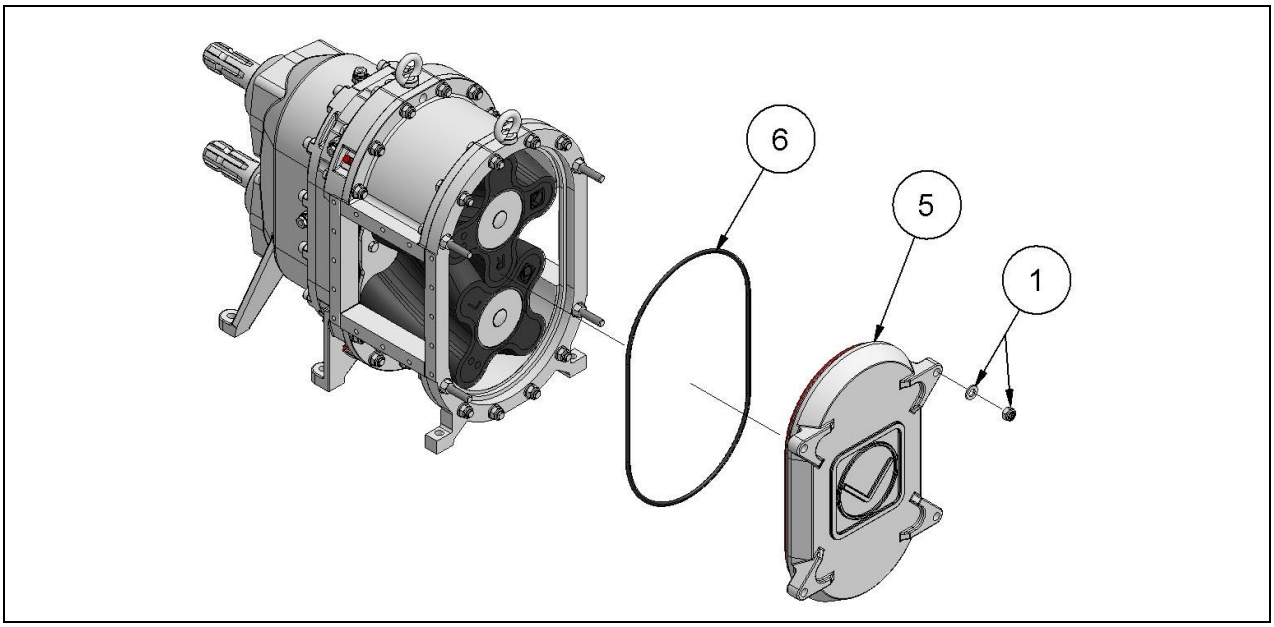


Fig. 23: Opening/Closing the Q cover

1	Hexagon nut / Hexagon head screw
5	Q cover
6	O-ring

8.5 Opening the QD cover

→ **Fig.** "Opening/Closing the QD cover"

1. Depressurise buffer chambers.
2. Loosen hexagon nuts (1) of the twelve hexagon head screws or threaded rods on the QD cover (5).
3. Remove the hexagon head screw plugs (2) carefully, as medium could spurt out due to pressure in the housing. Cover the screws to be dismounted with a cloth or similar item where appropriate.
4. Loosen anti-fatigue bolts (3).
5. Using the screws or threaded rods (for the QDM2 series, use the screws that are appropriate) the QD cover can be pressed off via the threads (4) until the QD cover is sitting loose. Use M12 hexagon head screws on VX230 series.
   Attention! Do not tilt the cover, but press it evenly "by hand"!
6. Remove O-Ring (6).

