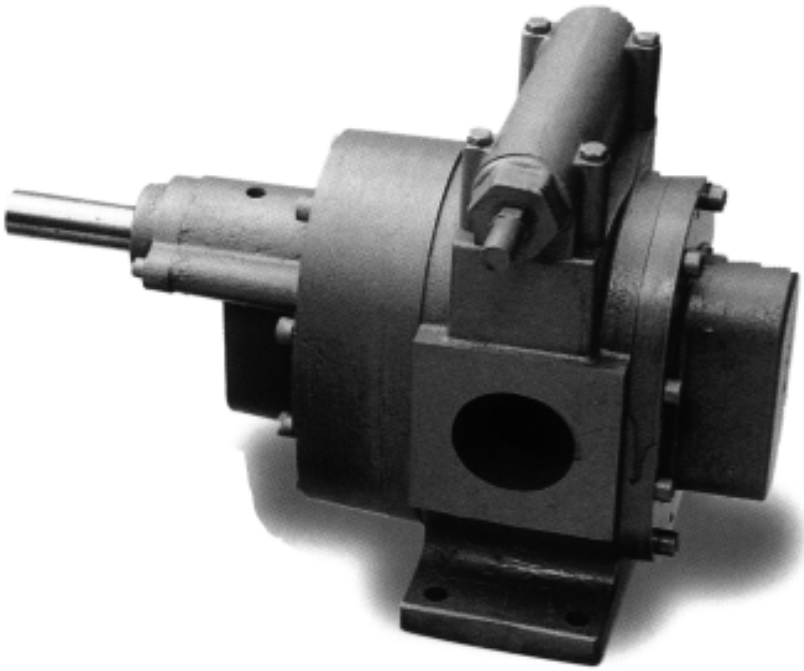
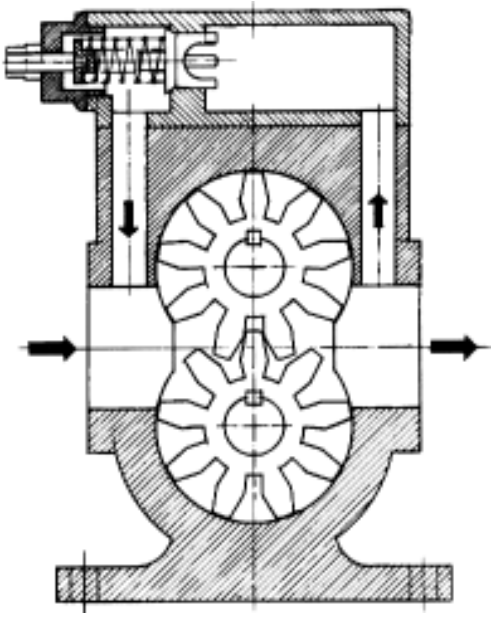
Gear Pump type BK

SWEDENPUMPEN

Instruction for Use and Maintenance





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DECLARATION OF CONFORMITY

We hereby declare that the pump unit described in these instructions

Type "BK"

complies in full with the European Parliament And The Council Of European Union 93/68/EEG [1] Annex I No. 1

Used norms

EN 809
EN 292 Part 1
EN 292

Manufactured by:

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Patrik Swedenborg

[1] **1.7.1994/1.1.1995: i.d.F.93/44/EEC**

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1 GENERAL

1.1 INTRODUCTION

These instructions are directed to the users of the SWEDENPUMP. Make sure that anyone operating the pump has readt access to these instructions, since they contain valuable information regarding the operation, safety and maintenance of the pump.

When the pump is installed, operated and maintained in accordance with our instructions, needless damage to the pump will be avoided, and the pump will be easy to maintain. AB GF Swedenborg cannot be held responsible for any disruptions in operations, impaired performance and/or damages incurred caused by the non-compliance of instructions.

1.2 WARRANTY

In order for the warranty to apply, the pump must be used in accordance with the terms stipulated in the order confirmation and the technical specifications listed on the spec. sheet. This applies in particular to the service life of the pump housing, but also with regard to the shaft seal, since the material used in the seal is always selected in keeping with the specified pump medium. If the pump is to be used for a medium other than the one specified, please contact us, and we will send you a written assessment indicating if the pump is suitable for use with this particular medium. In accordance with general delivery stipulations, the warranty runs twelve (12) months from the date the pump is placed into operation, and eighteen (18) months from the date of delivery. If a longer warranty period has been negotiated by the customer, this will be specified, in writing, in the acknowledgement of your order.

