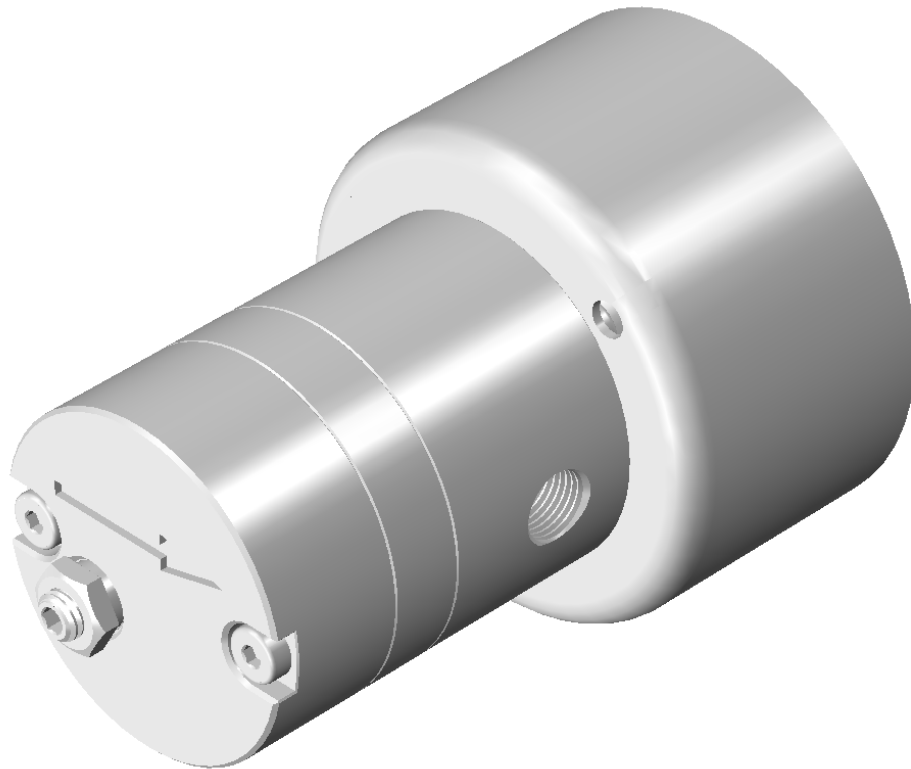


Operating Instruction

**for
Metering Pumps**



**Models:
VG004-VG540**

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1. General

This Manual includes all necessary Information required during Installation, operation and maintenance. It should be read prior to commencing installation and operation. It is absolutely necessary to store the manual within reach of the pump.

In addition to this manual, the operating instructions of the motor should be read and always be kept within reach of the pump.

All numbers in brackets after the names of the pump parts, relate to the numbers of the spare part list in section 9.1.

1.1. Usage

Pumps described in these operating instructions are capable of pumping lubricating and non-lubricating liquids. All liquids must not be corrosive for the used materials (section 1.3).

Should you require any additional information regarding the pump, contact VERDER GmbH. or their local authorized distributor. Please state the pump model and the date of manufacture in your correspondence.

1.2. Pump Model Designation

This manual is valid for the metering pumps VG060, VG120 and VG200 beginning with the year 1998, manufactured by VERDER Deutschland GmbH 42781 Haan, Germany.