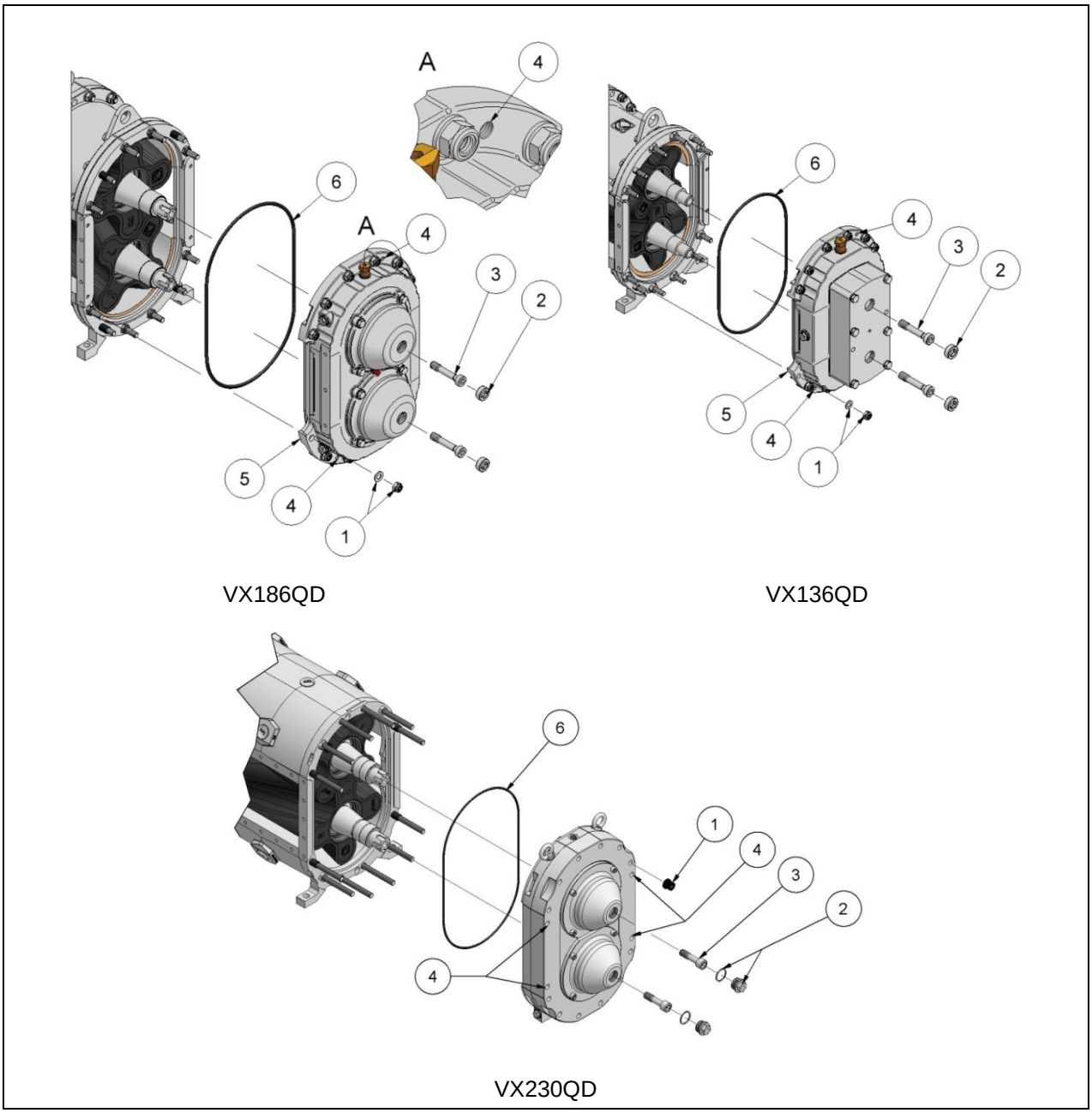


Fig. 24: Opening/Closing the QD cover

1	Hexagon nut	**4**	Thread - see A
2	Hexagon head screw plug	**5**	QD cover
3	Anti-fatigue bolt	**6**	O-ring

8.6 Closing the cover plate for QD/QD Marathon-pumps

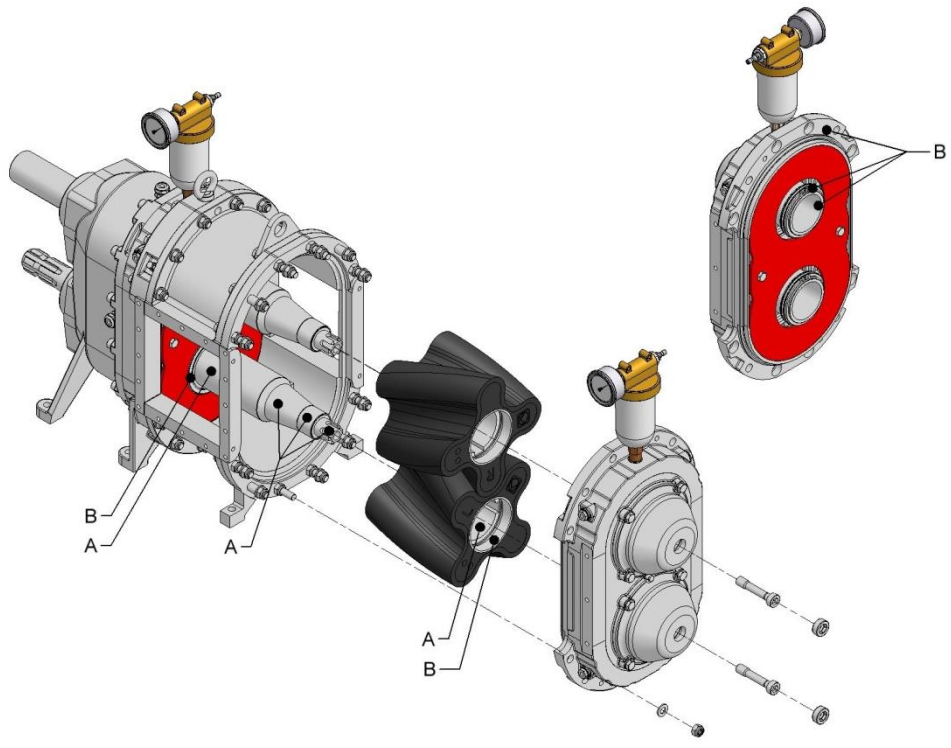
→ **Fig.** "Opening/Closing the QD cover"

1. Before assembly of the QD cover (5) thoroughly clean the components and also oil them if necessary → **Fig.** "Cleaning before the QD cover assembly".
2. Pull O-ring (6) onto the QD cover.
3. Set QD cover in place.
4. Screw in loosely but do **not** tighten the two anti-fatigue bolts (3).
5. Tighten hexagon nuts (1) of the twelve hexagon head screws or threaded rods (note tightening torques). **Attention! Do not tilt the cover while doing this, but press it evenly "by hand"! Watch for correct seating of the O-ring.**

Tightening torques

VX136 series:	M10 (10.9)	→ 70 Nm
	M10 (A4 70)	→ 40 Nm
VX186 series:	M12 (12.9)	→ 140 Nm
	M12 (A4 70 - stainless steel)	→ 60 Nm
VX230 series:	M16 (8.8)	→ 200 Nm

6. Tighten anti-fatigue screws (3) → **Chapter** "Tightening torques of the hexagon socket head screws or anti-fatigue bolts for installation of the pressure disc".
7. Install the hexagon head screw plugs (2).
8. Pressurise the buffer chamber.

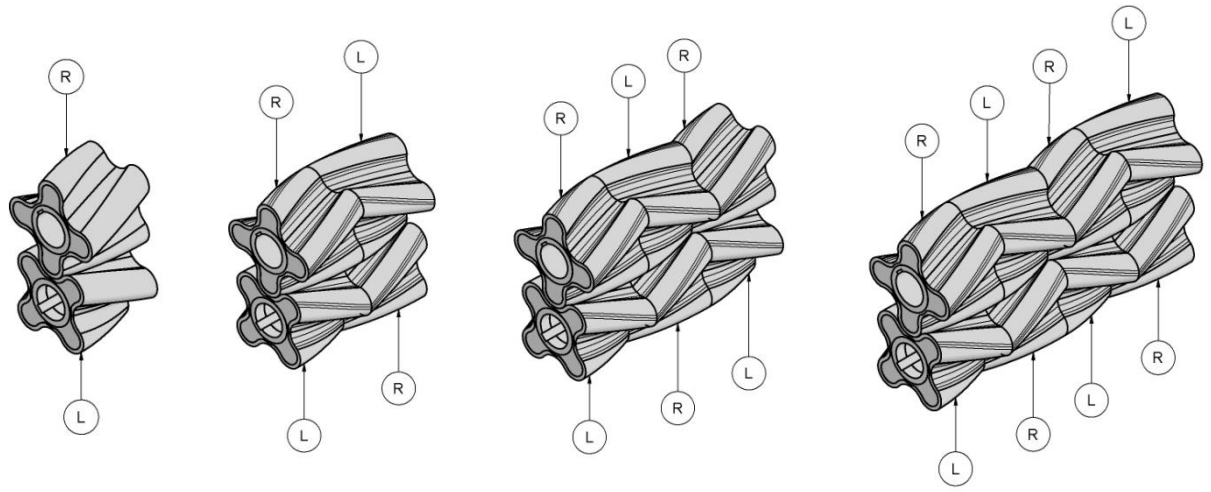


A clean thoroughly and oil
B clean thoroughly

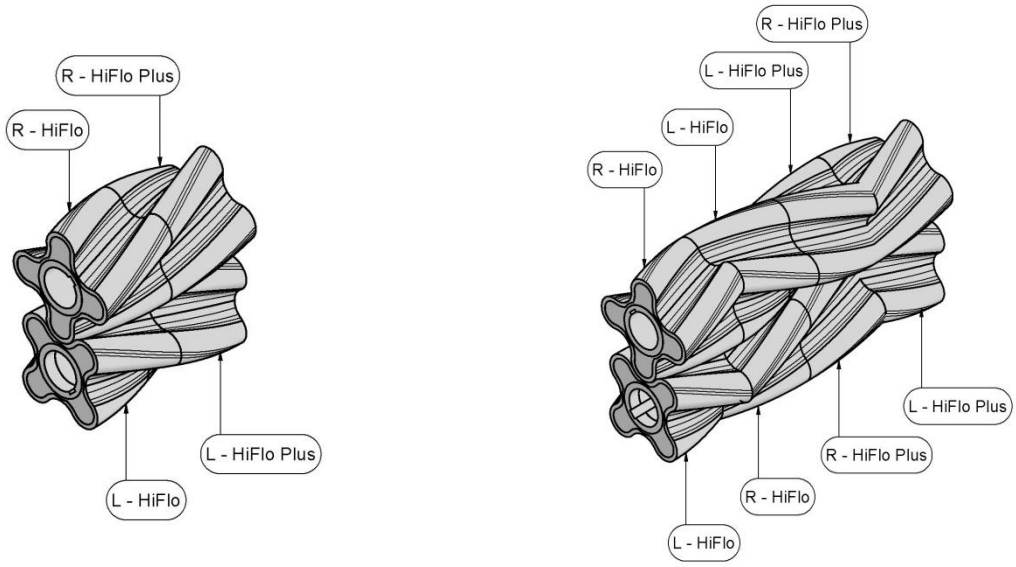
Fig. **25***: Cleaning before QD cover assembly*

8.7 Rotary lobe change

HiFlo arrangement



HiFlo*plus* arrangement



Marathon arrangement (VX136QDM2, VX186QDM2)

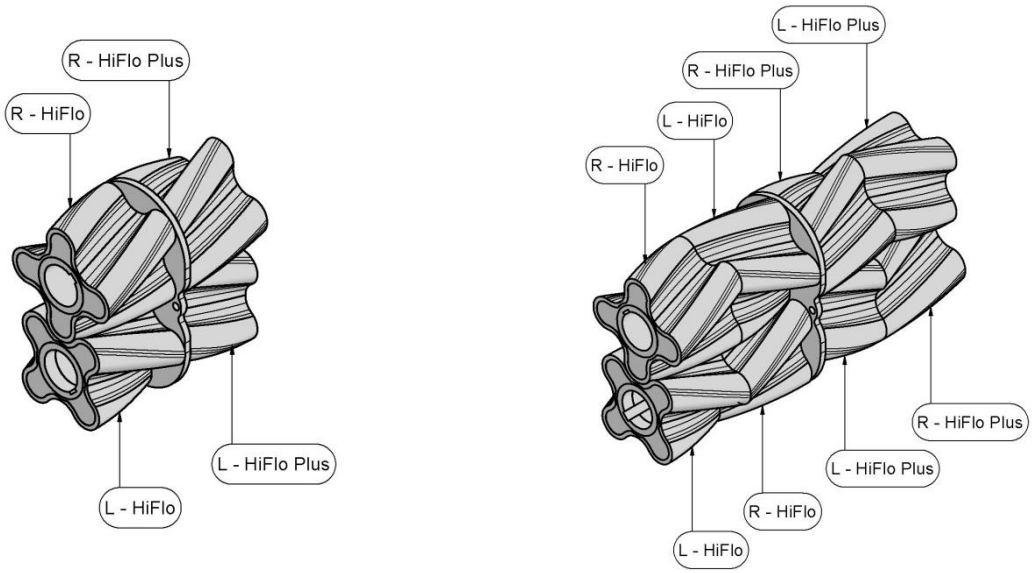


Fig. **26***: Arrangement of* HiFlo *and* HiFlo*plus*
(L = left rotary lobe, R = right rotary lobe)

HiFlo*plus*

HiFlo*plus*-rotary lobes, in contrast to HiFlo rotary lobes, have a second groove. The groove, which in the “arrangement HiFlo*plus*" **is not** to be used, is marked in red.

