

INSTALLATION, SERVICE AND MAINTENANCE
INSTRUCTIONS

ИНСТРУКЦИЯ ПО УСТАНОВКЕ И
ТЕХНИЧЕСКОМУ ОБСЛУЖИВАНИЮ

VCL LOBE PUMP РОТОРНЫЙ НАСОС VCL



c/Telers, 54 Aptdo. 174
E-17820 Banyoles
Girona (Spain)





EC DECLARATION OF CONFORMITY

(according to Directive 98/37/CE, annex II, part A)

Manufacturer:

C/ Telers, 54
17820 Banyoles (Girona) - SPAIN

Hereby declares, that the product:

<u>РОТОРНЫЙ НАСОС</u>	<u>BCL</u>	<u>2008</u>
Name	Type	Year of manufacture

conforms to the specifications of the Council Directive:

Machine Directive 98/37/CE, and complies with the essential requirements of the Directive and Harmonised Standards:

UNE-EN ISO 12100-1/2:2003
UNE-EN 1050:1996
UNE-EN 809/AC:2001
UNE-EN 294/AC:1993
UNE-EN 953:1997
UNE-EN 563/A1/AC:2000

Low Voltage Directive 2006/95/EC (what repeal 73/23/CEE Directive), and are conforms with UNE-EN 60204-1:1997 and UNE-EN 60034-1/A11:2002


EMC Directive 2004/108/EC (what repeal 89/336/CEE Directive), and are conforms with UNE-EN 60034-1/A11:2002

In compliance with the Regulations **(CE) n° 1935/2004**, relating to materials and articles intended to come into contact with foodstuff (repeal Directive 89/109/CEE), the materials in contact with the product do not transfer their components in quantities which may jeopardise consumer's health or safety

Declaration of Incorporation (Directive 98/37/CE, annex II, part B):

The equipments above mentioned won't put to operation till the machine into or onto it will be installed must comply with the stipulations of the Machine Directive.

Banyoles, February 2008


Marc Pons Bague Technical Manager

1. Safety

1.1. INSTRUCTIONS MANUAL

This manual contains information on the reception, installation, operation, assembly, disassembly and maintenance of the BCL pump.

The information provided in this Instructions Manual is based on updated data.

INOXPA reserves the right to modify this Instructions Manual without prior notice.

1.2. START-UP INSTRUCTIONS

This Instructions Manual contains vital and useful information for properly operating and maintaining your pump.

Read carefully these instructions before starting up the pump; become familiar with the operation and use of your pump and follow the instructions closely. It is very important that a copy of these Instructions is kept in a set place near the installation.

1.3. SAFETY

1.3.1. Warning signs



General danger of injury



Danger of injuries caused by the rotary parts of the equipment.



Electrical hazard



Danger! Caustics or corrosive materials



Danger! Suspended load



Danger of equipment malfunction



Compulsory requirement to ensure safety at work



Use of safety goggles is compulsory

1.4. GENERAL SAFETY INSTRUCTIONS



Read this Instructions Manual carefully before installing the pump and starting it up. If in doubt, contact INOXPA.

1.4.1. During installation



Always observe the *Technical specifications* given in Chapter 8.

Never start up the pump before it has been connected to the piping.

Do not start up the pump if the pump cover is not in place.

Check that the motor specifications meet the requirements, especially when working under conditions that involve the risk of explosion.



During the installation of the pump, all the electrical work must be carried out by authorized personnel.

1.4.2. During operation



Always observe the *Technical specifications* given in Chapter 8. NEVER exceed the limit of the specified values.

NEVER touch the pump or the pipes during operation when the pump is being used to decant hot fluids or when it is being cleaned.



The pump contains moving parts. Never place your fingers inside the pump while the pump is in operation.



NEVER operate the pump with the suction and discharge valves closed.

NEVER spray the electrical motor directly with water. The standard protection of the motor is IP-55: Protection against dust and spraying water.

1.4.3. During maintenance



Always observe the *Technical specifications* given in Chapter 8.

NEVER disassemble the pump before the pipes have been emptied. Remember that some of the fluid will always remain in the pump casing (when no drainage is provided). Note that the pumped fluid may be dangerous or very hot. In such cases, please refer to the regulations applicable in the respective country.

Do not leave detached parts on the floor.



ALWAYS disconnect the pump from the power supply before starting maintenance work. Remove the fuses and disconnect the cables from the motor terminals.

All electrical work must be carried out by authorized personnel.

1.4.4. Compliance with the instructions

Any failure to comply with the instructions might entail risks to the operators, the environment and the equipment, and result in the loss of the right to claim for damages.

Such non-compliance might involve the following risks:

- Failure of important functions of the equipment / plant.
- Failure to follow specific maintenance and repair procedures.
- Threat of electrical, mechanical and chemical risks.
- Environmental risks caused by the release of substances.