Repairs made during this warranty period are to be performed by Swedenborg service personnel only. After the warranty has expired, and if customers lack access to certified service personnel, we recommend the pump to be sent to Swedenborg for repairs. The warranty covers defects in materials and the functions specified in the spec. sheet. The warranty does not cover normal wear parts such as bearings and mechanical sealing.

1.3 FACTORY INSPECTION

Prior to delivery, all pumps are tested in a test bench using oil at 20℃.

1.4 NAME TAG

All pumps are provided with a name tag stating the order number.
This number must be indicated when ordering spare parts.
The tag will also state your Pos. No. if this was specified in your order.
If the tag is missing, the serial number of the pump is located at the base of the pump on the front side of the pump casing.

2 SAFETY

Key - definition of symbols

Caution **Work Safety Symbol**
This symbol is indicated in conjunction with the items that may, if not performed correctly, be hazardous or even deadly. Read instructions marked with this symbol carefully, and be extremly attentive in the operations described. Ensure that every person operating the pump is aware of the risks involved. In addition to the extra hazards described in this instructions, regular safety procedures must be observed and normal precautions must be taken.

Attention **Attention Notice**
This symbol is indicated in conjunction with passages in the instructions that include regulations and/or suggested procedures that may, if followed, prevent damage to the pump or other parts of the plant.

3. INSTALLATION

3.1 Location

Always place the pump as close as possible to the vessel.
Even if the pump is self priming, it's always better to place the pump below the liquid level in the vessel in order to obtain maximum performance of the pump.

3.2 Rotation direction - inlet/outlet

The rotating direction of the shaft determines the inlet and outlet.
Upon delivery, an arrow between the connection points will indicate the rotation direction and the flow direction.
If no flow direction is indicated, pump action is clockwise (factory standard), which means that the suction connection is on the left-hand side of the pump.
Please, check the rotation direction of the electric motor.
In accordance with pertinent standards, pumps are not equipped to operate in the opposite direction. Should a customer require counter-clockwise rotation, Swedenborg must be informed of this. The suction pipe must be at least as large as the pump connection. At extremely long suction pipe the dimension should be increased.

3.3 Testing

The initial pressure testing of a newly installed pump must be performed at pressures not exceeding 5 bar. The pump must be blocked at pressures higher than this. The reason for this is that the mechanical seal may detach from the stationary ring. The pump has been factory tested at a pressure of 16 bar.

3.4 Overflow Valve

Since the pump is a constriction pump, a specific amount of liquid is transported every revolution. If the pressure valve is closed, the pump will continue to

Caution operate until the motor stops or the pipe/valve bursts. In order to prevent this, an internal adjustable overflow valve ought to be connected. It is vital that the overflow valve is assembled correctly. If this is not the case, the overflow valve will not work. Then it will be necessary to detach it and rotate it 180°.
For the size 1 and 2, the adjustable screw should face the pressure side.
For the size 3 and 4, the adjustable screw should face the suction side.

3.5 Filter

The purity of the medium determines the service life of the pump. In most cases, a coarse filter with a mesh of 0.8 to 1 mm will be adequate. If you know that abrasive particles are present, you need to assess the situation in each individual case and safeguard your pumps in a suitable fashion. Abrasive particles cause damage, particularly to the contact surfaces and gables of the gears.

3.6 Mounting of Pump to the Base Plate

To ensure optimal operation, the pump must be correctly affixed to the base plate. If the pump has not been affixed properly, this will result in an increase in viberation which leads to damages.

Close coupled pump

Depending on the size of the motor, the height between the base of the motor and the base of the pump may vary.

Attention If this is the case, insert a leveling distance under the pump/motor. Under no circumstances should a motor or a pump be pressed down onto the base plate on its own.