8.7.1 Rotary lobe change - VX100Q, VX136Q, VX186Q, VX230Q series

→ **Fig.** “Rotary lobe change, Q series"

1. Open Q cover (5) → **Chapter** "Opening the Q cover".
2. Remove plug (7) and anti-fatigue bolts (VX136Q, VX186Q) or hexagon socket head cap screws (VX100Q) (8) in the rotary lobes (11). Pull off the pressure disc (9) using a suitable screw (anti-fatigue bolt, hexagon socket head cap screw) or with the threaded rod of the rotary lobe puller and remove the spring washers (10).
   - With the VVA series with rubberized rotary lobes (not with solid material lobes), the rotary lobe core is protected by an additional sealing ring in which the pressure disc and spring washers are located. Dismount this sealing ring and reinstall it after the rotary lobe change.
3. Pull the rotary lobes from the shafts using a rotary lobe puller (see spare parts list). With the VX230Q series the rotary lobes can be pulled off the shafts using a commercially available universal puller with a span width of 200 mm and a span depth of 150 mm.
   - Pull HiFlo- and HiFlo*plus*-rotary lobes off the upper and lower shaft in pairs.
4. Install the new rotary lobes in reverse sequence → **Fig.** "HiFlo and HiFlo*plus arrangement*".
   - Before installing the new rotary lobes, thoroughly clean the contact surfaces of rotary lobes and seal components!
5. With the VX136Q series install two spring washers per shaft, with the VX100Q, VX186Q and VX230Q series, install one spring washer per shaft → **Fig.** "Position of pressure disc and spring washers".
   - Make sure that the spring washers are the correct way round in the pressure disc.
   - Carefully press the pressure disc and spring washers into the rotary lobe groove. Spring washers must not fall into the extracting groove.
   - Use the anti-fatigue bolt or hexagon socket head screw to tighten spring washers and pressure disc → **Chapter** “Tightening torques of the hexagon socket head cap screws for mounting the pressure disc".
   - Install plug (7).
6. Close Q cover → **Chapter** "Closing the Q cover".
7. Apply pressure to buffer chamber → **Chapter** "Buffer chamber".

Material FPM for rotary lobes

The material 'FPM' for rotary lobes is usable only up to max. 6 bar. Please note the maximum operating pressure → **Chap.** “Technical data".

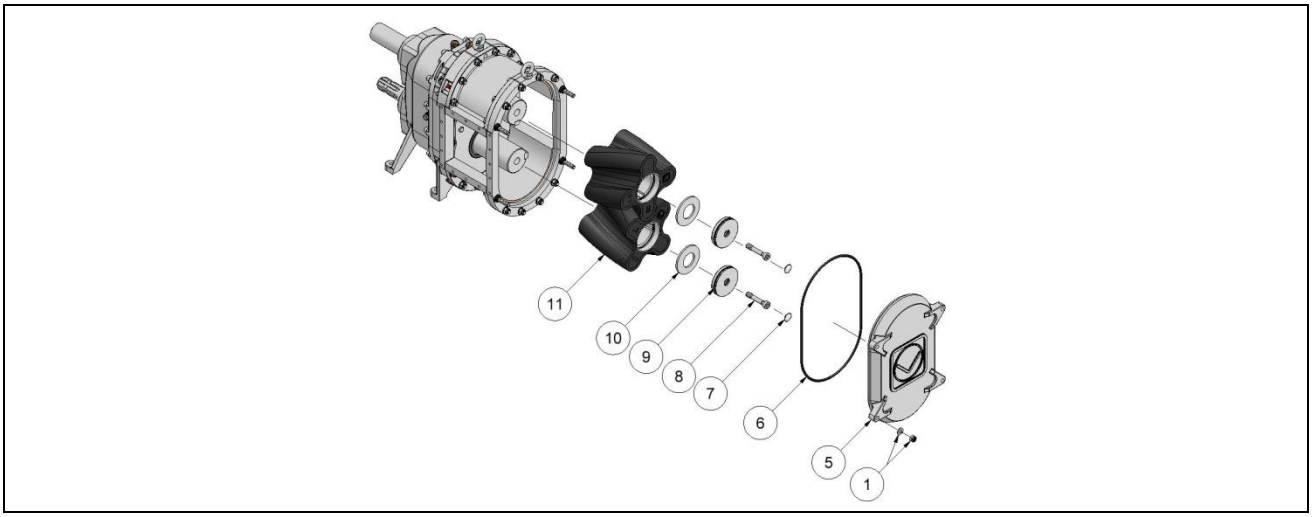
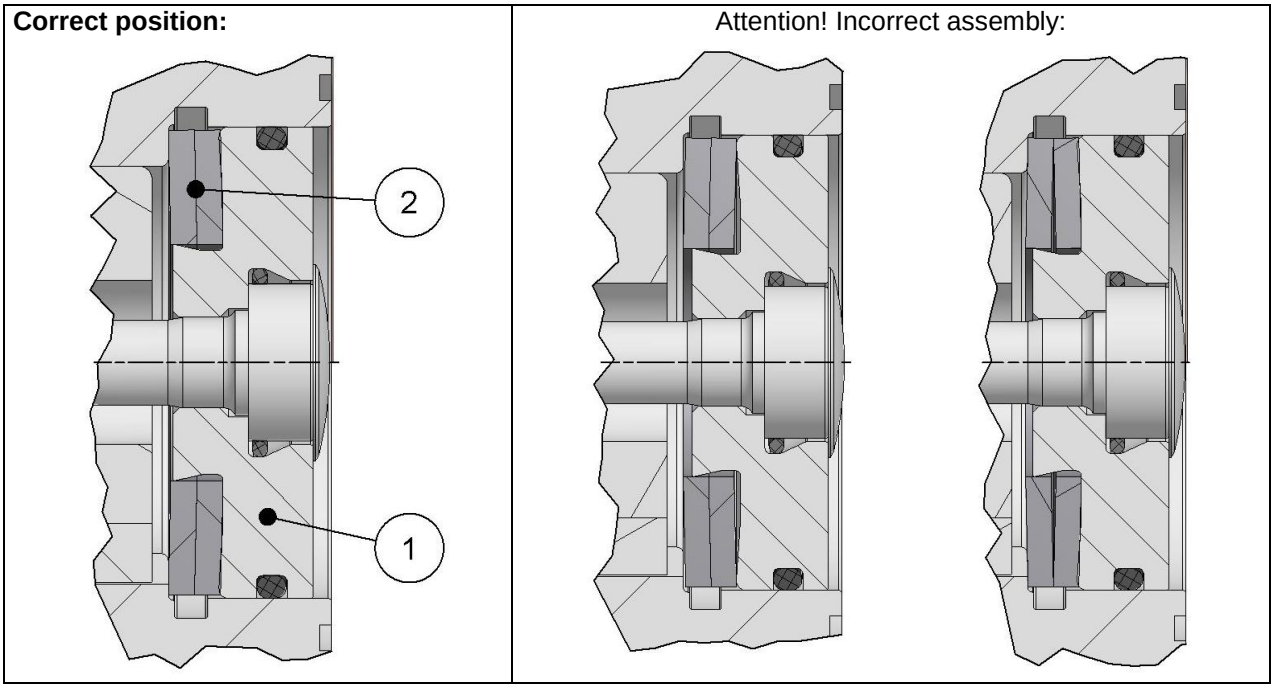