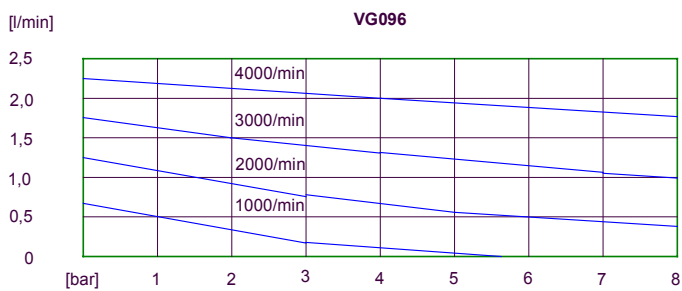
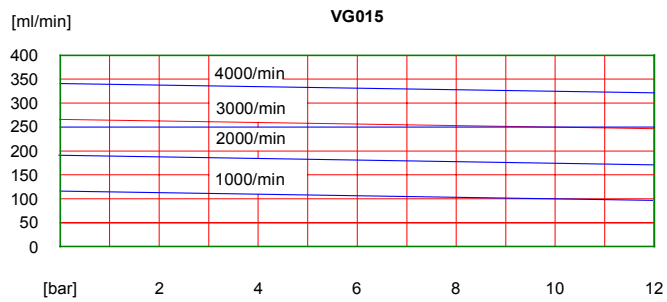
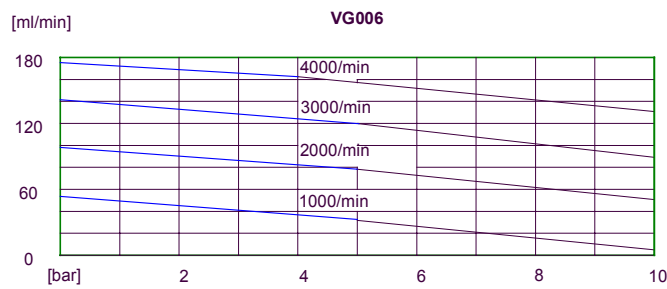
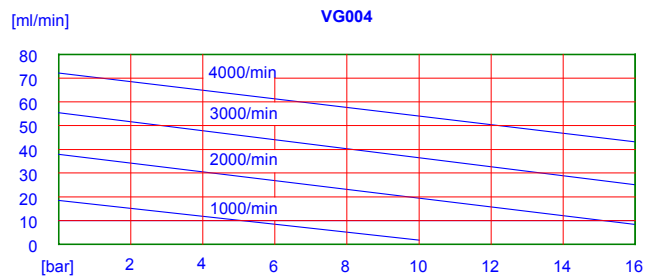
The date of manufacture is stamped on the bottom of the casing [1]. The first letter is the year of manufacturing, the following number the month of manufacturing. To determine the year we started, in 1998 with the letter G was used (H:1999, I:2000, J:2001, etc.).

The bottom line of this manual shows the issue and date of issue of this operating instruction.

1.3. Pump Data

Model	V004	V006	V015	V096	V108	V288	V330	V540
Differentialpressure [bar]	5,2	5,2	5,27	8,5	5	8,5	8,5	8,5
Systempressure [bar]	75	75	75	125	21	125	125	125
Temperature[°C]	-46 bis +122 (all Models)							
Viscosity [cps]	0,2 bis 1500 (all Models)							

flow rates



Curves for Model VG108; VG288; VG330 und VG540 on request
 the curves on this page are valid for:

materials in contact with liquid	
Housing:	1.4571 (A4)
Cover :	1.4571 (A4)
Centerpart:	1.4571 (A4)
Shafts:	1.4571 (A4)
Gears V004-V015	Graphit oder Ryton
Gears V096-V540	Ryton oder PEEK.
Bearing V004-V015	Graphit oder Ryton
Bearing V096-V540	Ryton oder PEEK
Capsule:	1.4404 (

liquids	see resistance against indicated materials
motor	motor to specification of manufacturer or distributor

WARNING

If you intend to operate the pump outside of the above given parameters ask, please consult the manufacturer of the pump. Modifications may be necessary to ensure successful operation. Otherwise the pump or your system may be damaged.

1.4. Representatives

Please contact VERDER for the representative in your area.

2. Safety

Equipment that is incorrectly installed, operated in a dangerous manner, or poorly maintained, is a potential safety hazard. If all reasonable precautions are not taken, the result may be personal injury or damage to equipment.

2.1. Symbols Used In These Operating Instructions

These operating instructions contain safety regulations. If these regulations are ignored, the result may cause injury or death. Warnings are noted with the following symbols:

danger symbol



symbol referred to DIN 4844 - W9

high voltage symbol



symbol referred to DIN 4844 – W8

Please pay close attention to items marked with the following symbol. Pump or system damage is possible if these warnings are ignored.

WARNING

information plates attached directly to the pump head:

- sign with direction of rotation
- date of manufacture

this information must be observed and preserved.

2.2. Personnel Qualification

Individuals responsible for operation, maintenance and assembly of this equipment require proper training. It is essential the operator is aware of proper operational methods. This operating manual must be read and understood before installing and operating the pump.

2.3. Possible Dangers If Safety Warnings Are Not Observed

Failure to observe safety warnings may cause danger to the personnel, environment and the pump. Liability claims are also possible.

Examples of such dangers are:

- malfunction of the pump
- electrical shock
- mechanical failure
- danger to the environment by leakage

2.4. Local Safety Regulations

The installation and operation of the pump must comply with national and local health, legislation, and safety regulations.