1.4.5. Warranty

Any warranty provided shall immediately be cancelled and void *ipso jure*, and INOXPA shall be compensated for any product liability claim from third parties, if:

- the service and maintenance work was not carried out in accordance with the service instructions, or the repair work has not been carried out by our personnel or it has been conducted without our written authorization;
- our equipment has been changed without prior written authorization;
- the parts or lubricants used are not original INOXPA parts and products;
- the materials were used incorrectly or negligently, or not in accordance with these instructions and their intended use;
- pump parts were damaged by excessive pressure owing to the lack of a safety valve.

The General Delivery Terms already provided also apply.



No change can be made to the equipment without prior discussion with the manufacturer. For your safety, please use original spare parts and accessories.

The use of other parts will release the manufacturer from any liability.

The service terms can only be changed with prior written authorisation from INOXPA.

IF IN DOUBT, OR IF YOU REQUIRE FURTHER EXPLANATIONS ON SPECIFIC INFORMATION (MODIFICATIONS, ASSEMBLY, DISASSEMBLY, ETC.), PLEASE DO NOT HESITATE TO CONTACT US.

2. Table of contents

1. Safety	
1.1. Instructions manual	4
1.2. Start-up instructions.....	4
1.3. Safety	4
1.4. GENERAL SAFETY INSTRUCTIONS.....	4
2. Table of contents	
3. General information	
3.1. Description	8
3.2. OPERATING Principle	8
3.3. Application	8
4. Installation	
4.1. PUMP RECEPTION.....	10
4.2. TRANSPORT AND STORAGE	10
4.3. Location	11
4.4. COUPLING.....	11
4.5. PIPES.....	12
4.6. PRESSURISATION TANK.....	12
4.7. ElectricAL INSTALLATION.....	12
5. Start-up	
5.1. Start-up	14
5.2. SAFETY VALVE.....	15
6. Operating problems	
7. Maintenance	
7.1. General MAINTENANCE.....	17
7.2. Torque value	17
7.3. Lubrication	17
7.4. STORAGE	17
7.5. Cleaning.....	18
7.6. DISassembly / ASSEMBLY OF THE PUMP.....	19
8. Technical specifications	
8.1. Technical specifications	25
8.2. WEIGHTS	26
8.3. BCL Dimensions.....	27
8.4. BCL 1-25 / 1-40 EXPLODED PARTS DIAGRAM.....	28
8.5. BCL 1-25 / 1-40 PARTS LIST.....	29
8.6. BCL 2-40 / 2-50 EXPLODED PARTS DIAGRAM.....	30
8.7. BCL 2-40 / 2-50 PARTS LIST.....	31
8.8. BCL 3-50 / 3-80 EXPLODED PARTS DIAGRAM.....	32
8.9. BCL 3-50 / 3-80 PARTS LIST.....	33

8.10. DETAIL OF THE BCL COOLED SEAL.....	34
8.11. DETAIL OF THE BCL DOUBLE MECHANICAL SEAL.....	35
8.12. DETAIL OF THE BCL ASEPTIC VERSION	36

3. General information

3.1. DESCRIPTION

The BCL lobe pump has been specifically designed to comply with all requirements in the pharmaceutical industry, for biotechnology and sterile processes.

The BCL series lobe pumps form part of the range of positive displacement, rotary pumps for viscous liquids. Their basic structure consists in a cast housing manufactured from CF-3M and two lobes in AISI 316L. The other parts in contact with pumped material are also made of AISI 316L. Ra \leq 0,5 μ m interior finished.

The BCL lobe pump shaft has been designed to allow free play, for vertical suction and delivery, with Clamp-ISO 2852 connections. The tri-lobes are manufactured in one piece. The mechanical seal is completely sanitary. The springs are protected against contact with the pumped fluid.

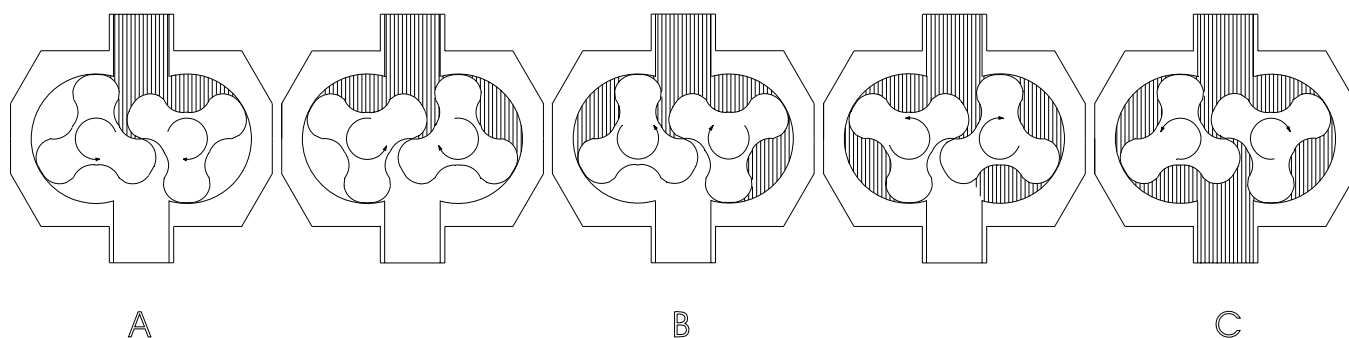
The motor complies with IEC standards. IP-55 protection. Class-F insulation. Three-phase power 220-240 / 380-420 V or 380-420 / 660 V at 50 Hz, depending on power supply. On request, the motors can be flameproof (EExd) or enhanced-safety (EExe) motors.