Fig. **27***: Rotary lobe change, Q series*

8.7.1.1 Position of pressure disk and spring washer

VX136Q series



VX100Q, VX186Q and VX230Q series

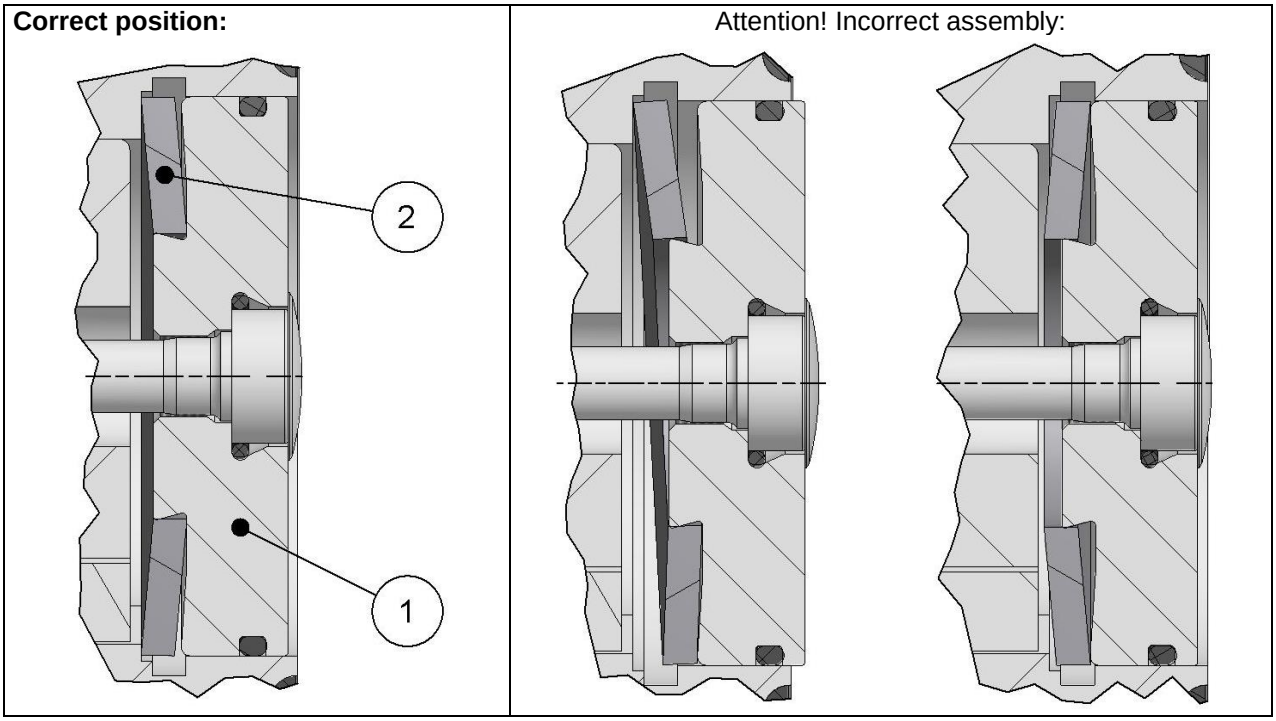


Fig. **28***: Position of pressure disc and spring washer*

1 | Pressure disc
2 | Spring washer (1 piece for VX100Q, VX186Q and VX230Q and 2 pieces for VX136Q)

8.7.2 Rotary lobe change - VX136QD, VX186QD, VX230QD series

→ **Fig.** “Rotary lobe change, Q series"

1. Open QD cover (5) → **chap.** "Opening the QD cover".
2. Pull the rotary lobes (11) from the shafts using a rotary lobe puller (see spare parts list).
   – Assemble HiFlo- and HiFlo*plus*-Rotary lobes in pairs, i.e. simultaneously to the upper and the lower shaft.
3. Install the new rotary lobes in reverse sequence →**Fig.** "HiFlo and HiFlo*plus arrangement*".
4. Close QD cover → **chap.** "Closing the QD cover".
5. Apply pressure to buffer chamber → **chap.** "Buffer chamber".

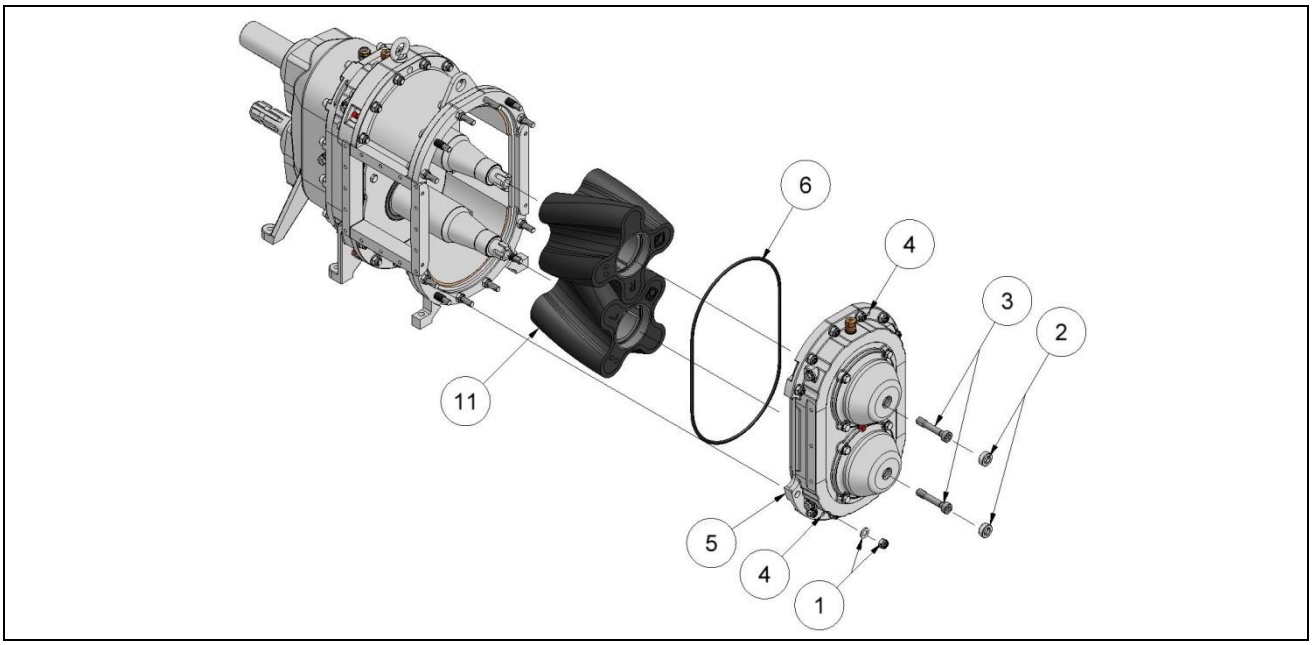


Fig. **29***: Rotary lobe change, QD series*

8.7.3 Rotary lobe change - VX136QDM2, VX186QDM2 series

→ **Fig.** "Rotary lobe change, QDM2 series"

Rotary lobe change of the 2nd stage (B) in → **Fig.** "Rotary lobe change QDM2 series"
The rotary lobe change of the 2nd stage is done as described in → **Chapter** "Rotary lobe change - VX136QD, VX186QD series".

Rotary lobe change of the 1st stage (A) in → **Fig.** "Rotary lobe change QDM2 series"

1. Dismount the fitting keys (12) from the shafts.
2. Unscrew two hexagon socket head cap screws (13) of the wear plate (14) and remove the wear plate.
3. Loosen the four hexagon socket head cap screws (15) right and left and the two hexagon socket head cap screws (16) above and below and take off the fixing plate (17).
4. With the VX186QDM2 series, remove the top/bottom angle rings (18) and the sealing plate (19).
5. Take off the shims (20) and the O-rings (21).
6. Remove spacer washer (22) incl. O-ring (23).
7. Pull off the O-ring (24).
8. Take off the fixing plate (25) incl. screwed on wear plate (26).
9. Pull the rotary lobes (11) from the shafts using a rotary lobe puller (see spare parts list).
   – Pull HiFlo- and HiFlo*plus*-rotary lobes off the upper and lower shaft in pairs.
10. Install the new HiFlo or HiFlo*plus*-rotary lobes in reverse sequence → **Fig.** "Arrangement of HiFlo- and HiFlo*plus*".
11. Assemble in the reverse order. Attention! Install the wear plates as in → **Chapter** "Wear plate replacement" (Observe installation position and tightening torques).
12. Close QD cover → **Chapter** "Closing the QD cover".
13. Apply pressure to buffer chamber → **Chapter** "Buffer chamber".