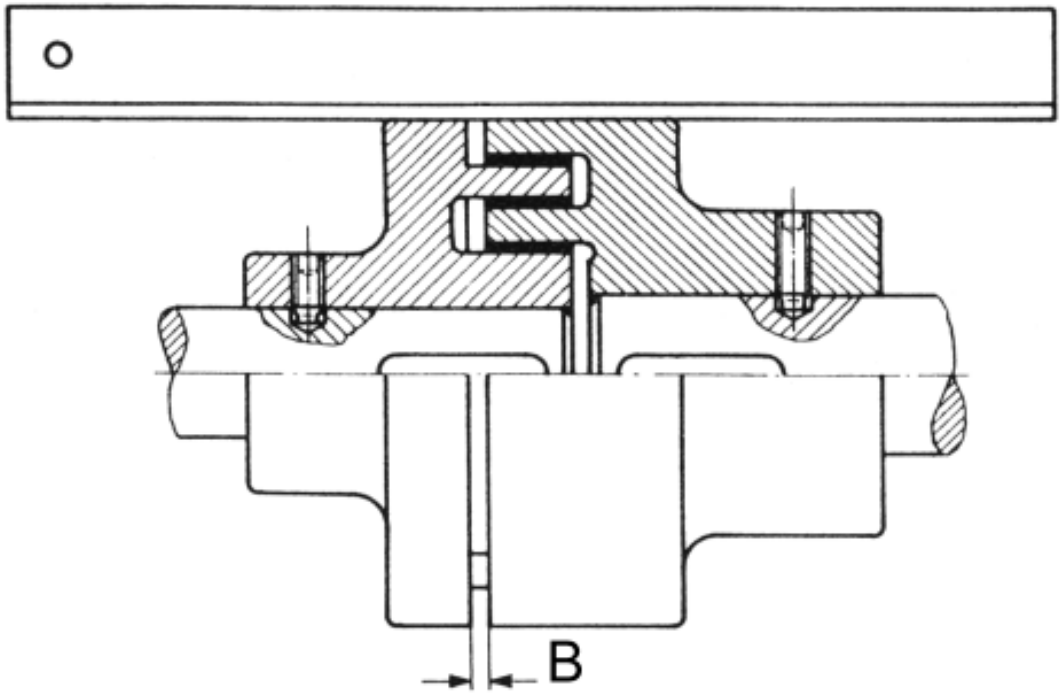
Pump With Shaft Coupling

The coupling should be checked before starting the pump. The max. deviation in the X and Y axis is 0.1 mm.

One method to achieve this end is to use a steel ruler, placing it at three points on the two coupling halves (see the illustration below). These three points should be 120° apart. Any gaps will appear as a band of light between the ruler and the coupling.

The distance marked "B" will vary according to the type of coupling used, but usually lies within the range of 2-6 mm.

Caution Never operate the pump without the coupling guard mounted.



4. START UP

4.1 Prior To Start Up

1. Check the coupling, see item 3.6 on page 5: "Mounting of Pump to the Base Plate".

2. Ensure that no tension exists between the pump and its connection pipes.

3. Rotate the pump shaft manually to see that it rotates freely. This does not apply for closed coupled pumps. In this case you have to disassemle the fan case of the motor and make sure that the pump rotates freely. Replace the fan case before starting the pump.

4. Ensure that the motor is correctly installed with a proper protective motor switch and the right current.

5. Check the rotation direction, see page 4, item 3.2: "inlet/outlet".

6. Check the overflow valve (optional equipment), see page 4, item 3.4: "Overflow Valve".

Caution

7. Never operate the pump without the protective motor switch or without the motor fan case in place.

4.2 Starting Up

1. Open the suction and pressure pipes. If there is no flow - prime the pump.

2. Start the pump.

5. MAINTENANCE

5.1 General Guidelines

The pump is designed to require a minimum of maintenance. Its simple construction is detailed in the illustration on page 12.

Caution - Before undertaking any repairs, see that the power supply to the motor of the pump has been shut off. Ensure that it cannot be turned on again by mistake during repairs.

- Never adjust the gland packing and the mechanical seal during operation.
- Never tighten the bolts while the pump is running. If a bolt breaks, leakage may occur.

5.2 Lubrication

1. Pumps without grease nipples are lubricated by the pump medium.
2. Pumps equipped with grease nipples should be lubricated every 750 hours with 3 grease pumpings.
3. On pumps equipped with the dry-run set SKF-24, two blue cylinders are located on each cover. At the top of each cylinder, a screw is located which is graded 1 to 12 months. If the pump is operated around the clock, 6 month is the recommended interval. Pumps used less than this should be adjusted accordingly in a sliding scale, but the interval should never exceed 12 months. According to SKF, the maximum operational interval is 12 months.
4. Pumps with a dry-run mechanical seal are equipped with a cylinder that keeps the seal lubricated using the pump medium and a spring mechanism. The grease is filled at the top of the cylinder until the indicator rod is fully depressed. Check regularly the grease level.
5. The type of grease used depends on the operating temperature and the medium.