2.5. Safety Guidelines For The Operator

- Protect hot or cold machine parts against touching.
- Leaking dangerous liquids (e.g. explosive, poisonous, hot) must be drained, to ensure they do not cause danger to personnel and the environment. Laws must be obeyed.
- Electrical dangers must be avoided.

2.6. Safety Guidelines For Maintenance, Assembly and Disassembly

Maintenance, assembly and disassembly must be performed by skilled technicians, who have read these operating instructions.

Perform all work while the pump is not in operation.

If you are pumping noxious liquids, the pump must be decontaminated prior to performing maintenance.

After completion of maintenance , all safety devices must be reinstalled.

Prior to start up, all guidelines must be followed.

2.7. Technical Changes And Manufacturing Of Spare Parts

It is necessary to consult the manufacturer prior to make modifications and technical changes to the pump. We recommend the use of spare parts produced by the manufacturer. The use of other parts will void your warranty.

2.8. Inadmissible Operation

The safe operation of the pump model is only possible if the pump is operated in a correct manner according to section 1 - General – of this operating manual. The pump data in the data sheet must also be observed.

3. Transportation And Storage

3.1. Shipping

The pump heads are packaged to prevent damage during shipment. Additionally, the inlet and outlet ports are plugged to prevent leakage of retained test liquid, protect the threads, and to prevent particles from reaching the internals of the pump.

3.2. Transportation

We guarantee that the pump at time of delivery was working well. The pump was packaged in a suitable transportation box. After receipt, inspect pump immediately for shipping damage. If you discover damage immediately contact the forwarder agent and/or supplier.

3.3. Preparation For Storage After Use

Depending on the liquid pumped, there are different methods for preparing the pump for storage. If liquids without poisonous or aggressive additives were pumped, flush the pump for one minute with at half speed.

If toxic or aggressive liquids were pumped, be sure to follow all safety precautions. First, flush the pump with a neutralizing liquid at half speed. Parts such as the relief valve (section 7.3.4) and magnetic coupling (section 7.3.3), which cannot be cleaned completely by flushing the pump need to be disassembled and cleaned by hand.

WARNING

If liquids that solidify have been pumped (e.g. paint), completely disassemble the pump (section 7.3). Clean all parts by hand to guarantee a successful start up. Clean the pump with normal detergent (see resistance of pump materials). After assembly the pump should be flushed with water, at half speed.



When handling noxious liquids, adhere to all safety regulations!

3.4. Long Term Storage

Please adhere to the following guidelines for long term store of your pump:

- clean the pump according to section 3.3
- plug the inlet and outlet ports
- Refer to section 1.3 for storage temperature

4. The pump

4.1. Principle of a gear pump

Gear pumps are rotary displacement pumps in which two gears engage with each other. The transfer of fluid is caused by counter rotation of two gears in a gear chamber. The gears are fixed on two shafts, which are running in bearings in the casing and the cover. The shaft drives one gear, the other is driven by the first gear. The opening teeth create a suction, which pulls the liquid into the pump (figure 4.1). The liquid is transported between the teeth and the gear chamber to the pressure side (figure 4.2, figure 4.3). When the gear teeth meet again, the liquid is squeezed out and pressed into the outlet port (figure 4.4). In this way liquid can be pumped against pressure.

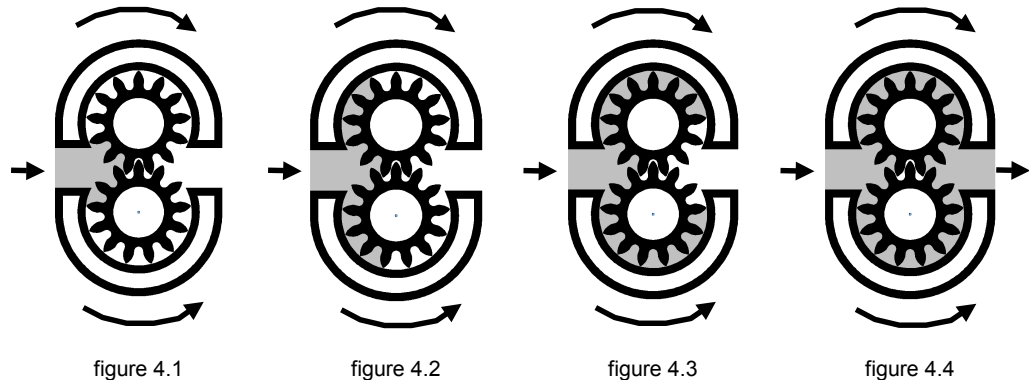


figure 4.1

figure 4.2

figure 4.3

figure 4.4

4.2. Design Of The Pump Head

4.2.1. General Design

The robust body consists of the three parts: Casing], cylinder and cover .The pump design lends itself to easy, fast and economic maintenance. The cylinder and cover are screwed with two socket head cap screws to the casing. The exact position is determined by two pins. The casing, cylinder and cover are sealed with O – rings]. The gears and the shafts are pressed together which run in bearings in the casing and cover. All bearings are sleeve bearings. The torque from the motor to the drive shaft of the pump is transmitted by a magnetic coupling.