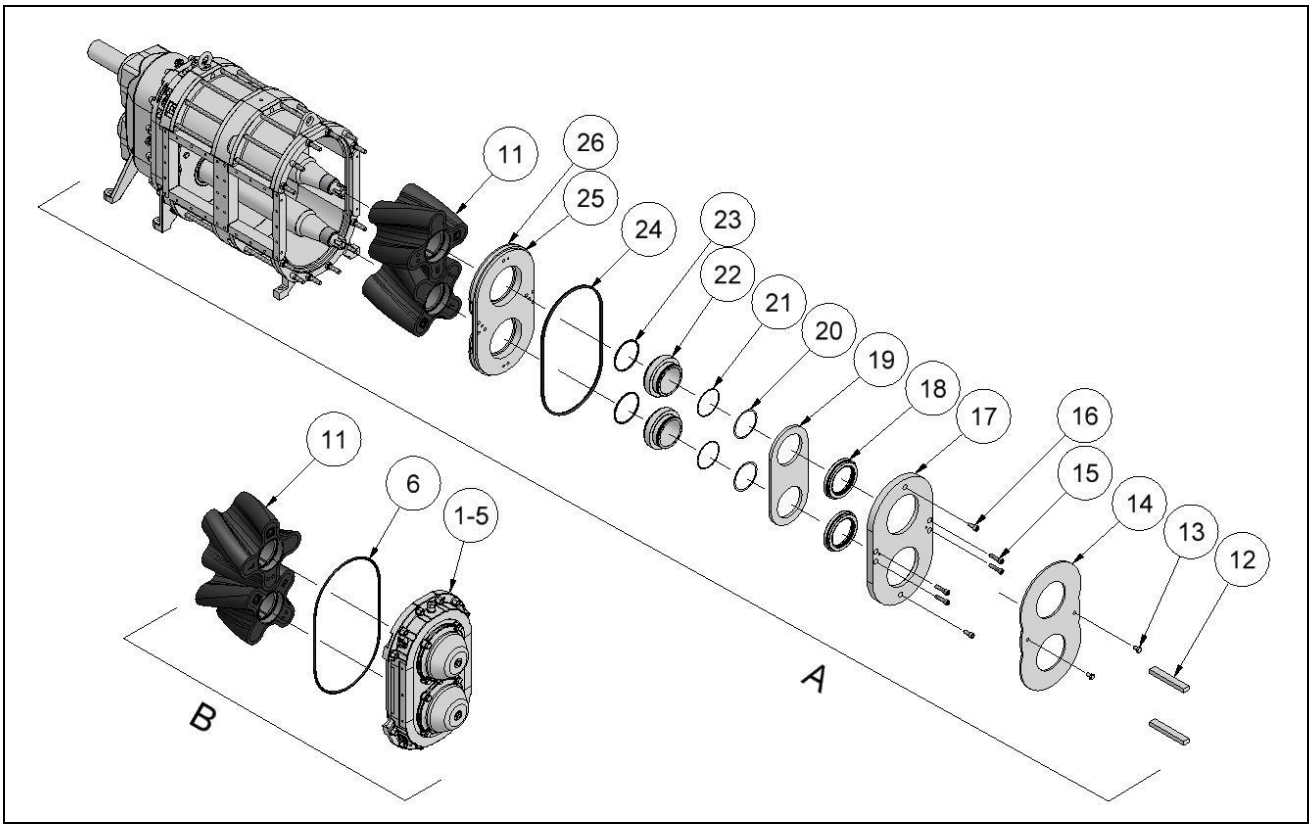


Fig. **30***: Rotary lobe change, QDM2 series*
(A = 1st stage, B = 2nd stage)

8.7.3.1 Tightening torques of the hex socket head screw or strain screw for mounting the pressure disk

VVA

VVA = All steel and cast parts of the machine coming in contact with the medium are made of stainless steel.

Series	Hexagon socket head cap screw	Tightening torque
VX100Q VX100QVVA	M10, 10.9 M10, A4	45 Nm 42 Nm
Anti-fatigue bolt		
VX136/VX186	M16, 10.9 steel	Tighten anti-fatigue bolt with 200 Nm, then undo before tightening with 140 Nm.
	M16, A4 Stainless steel	Tighten anti-fatigue bolt with 160 Nm, then undo before tightening with 140 Nm.
VX230	M20, 8.8 steel	300 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.

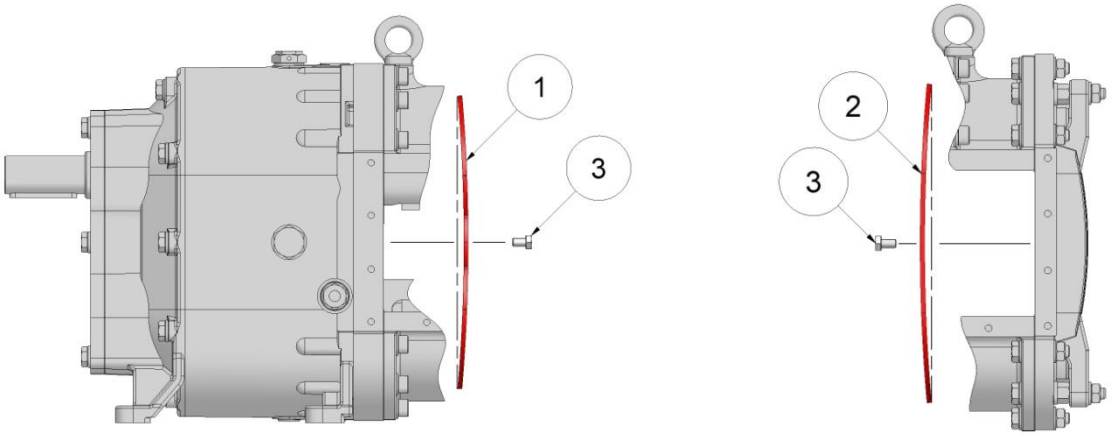
8.8 Change of wear plates

Wear plate installation position

- The wear plates of the VX100, VX136 and VX186 series have a defined curvature. To prevent premature wear by the rotary lobes, the correct installation position of the wear plate must be observed during installation → **Fig.** "Installation position of the curved wear plates".
- The wear plates of the VX230 series have no curvature and can be orientated in any direction.

Tightening torques

- Wear plate screws of VX100 series: **20 Nm**
- Wear plate screws of the VX136, VX186 and VX230 series: **40 Nm**



(1) Wear plate on the gearbox (2) Wear plate on the cover

(3) Hexagon head screw with microencapsulation

Fig. **31***: Installation position of the curved wear plates*

8.9 Change of cartridge mechanical seal

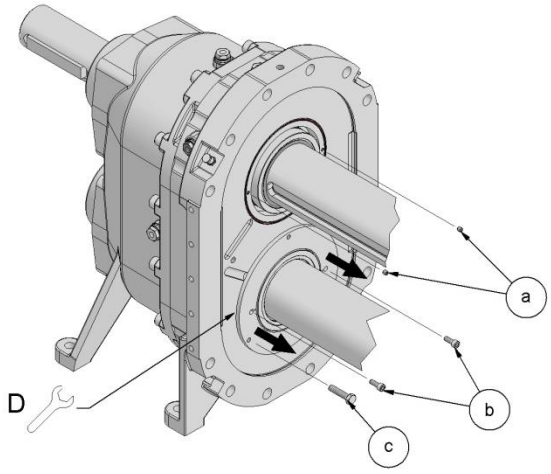
Material Duronit for seal rings

Mechanical seals made of 'Duronit' can only be used up to an operating pressure of 10 bar. Please note the maximum operating pressure → **Chap.** “Technical data".

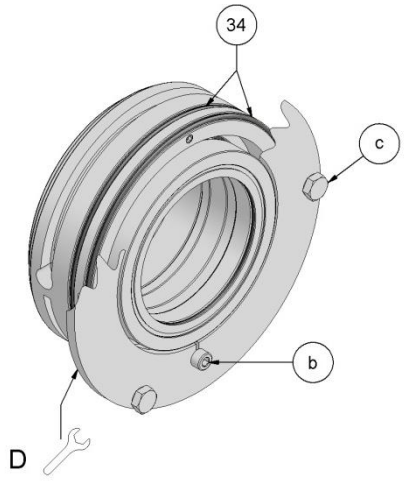
8.9.1 Change of cartridge mechanical seal on the gearbox

→ **Fig.** “Cartridge mechanical seal on the gearbox"