6. REPAIRS

6.1 Shaft Seal

The pumps are equipped with mechanical seals accordning to DIN 24960, with the exception of the steel bellow seal.
We recommend that you should buy your replacement seal from us in order to obtain the proper material quality for the pump medium.

To replace a seal, unscrew the bolts at position 227 and the cover at position 215. On the side of the cover, at position 201, a plug is located that should be removed. Rotate the pump shaft until the locking screw on the rotating part of the seal is facing the opening. Unscrew the locking screw and remove the seal. Reassemble the pump in the reverse order.

6.2 Gears

Every pair of gears are manufactured together to achive minimum tolerances. Therefore both gears must always be changed. When mounting the gears, rotate the shafts so the keygroove is straight up. Then mount the gears on the shafts. It's important that the stamped number on each gear are faced in the same direction.

6.3 Inspections And Measurement Points

Covers

If necessary, the covers may be shaved to a total of 0.5 mm in all. Should further reduction be required, please contact Swedenborg. The tightening torque for the bolts on the covers of the BK 1 and 2 is 27 Nm, and for the BK 3 and 4 - 47 Nm.

Bearings

When replacing the bearings at position 205, you must replace all four. Usually, the bearing will wear down at the same rate as the gears, reducing the tolerance of the bearings in relation to the gears. In normal usage, large bearing allowance and gear allowances will generally coincide. However, bearings will wear down at a much more rapid pace if the pumps run dry as well as during cavitation and, naturally, if the medium is abrasive.

Shafts

Shafts and gears are not attached, and may be replaced separately in accordance with the API.
The bearing surface allowances to the shaft should be added to the bearing allowance, so that they will amount to at least 0.05 mm less than the radial allowance for the gears.

Others

Measure the axial allowance of the drive shaft when the pump is assembled and cleaned.
The radial allowance is measured (by way of the suction or the pressure flange) using a feeler gauge between the gear and the pump housing.
The cover gaskets at position 207 must be 0.2 mm thick.

7. Tolerances

7.1 Allowances and Dimensions

	Pump Type	ºC	mm
Axial allowance	BK 1 + 2	<200	0.1 - 0.2
	"	>200	0.2 - 0.3
	BK 3 + 4	<200	0.2 - 0.4
	"	>200	0.4 - 1.0
Radial allowance	BK 1 + 2	<200	0.1 - 0.2
	"	>200	0.15 - 0.3
	BK 3 + 4	<200	0.2 - 0.5
	"	>200	0.4 - 1.0
Cover, radial dimension	BK 1 + 2		25.05
	BK 3		40.05
	BK 4		55.05

Bearing allowance less than radial allowance	min 0.05

Shaft diameter	BK 1 + 2	18.00 +/- 0.02
	BK 3	25.00 +/- 0.02
	BK 4	30.00 +/- 0.02

Individual variations may occur depending on the medium used.

8. TROUBLE SHOOTING

8.1 New pump

The pump does not obtain rated flow:

- Open suction and pressure valve max.
- Check that the suction pipe has the right dimension.
- Check the rotation direction. Are the suction and pressure pipe in the correct spots ?, see page 4, item 3.2.
- Fill up the pump with suitable liquid.

8.2 Used pump

There has been a reduction in performance following a longer period of operating:

- Check the suction filter or strainer (if mounted).
- Check the clearance between the gear, pos. 204 and the pump casing; see the table at page 9, item 7.1, and see page 8, item 6.3.
- Check the sides of the gears and the positions 201 and 203, and make sure that these spots do not show wear or have been badly scratched.
- See table for axial clearance.
- For stainless steel pumps, check the teflon wear plates (intergrated with the pump casing gasket).