VERDER VG series models are available in several different flow rates. . To determine the flow rates for each model ask your local distributor.

4.2.2. Relief Valve only VG108 and VG096

The relief valve protects your system against high pressure. It is adjustable to crack between 0 and 7 bar (figure 6.1).

While cracking, the valve relieves internally from pressure to suction side to protect the system and pump from damage.

Refer to section 6.3 for relief valve adjustment.

4.2.3. Magnetic Coupling

The magnetic coupling of the pump head is hermetically sealed. There is not a rotating shaft end, which can cause leakage by wear of lip seal rings or shaft. The pump head is statically sealed with O–rings [18].

Pumps with a magnetic coupling transmit the torque from the driving motor to the pump by magnetic forces without contact. Both the motor drive shaft and pump drive shaft are equipped with a magnetic ring and a group of single magnetic plates, that create a system of magnetic

poles. Under operation, the driving part and driven part of the coupling move synchronously at the same speed due to an existing magnetic field.

In addition to the relief valve, the magnetic coupling protects the pump against damage. Exceeding the maximum torque will cause the coupling to de-couple. If the coupling de-couples, the systems will start to rattle, the gears will not turn, and no liquid will be pumped. Synchronizing the magnetic coupling is only possible if the driver motor is switched off and restarted again with a lower load.

WARNING

Operating the pump more than 20 seconds in an uncoupled working condition could cause demagnetization of all magnets. As a result, the maximum reachable torque and the maximum reachable pressure rise declines.

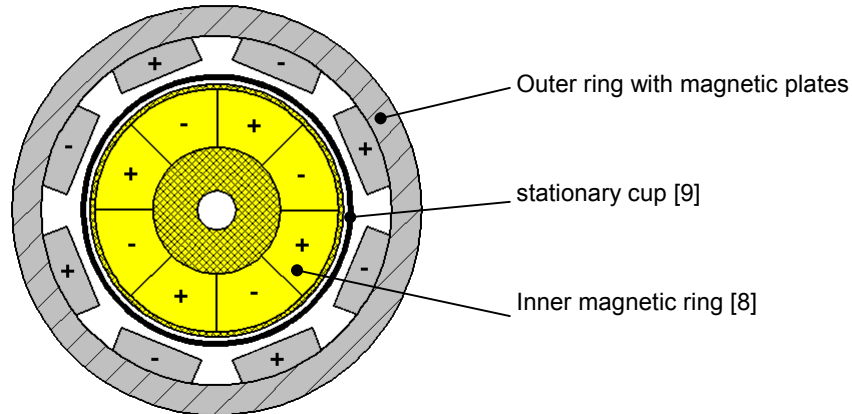


figure 4.6 – principle of the magnetic drive used in this pump

5. Pre Installation Check

5.1. Check Before Installation

Inspect pump heads for potential shipment damage (see section 3.2).

Verify the following points to ensure the pump head is right for your application (see section 1.3):

- corrosion resistance of the used materials
- liquid viscosity
- delivery rate
- temperature range

If there are differences between the pump you need and the pump we supplied, please contact VERDER.

5.2. Piping

It is very important to install only correct fittings to the pump head. All fittings should screw together easily, only use force only for final seat.

WARNING Avoid connection pipes that place any external strains or loads on the pump head.

Be sure to choose a connection with a suitable inner diameter. Below are the maximum flow velocities:

- for inlet port piping : 1,5^m/s
- for outlet port piping: 3,0^m/s

WARNING To protect the pump from damage caused by solids in the liquid, we recommend a 50-micron filter in the suction piping. Be sure the filter does not cause a serious pressure drop.

Suction piping should be as straight and direct as possible to the pump with the minimum number of elbows. Elbows when used should be of the long radius type.

The suction pipe should have a continuous rise to the pump. If there is a need to install the piping rising and descending, at the highest points there must be a provision to purge air from the piping.

WARNING After installing the pipes, be sure they are free from sediments and chips. Otherwise the pump head may be damaged.