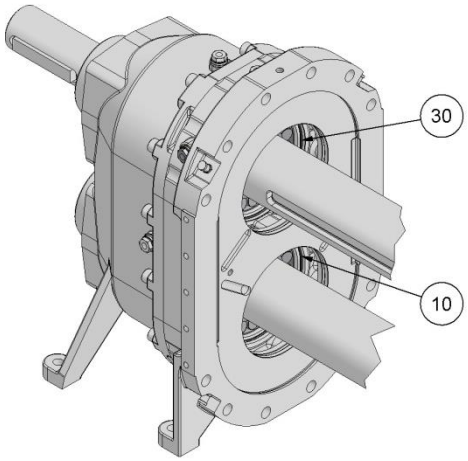
1. Depressurize the buffer chamber (with QD pumps, both buffer chambers).
2. Empty and clean the buffer chamber on the gearbox.
3. Remove any flushing connections and circulation system → **chap.** "Circulation system on the cartridge mechanical seal” and → **Fig.** “Flushing operation".
4. Drain gearbox oil.
5. Work steps → **chap.** "Perform “Rotary lobe change and wear plate change”.
6. Remove hex socket set screws (a) of the cartridge mechanical seal (Fig. a)).
7. Put on cartridge installation tool (D) and screw the hexagonal socket screws (b) into the borings of the cartridge mechanical seal (fig. b)).
8. Smoothly pull out cartridge mechanical seal using the three hex head screws (c) of the installation tool (Fig. b)).
9. Change O-ring (30) in the bearing seal housing (fig. c)).
10. Carefully remove the burrs on the keyways and clean the cartridge sealing ring seat in the housing before installing the new cartridge sealing ring.
11. Push new cartridge mechanical seal onto the shaft. Carefully oil the outer O-rings on the seal carrier (Pos. 34 in fig. b)) before installation. Attention! Do not use oil for EPDM O-rings!
12. If a circulation system is present, the bore holes in the cartridge mechanical seal must be aligned with the flushing connections in the bearing seal housing.
13. To install the new cartridge mechanical seal, place the installation tool on the cartridge mechanical ring without screws.
14. Push rotary lobe without key on the shaft.
15. Insert the pressure disk and the strain screw.
16. Tighten the rotary lobe until the cartridge mechanical seal is flush with the pump housing.
17. Reinstall any removed flushing connections.
18. Remove rotary lobe again.
19. Push O-ring and support ring onto the shaft.
20. Before installing the new rotary lobes, clean contact surfaces of rotary lobes and sealing components very carefully.
21. Install rotary lobes, wear plates and Q cover or QD cover.
22. Top up buffer fluid.
23. Readjust pressure in the buffer chamber (for QD pumps in both buffer chambers).
24. Fill up the gearbox oil.



a)



b)



c)

a	Hexagon socket set screw
b	Hexagon socket head cap screw
c	Hexagon head screw
30	O-ring (bearing seal housing)
34	O-ring (seal carrier)
D	Installation tool

	Complete kit part no.
VX100	WKZ0455
VX136	WKZ0456
VX186	WKZ0457
VX230	WKZ0462

Fig. **32***: Cartridge mechanical seal on the gearbox*

8.9.2 Cartridge mechanical seal change on the QD cover

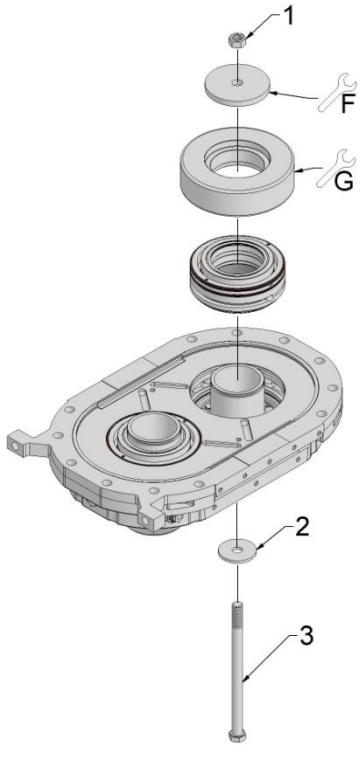
1. Depressurize both buffer chambers.
2. Emptying and cleaning the buffer chamber at the QD cover.
3. Remove any flushing connections and circulation system → **chap.** "Circulation system on the cartridge mechanical seal" and → **Fig.** "Flushing operation".
4. Perform the work steps according to → **chap.** "Opening the QD cover" starting at point 2.

→ **Fig.** "Cartridge mechanical seal on gearbox a) and b)"

5. Put on cartridge installation tool (D) and screw the hexagonal socket screws (b) into the borings of the cartridge.
6. Remove retaining ring, O-ring carrier and O-rings
7. Pull off cartridge evenly by the means of the three hex head screws (c) for the cartridge installation tool.

→ **Fig.** "Cartridge mechanical seal on the QD cover"

8. Place washer (2) on the hex head screw (3 and push it through the bearing cover.
9. Change O-ring in the bearing seal housing.
10. Clean the cartridge seat in the housing.
11. Insert the new cartridge.
12. If a circulation system is present, the bore holes in the cartridge mechanical seal must be aligned with the flushing connections in the QD cover.
13. Put on tool G with the large boring facing the cartridge.
14. Insert tool F in tool G.
15. Slowly tighten the cartridge by tightening hex head screw (3).
16. Remove tools F and G.
17. Reinstall any removed flushing connections.
18. Fit O-ring carrier, O-rings and retaining ring.
19. Remove the hex head screw (3).
20. Close QD cover as per → **chap.** "Closing the QD-cover".
21. Top up buffer fluid.
22. Readjust pressure in the buffer chambers.



1	Hexagon nut
2	Washer
3	Hexagon head screw
F	Tool WKZ0119 (VX100, VX136, VX186) Tool NUS0067 (VX230)
G	Tool WKZ0171 (VX136) Tool WKZ0098 (VX186) Tool PBA0035 (VX230)

	Complete kit part no.
VX136	WKZ0172
VX186	PBA0009
VX230	PBA0040

Fig. **33***: Cartridge mechanical seal on the QD cover*

8.10 Adjusting of pump housing segments

Should the pump housing segments be worn, they can be readjusted as follows.

1. Remove Q or QD cover → **Chapter** "Opening the Q cover" or “Opening the QD cover".
2. Loosen the connector and screws at the pump housing segments.
3. Adjust the top and bottom spring pins in the pump housing segments → **Fig.** “Adjustment of pump housing segments".
4. Before installation of the pump housing segments, apply flange sealant, set an asbestos-free gasket in place and coat this with flange sealant as well. The asbestos-free gaskets do not apply to the VX230 series, here you only need to apply flange sealant.
5. Screw all screws back on at the pump and the connectors.
6. Install Q or QD cover → **Chapter** “Closing the Q cover" or “Closing the QD cover".

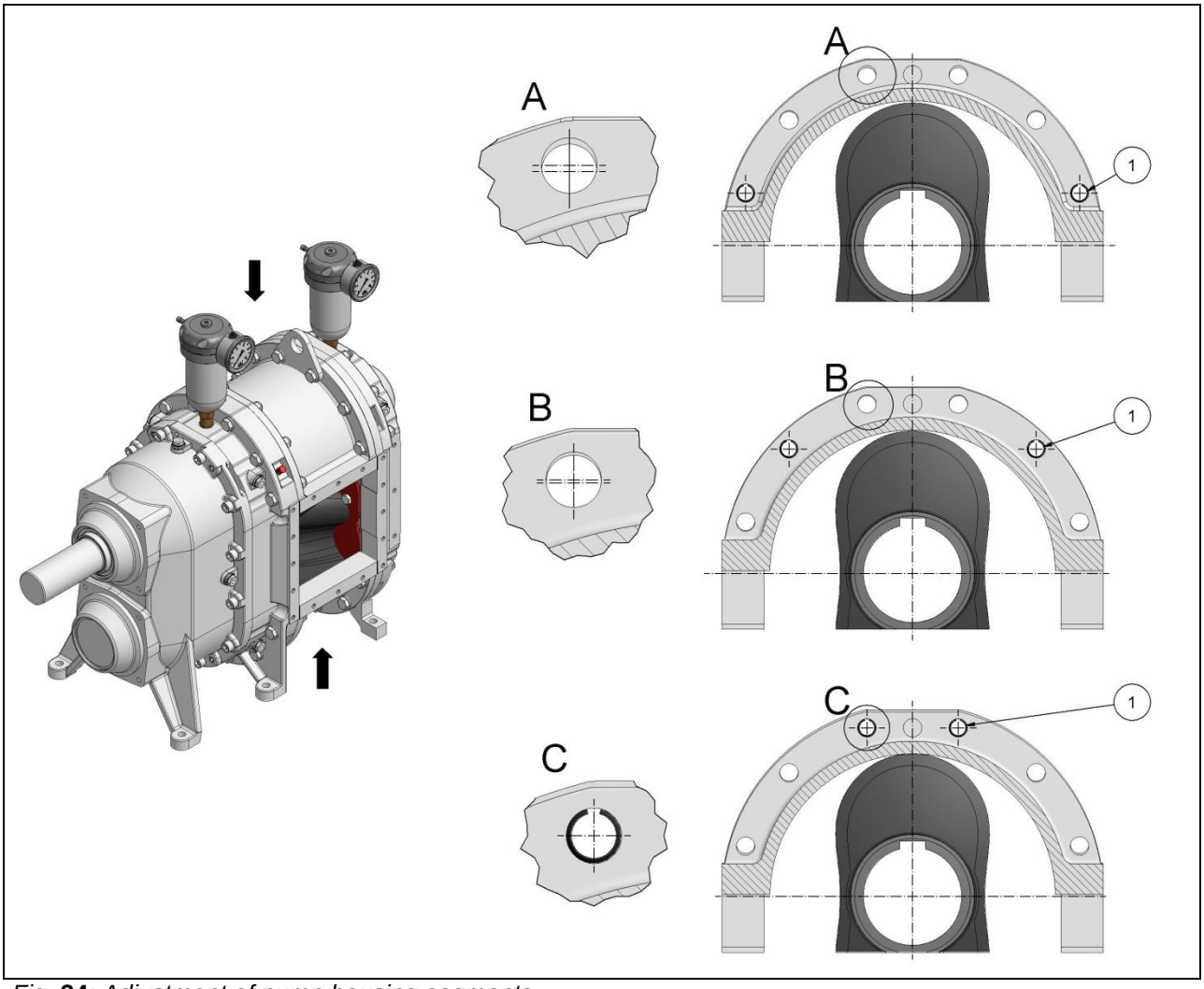


Fig. **34***: Adjustment of pump housing segments*

1 Position of the spring pin
A Original

		VX100	VX136	VX186	VX230
B	1. adjustment	0.5 mm	0.7 mm	0.9 mm	1.5 mm
C	2. adjustment	1.0 mm	1.4 mm	1.8 mm	--