9. SPARE PARTS

9.1 Recommended Spare Parts

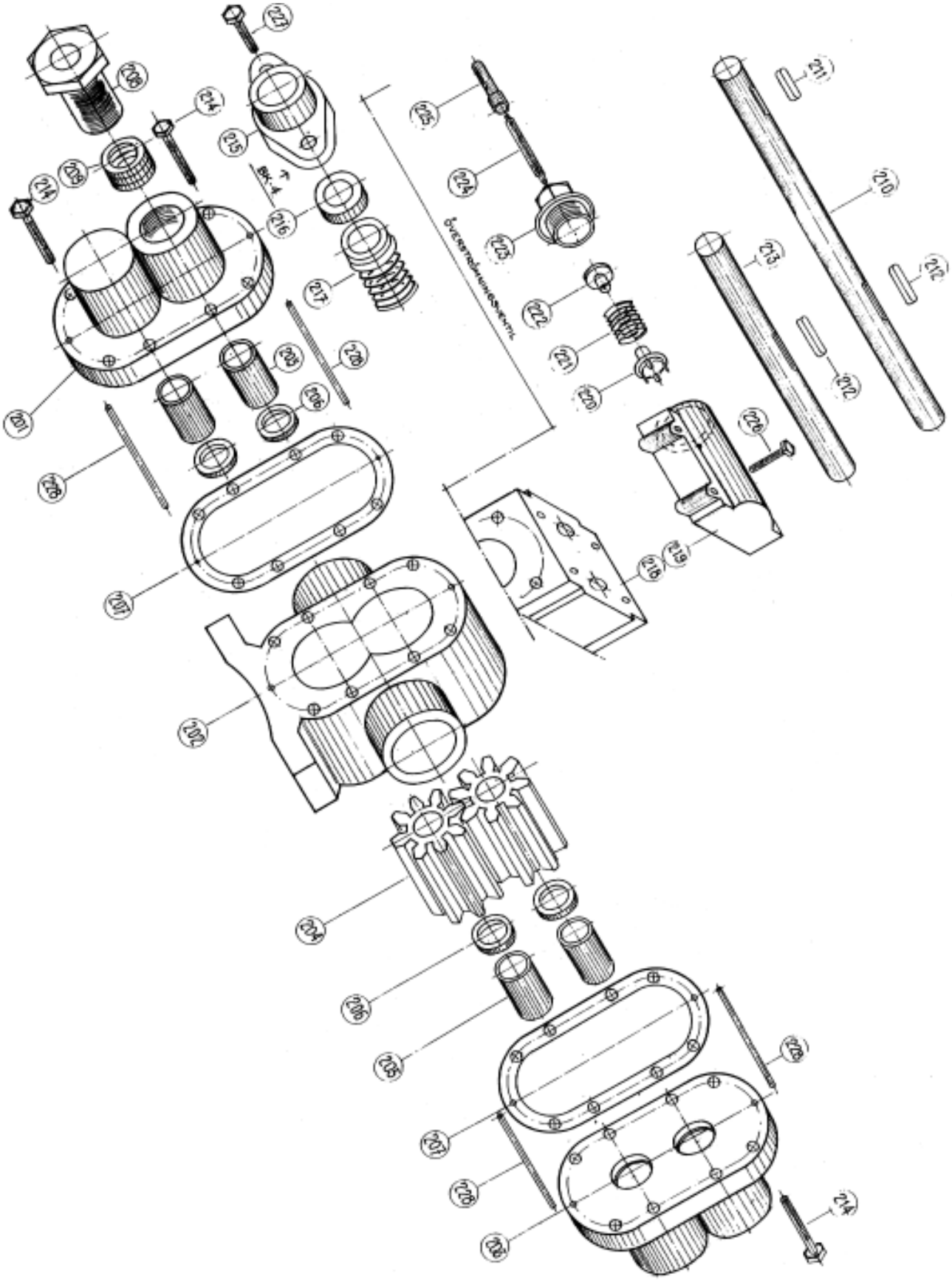
When ordering spare parts, always indicate the serial number of the pump, which is stamped on the base of the pump casing, or our order number found on the name tag at the top of the pump; see page 3, item 1.4.

Recommended spare parts:

* Mechanical seal
* Set of gaskets
* Bearings - if abrasive media is used
* If malfunction of a pump will lead to extensive problems, we suggest a complete spare pump.
* For stainless steel pumps: teflon wear plates

10. PARTS LIST

Pos. No.	Part	Number	Remarks
201	Cover - driving side	1	
202	Pump casing	1	
203	Cover - free side	1	
204	Gear	2	
205	Bearing	4	
206	Bearing seal	4	option
207	Casing gasket	2	
208	Gland	1	only stuffing box
209	Gland packing	1	only stuffing box
210	Drive shaft	1	
211	Key - shaft coupling	1	
212	Key - gear	2	
213	Shaft - intermediate	1	
214	Cover bolts		
215	Cover mechanical seal	1	
216+217	Mechanical seal	1	
218	Pump casing/ int. relief valve	1	
219	Internal relief valve	1	
220-225	Internal parts/ relief valve	1	only supplied complete
226	Bolt/ refief valve	4	
227	Bolt/ mech. seal cover	2	
228	Fitting bolt	1	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