Be sure all pipe connections are securely fastened to avoid sucking air into the pump and to prevent leakage.

6. Start Up / Shut Down

6.1. Prepare For Start Up

- assemble pump head and motor. Pay attention to the correct measurements according to the data sheet.
- connect the piping (see section 5.2). Be sure the inlet and outlet are connected correctly.



Disassemble and assemble while the motor is not operating.

6.2. Start Up

- If necessary, disinfect the piping and the pump head.
- To clean the pump head, we recommend to flushing the pump with the liquid used at least one minute to ensure all residues of the test liquid remaining in the pump are removed.
- Adjust the relief valve according to section 6.3.
- Avoid dry running at start up longer than 30 seconds.

6.3. Adjusting The Relief Valve (VG108 and VG096)

With the integrated relief valve it is possible to determine the relative pressure rise to exact value (see section 4.4.2).

All relief valves are tested to ensure they are in good working condition. Relief valves are not set at a specific value, unless requested by the customer.

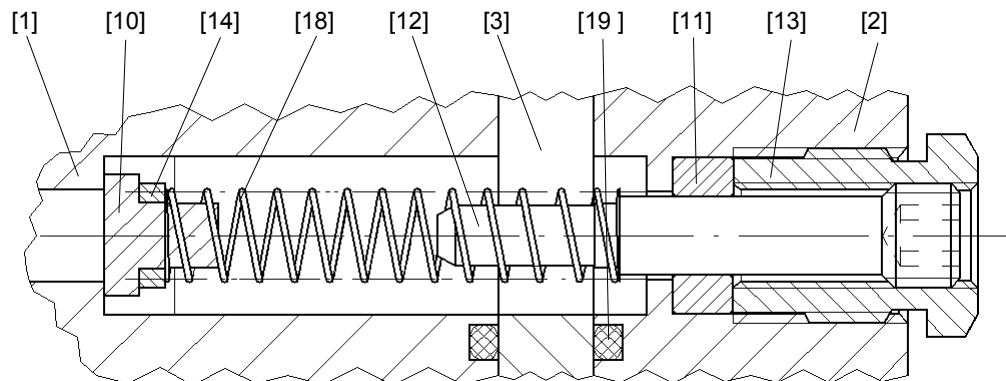


figure 6.1- cutaway of relief valve

The relief valve should be set while the pump is operating. Measure the pressure on the outlet side of the pump. Pay attention to the following operating conditions while setting the relief valve:

- flow rate
- temperature
- system pressure
- speed of rotation

To adjust the relief valve (figure 6.11):

- open the locking screw [13] one quarter rotation
- adjust the relief valve by turning the adjusting screw [12]
 - to the left (counter clockwise) ⇒ decreasing the crack pressure
 - to the right (clockwise) ⇒ increasing the crack pressure
- tighten locking screw [13]



Unscrew the adjusting screw [12] maximum until it is even with the locking screw [13]. With an opened locking screw [13] a small amount of leakage is possible.

WARNING

The relief valve is designed for a short-term overload protection. Pumping liquid through a relief valve will generate heat in the liquid. For application at ambient operating temperatures, if the relief valve is opened more than 3 minutes, damage to the pump head could occur. The higher the operating temperature, the shorter the possible relief valve opening time.

6.4. Monitoring

WARNING

We recommend installing a manometer on the outlet side of the pump to check the operating pressure. If the operating temperature is greater than 80°C we recommend installing a temperature gauge. Temperatures greater than 150°C may destroy the magnets of the magnetic coupling.

6.5. Shut Down

- Reduce the speed of rotation, if possible, to half operating speed.
- Drain the pump head by reducing the outlet pressure to atmospheric pressure and remove the suction piping out of the liquid tank so that the pump sucks air (not if the system is under pressure).
- Be sure the pump does not run dry for more than 30 seconds.
- If you are pumping noxious liquids, flush the pump with a neutralizing liquid.
- Flush the pump head a second time with water at a speed of about 1000 RPM.

6.6. Disconnecting The Pump From The Motor



Disconnect the motor! Make sure that all steps mentioned in section 6.5 are completed.

Open the two fastening screws that connect the flange to the motor. Pull the head straight away from the motor.

7. Maintenance

7.1. General Information



Be sure that the pump head is cleaned with a non-toxic liquid. In the event the pump head was operating with dangerous or noxious liquids, use necessary safety precautions.

7.2. Maintenance And Inspection

There are no special maintenance periods. Maintenance must be done if:

- the pump head is stored,
- the pump head no longer has the performance it should have (section 1.3),
- other liquids are pumped,
- if pump head leaks.