8.11 Reducing the starting torque

With the **VX100Q**, **VX136Q** and **VX186Q** series, the starting torque can be reduced by installation of thin wear plates (except for …QVVA series) or by the installation of shims between rotary lobes and wear plates. Increasing the gaps between rotary lobes and wear plates however reduces the volumetric efficiency.

Increasing the gap by installing thinner wear plates

(VVA series excluded)

Gap increase (→ + 1 mm)
VX136Q
At gearbox side: Wear plate **PFL.B009.T1 (4 mm)** replaces wear plate **PFL.B009 (5 mm)**
Cover side: Wear plate **PFL.B002.T1 (3 mm)** replaces wear plate **PFL.B002 (4 mm)**

VX186Q
At gearbox side: Wear plate **PFL.A017.T1 (5 mm)** replaces wear plate **PFL.A017 (6 mm)**
Cover side: Wear plate **PFL.A002.T1 (4 mm)** replaces wear plate **PFL.A002 (5 mm)**

Gap increase (→ + 0.3 mm)
VX136Q
At gearbox side: Wear plate **PFL.B009.T2 (4.7 mm)** replaces wear plate **PFL.B009 (5 mm)**
Cover side: Wear plate **PFL.B002.T2 (3.7 mm)** replaces wear plate **PFL.B002 (4 mm)**

VX186Q
At gearbox side: Wear plate **PFL.A017.T2 (5.7 mm)** replaces wear plate **PFL.A017 (6 mm)**
Cover side: Wear plate **PFL.A002.T2 (4.7 mm)** replaces wear plate **PFL.A002 (5 mm)**

Gap increase by installing shims

Increasing the gap on the Q cover (each with a new shim)
→ **Table** “Increasing the gap using shims"

- Put one new shim on each of the four distance nuts of the Q cover.

Increasing the gap on the gearbox (each with a new shim)
→ **Table** “Increasing the gap using shims"

- **VX136Q, VX186Q:** Slide a new shim in front of the 1st rotary lobe on the shaft.
  VX100Q: Replace the shims.
- **In addition** put one shim on each of the four distance nuts of the Q cover to adjust the gap accordingly.

Increasing the gap on the Q cover and/or on the gearbox (with multiple shims)
→ **Table** “Increasing the gap using shims"

- Procedure as in → **Chapter** “Increasing the gap on the Q cover" and/or → **Chapter** “Increasing the gap on the gearbox".
- **Attention!** If more than two shims are placed on each distance nut of the Q cover, you have to mount a thicker O-ring under the Q cover to attain continued reliable sealing.
  VX100Q: O-ring part no. DOR.092
  VX136Q: O-ring part no. DOR.093
  VX186Q: O-ring part no. DOR.094

	Increasing the gap on the gearbox		**Increasing the gap on the Q cover**	
Series	Shim Part no. (dimensions)	Increasing the gap [mm]	Shim Part no. (dimensions)	Increasing the gap [mm]
VX100Q	NUS.056 (45x55x0.5) replaces NUS.033 (45x55x0.3)	→ **+ 0.2**	NUS.063 (8x14x0.2)	→ **+ 0.2**
VX136Q	NUS.061 (60x75x 0.2)	→ **+ 0.2**	NUS.062 (10x16x0.2)	→ **+ 0.2**
VX186Q	NUS.048 (85x105x0.3)	→ **+ 0.3**	NUS.049 (12x25x0.3)	→ **+ 0.3**

Table: *Increasing the gap using shims*

In case of wear on rotary lobes and plates, the gaps can be reduced accordingly again.

9 Maintenance plan

	Start-up*	**Before and after longer periods of non-use**	**After the first 10 operating hours**	**After the first 20 operating hours**	**Every 200 operating hours**	**Every 500 operating hours, at least every 3 months**	**Every 2000 operating hours, at least once a year**	**When there is severe contamination**
Lubricate grease nipple	**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**				
Checking buffer fluid tank or quenching fluid tank				**X**	**X**			
Changing buffer fluid or quenching fluid							**X**	**X**
Change gearbox oil				**X**			**X**	
Check gearbox oil						**X**		

* → **chap.** "Checklist before start-up"

! Pumps with a mechanical seal consisting of the material combination SiC-SiC:

To avoid adhesion of the mechanical seal faces this pump needs to be rotated (at least one revolution) every two months when not in service.

10 Service plan

Warranty is valid only when service intervals acc. to → **Chap.** "Service instructions" have been followed and performed.

Serial number (nameplate):												
Lubricate grease nipple	Checking belt tension	Tighten the screws for the base	Checking buffer fluid tank or quenching fluid tank	Changing buffer fluid or quenching fluid	Check gearbox oil	Change gearbox oil	Other:	operating hours	Overall delivery rate	Date	Name	Signature

11 Trouble-shooting

11.1 Troubleshooting

Troubleshooting	**Help → Chapter "Help"**
• No pump delivery	A, B, D, G, J, R
• Pump stops after start	J, K, M, R, S, V
• Intake flow breaks away after start	D, E, G, S, V
• Irregular pump delivery	D, E, G, J
• Pump performance too low	D, G, J, R, S, T, U
• Pump blocked	C, F, J, K, M, R, U, V
• Power consumption too high	C, M, R, S, V
• Drive belt slips	F, H, M, R, S
• Leakage at the pump	C, R, U
• Pressure and level variations in the buffer chamber	O, U, V
• Extreme pressure and level changes in the buffer chamber	P
• With dry buffer chamber: buffer chamber tank more than half full	Q
• Pump too hot	A, C, M, N, R, S, U
• Motor too hot	C, K, L, M, R, S, V
• Noises & vibrations	C, D, E, F, G, I, J, K, M, N, R, S

11.2 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 fix 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"
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, increase the gaps → **Chapter** "Reduction of the starting torque", adjust the drive.	"Repair", "Connection to the power supply"
N	Oil level in the gearbox is not okay	→ **Chapter** "Gearbox"	"Maintenance"
O	Operation-related fluctuations in buffer chamber	→ **Chapter** "Buffer chamber"	"Maintenance"
P	Mechanical seal damage	Change the mechanical seal, → **Chapter** "Cartridge mechanical seal change"	"Repair"
	Faulty repair of the mechanical seal		
	Buffer fluid tank leaking	Check buffer fluid tank for leaks.	"Maintenance"
Q	Seal leaking	→ **Chapter** "Dry buffer chamber"	"Maintenance"
R	Operating pressure too high	Reduce the operating pressure.	"Specifications"
S	Medium viscosity above the nominal value	Reduce speed. Increase medium temperature.	"Designated use"
T	Medium viscosity below the nominal value	Increase speed, decrease medium temperature, replace wear parts.	"Repair"
	Gap too large	Reduce gaps → **Chapter** "Reduction of the starting torque" in reversed procedure	"Maintenance"
U	Medium temperature above the nominal value	Reduce medium temperature.	"Designated use", "Material description for rotary lobes"
V	Medium temperature below the nominal value	Increase medium temperature (after consulting Vogelsang)	

12 Specifications

12.1 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 (solid material)	1.4571	150°C 200°C*	pure medium Chemistry	high temperatures, high chemical resistance
	Steel lobes (solid material)	C45 nitrided	150°C 200°C*	pure medium petrochemical	high temperatures, chemical resistance

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

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

Please consult us ☎✉

- if you require combinations with high pressure and high temperatures, see * in table
- with solid material lobes with media containing foreign matter
- if you should discover discrepancies or if precise media data has not been provided

Material FPM for rotary lobes

The material 'FPM' for rotary lobes is usable only up to max. 6 bar. Please note the maximum operating pressure → **Chap.** “Technical data".

12.2 VX100 – Technical data

Pump size of series VX100Q	Theoretical capacity* n_{max} = 1000 min^{-1}			Max. operating pressure**		Theoretical operating torque with max. operating pressure and water (valid for NBR elastomers)
	[l]	**[l/min]**	**[m^3/h]**	**[bar]**	**ALU*** [bar]**	**[Nm]**
45	0.29	290	18	10	7	65
64	0.42	420	25	9	5	80
90	0.59	590	35	7	3	90
128	0.84	840	50	4	2	85

12.3 VX100 with flanged electric motor – Technical data

Pump			**Motor**					
			AEM0269			**AEM0270**		
			Nominal power **2.2** [kW]			Nominal power **4** [kW]		
			Speed **1420** min^{-1}			Speed **1440** min^{-1}		
			Gear ratio [i]			Gear ratio [i]		
			1.913	**2.19**	**2.526**	**1.913**	**2.19**	**2.526**
VX100..	Speed	[min^{-1}]	**742**	**648**	**562**	**753**	**658**	**570**
45Q	Displacement **0.29** [l]							
	max. operating pressure	[bar]	**2.0**	**3.0**	**4.0**	**6.7**	**8.5**	**9.7**
	Theoretical capacity*	[m³/h]	**12.9**	**11.3**	**9.8**	**13.1**	**11.4**	**9.9**
64Q	Displacement **0.42** [l]							
	max. operating pressure	[bar]	**1.1**	**1.8**	**2.4**	**4.3**	**5.6**	**6.8**
	Theoretical capacity*	[m³/h]	**18.7**	**16.3**	**14.2**	**19.0**	**16.6**	**14.4**
90Q	Displacement **0.59** [l]							
	max. operating pressure	[bar]	--	**--**	**--**	**2.8**	**3.6**	**4.5**
	Theoretical capacity*	[m³/h]	--	**--**	**--**	**26.7**	**23.3**	**20.2**
128Q	Displacement **0.84** [l]							
	max. operating pressure	[bar]	--	**--**	**--**	**1.7**	**2.3**	**2.9**
	Theoretical capacity*	[m³/h]	--	**--**	**--**	**38.0**	**33.2**	**28.7**

Free passage

For series VX100 the maximum free passage is Ø 20 mm.

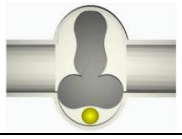
* All data refer to theoretical capacity. The actual capacity is lower; it depends on the various operating conditions.

** Valid only for short operation times. For continuous operation, please contact our Service department ☎✉.
The service life of the rotary lobes is reduced by high temperatures, especially in combination with high pressure.

*** For pumps with aluminium gearbox housing, operating pressure is reduced.

12.4 VX136 – Technical data

Pump size of series:		Theoretical capacity*		Max. operating pressure**			Theoretical operating torque with max. operating pressure and water		
VX136	VX136QD Marathon	n_{max} = 800 min^{-1}		VX..QD	VX..Q	VX..QD Marathon	VX..QD	VX..Q	VX...QD Marathon
		[l]	**[m^3/h]**	**[bar]**	**[bar]**	**[bar]**	**[Nm]**	**[Nm]**	**[Nm]**
70	140 (70/ 70)	1.27	60	12 5	10	16	280 135	240	400
105	210 (105/105)	1.90	90	12 5	10	16	415 200	355	580
140	280 (140/140)	2.53	120	12 5	8	14	550 260	390	675
210	420 (210/210)	3.80	180	10 5	5	12	695 380	395	860
280	-	5.06	240	8 5	-	-	755 500	-	-
420	-	7.59	360	6 -	-	-	865 -	-	-

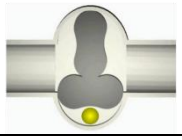


Free passage

For series VX136 the maximum free passage is Ø 40 mm.

12.5 VX186 – Technical data

Pump size of series:		Theoretical capacity*		Max. operating pressure**			Theoretical operating torque with max. operating pressure and water		
VX186	VX186QD Marathon	n_{max} = 600 min^{-1}		VX..QD	VX..Q	VX...QD Marathon	VX..QD	VX..Q	VX..QD Marathon
		[l]	**[m^3/h]**	**[bar]**	**[bar]**	**[bar]**	**[Nm]**	**[Nm]**	**[Nm]**
92	184 (92/ 92)	3.56	125	-	10	16	-	675	1100
130	260 (130/130)	5.03	180	12	10	16	1100	940	1510
184	368 (184/184)	7.12	250	12	8	14	1540	1090	1850
260	520 (260/260)	10.06	360	10	5	12	1835	1035	2205
368	-	14.24	510	8	3	-	2100	970	-
390	-	15.09	540	7	3	-	1975	1020	-
520	-	20.12	720	6	-	-	2250	-	-
736	-	28.48	1000	3	-	-	1680	-	-



Free passage

For series VX186 the maximum free passage is Ø 61 mm.

* 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 life of the rotary lobes is reduced by high temperatures, especially in combination with high pressure.

12.6 VX230 – Specifications

Pump size of series: VX230	theoretical capacity* n_{max} = 540 [min^{-1}]		max. operating pressure**		theoretical operating torque with max. operating pressure and water	
			VX..QD	VX..Q	VX..QD	VX..Q
	[l]	**[m^3/h]**	**[bar]**	**[bar]**	**[Nm]**	**[Nm]**
226	13.45	435	12	8	2900	2000
320	19.04	615	10	5	3470	1960
640	38.08	1230	6	-	4260	-

Free passage

For the VX230 series the maximum free passage is Ø 75 mm.

* 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 life of the rotary lobes is reduced by high temperatures, especially in combination with high pressure.

13 Long-term storage

Complete pumps, cartridge mechanical seals, 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 humididty 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.

From a storage period of over 5 years and before start-up we recommend:

- checking and renewing (if necessary) all wetted gaskets and rotary lobes
- changing the gear oil and the buffer or quenching fluid

For pumps with a mechanical seal that has mating materials SiC-SiC, the shaft must be turned (at least one revolution) every two months so that the sealing surfaces of the mechanical seal rings do not stick together.

14 Putting out of operation and disposal

1. Disconnect pump from the power supply or the PTO drive.
   - With electric or hydraulic drive: Observe notes and safety notes → **Chapter** "Connection to the power supply".
   - For PTO drive: Observe notes and safety notes → **Chapter** “PTO drive".
2. Disconnect pump from the pipe: Observe notes and safety notes → **Chapter** "Installation in pipes".

Risk of injury by crushing or falling down

Pipes under flexural strain can spring back under spring energy. In order to prevent risk of injury due to crushing or falling, carefully loosen screws. Wear protective clothing.

3. Empty auxiliary materials and supplies and residual medium.
   - Empty pump gearbox: Observe notes and safety notes → **Chapter** "Checking and replacing the gear oil".
   - Emptying the buffer chamber: Observe notes and safety notes → **Chapter** "Emptying and cleaning the buffer chamber".
   - Empty any residual medium: Observe notes and safety notes → **Chapter** “Before opening the Q or QD cover".

Environmentally friendly disposal

Treat auxiliary materials and supplies, 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".

15 Declaration of Installation

Declaration of installation

for an incomplete machine
according to Machinery Directive 2006/42/EG; annex II B

Manufacturer:

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

We declare that this delivery concerns the following machine which is not complete. The machine must not be put into service until the machinery into which this incomplete machine is incorporated is in conformity with the Machinery Directive 2006/42/EC.

Product: Rotary lobe pump
Type of machine: HiFlo®
Serial number:
Year of construction:

The following basic health and safety requirements according to Annex I of the Machinery Directive (2006/42/EC) are applied and observed:
1.1.3; 1.1.5; 1.5.4; 1.5.13; 1.6.1; 1.7.1.1; 1.7.3; 1.7.4

Applied harmonised standards:
EN 349:1993+A1:2008
EN 1037:1995+A1:2008
EN ISO 12100:2010
EN ISO 13857:2008

Applied national standards and technical specifications:
DIN 4844-1:2012-06
DIN 4844-2:2001+A1:2004
DIN ISO 3864-1:2012-06
EN 809:2012-10
EN 12162:2010-05
EN 62079:2001-11

The technical documents according to annex VII B have been prepared and can be obtained if necessary.

The person authorized to compile the technical documentation is:
Ms Ilona Ballmann; Hugo Vogelsang Maschinenbau GmbH; Holthöge 10-14; D-49632 Essen/Oldb.

The manufacturer is obliged to electronically forward the relevant technical documentation for the partly completed machine to national authorities upon justified request.

49632 Essen, 2012-10-15

H. Vogelsang

Harald Vogelsang (Managing Director)

Hugo Vogelsang Maschinenbau GmbH
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