See section 3.3.

7.3. Disassembly And Re-assembly

The detailed maintenance instructions you will find in section 9.

WARNING If the pump head has been disassembled, it is necessary to replace all O-rings to ensure a proper seal.

7.3.1. Tools

For maintenance and assembly you need:

- Allan key, size 3mm
- screw driver size 7mm x 1,2mm
- ring wrench or wrench, size 10mm
- withdrawer for the sleeve bearings (inner diameter 4mm)
- insert pin (outer diameter 5 to 5,4mm)
- dynamometric key (50-500 Ncm)

8. Failure, reasons and troubleshooting

failure				reason	solution		
pump doesn't work correctly	motor runs	pump doesn't suck	pump rattles	pressure rise was at least for a few moments higher than 7 bar	motor uncoupled	stop motor and restart with a lower speed and / or lower load	
				pressure rise lower than 7 bar	liquid viscosity lower than 200 cSt	inlet piping plugged	check inlet piping and clean it
						outlet piping plugged	check outlet piping and clean it
					particles in the pump head	disassemble pump head and clean it	
				liquid viscosity higher than 200 cSt and speed faster than 1000 RPM	motor uncoupled	stop motor and use liquid with lower viscosity or restart with lower speed	
				pump runs smooth	inlet piping longer than 1m and speed lower than 1400 RPM	pump is dry inside	Pour a little bit of liquid into the pump
				inlet piping longer than 1m and speed higher than 1400 RPM	inlet piping plugged	check inlet piping and clean it	
			outlet piping plugged		check outlet piping and clean it		
			liquid viscosity to high		use liquid with lower viscosity		
			leakage in the inlet piping		check inlet piping and seal it		
		leakage in the pump head	replace seals in the pump head				
		pump sucks but the flow or pressure rate is worse than described in the data sheet		liquid viscosity lower than 1cSt	liquid viscosity to low	use liquid with higher viscosity	
			liquid viscosity higher than 1cSt	relief valve opened	internal relief caused by the relief valve	adjust relief valve to a higher level	
				relief valve closed	inner diameter of the outlet pipe to small	use bigger outlet pipe	
			inner diameter of the inlet piping smaller than 5mm	pump worn or damaged	maintain pump		
				inner diameter of the inlet pipe to small	use larger inlet pipe		
				Motor does not run	connect electric wires and start motor		

9. Additional documents**9.1. Spare part list**

pos.	pieces	name	pump head		
			VG060 ID: 200815	VG120 ID: 200 816	VG200 ID: 200 916
1	1	casing*	3000-001.01 ID: 021 338		3000-001.31 ID: 022 550
2	1	cover*	3000-002.01 ID: 021 468		
3	1	cylinder	3000-004.11 ID: 022 547	3000-004.21 ID: 022 551	3000-004.31 ID: 022 552
4	1	drive shaft	3000-005.10K ID:	3000-005.20K ID:	3000-005.30K ID:
5	1	driven shaft	3000-006.10K ID:	3000-006.20K ID:	3000-006.30K ID:
6	5	bearing	3000-010.00 ID: 021 778		
7	1	flange	3000-122.00 ID: 500 258		
8	1	inner magnet	3000-124.00K ID: 120 160		
9	1	stationary cup	3000-145.00 ID: 500 512		
10	1	valve piston	9250-054.01 ID: 500 359		
11	1	valve seal	9250-078.00 ID: 500 326		
12	1	adjusting screw	9250-093.10 ID: 500 398	9250-093.20 ID: 500 399	9250-093.30 ID: 500 400
13	1	locking screw	9250-096.00 ID: 021 197		
14	1	valve washer	9250-116.00 ID: 500 350		
15	2	pin	5m6x14 DIN7 ID: 701 163	5m6x18 DIN7 ID: 701 176	5m6x24 DIN7 ID: 701 262
16	2	socket head cap screw	M4x25 DIN6912 ID: 702 522	M4x30 DIN6912 ID: 702 000	M4x35 DIN9612 ID: 702 658
17	4	countersunk screw	M4x8 DIN 85 ID: 702 593		
18	1	valve spring	3,6 x 5 4 x 26,8 ID: 713 006		
19	3	O - ring	26,7 x 1,78 ID: 718 121		

In the event a spare part order is marked * pump parts are supplied including the bearings pos. 6 (3000-010.00). You do not need to order these parts separately.

9.2. Drawing