In terms of hygiene, reliability and durability, the entire range satisfies all of the requirements imposed by the aforementioned industries. Its design enables the highest level of interchangeability of parts.

This equipment is suitable for his use in food process.

3.2. OPERATING PRINCIPLE

The lobe pump is a positive displacement, rotary pump. The left lobe is operated by the drive shaft. The right-hand lobe is situated on the idler shaft, and is operated by means of helical gear. Both lobes turn in synchronisation without touching. During pump operation, a fixed volume is displaced. The illustration below shows how the lobe pump operates.



- As the lobes rotate, the space on the suction side increases as one lobe is distanced from another, thus creating a partial vacuum which draws the fluid into the pump chamber.
- As they are rotated by the shafts, each lobe is consecutively filled and the fluid is displaced to the delivery side. The small gaps between the lobes and between the lobes and the walls of the pump body ensure that the spaces are duly filled.
- The pump housing is completely filled and the fluid escapes through the teeth of the lobes and is forced against the walls of the spaces, which contributes to the pump action.

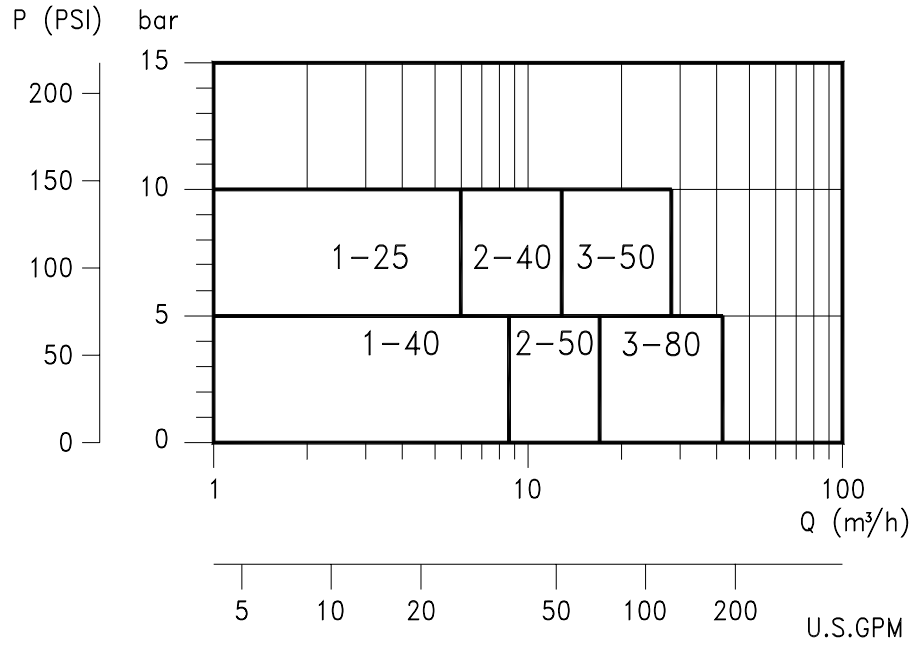
3.3. APPLICATION

As a general rule, standard version BCL pumps are mainly used in the food-processing and pharmaceutical industries for transferring fluids.

The great advantage of the BCL lobe pump is its capacity to pump a wide range of viscous liquids, from 1mPa.s to 100,000 mPa.s.

Apart from this, it can pump delicate products / liquids that contain soft solids, causing minimal damage.

3.3.1. Performance



Each pump has performance limits. The pump was selected for certain pumping conditions at the time the order was placed. INOXPA shall not be liable for any damage resulting from the incompleteness of the information provided by the purchaser (nature of the fluid, RPM, etc.).

4. Installation

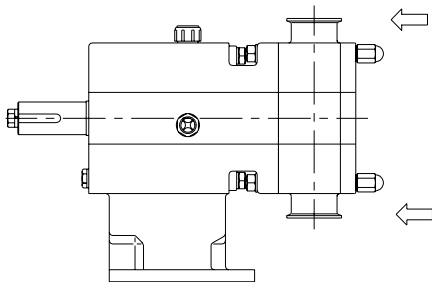
4.1. PUMP RECEPTION

INOXPA cannot be held responsible for the damage sustained by the equipment during transport or unpacking. Please visually check that the packaging is not damaged.

The pump will be accompanied by the following documents:

- Dispatch notes.
- Pump Instructions and Service Manual.
- Motor Instructions and Service Manual (*)
- (*) when the pump is supplied with a motor by INOXPA.

Unpack the pump and check the following:



- The pump suction and delivery connections, removing the remains of any packaging materials.
- Check that the pump and the motor have not suffered any damage.
- If the equipment is not in good condition and/or any part is missing, the carrier should draw up a report accordingly as soon as possible.

4.1.1. Pump identification

CE

INOXPA S.A.
C. Telers, 54 · P.O. BOX 174
17820 BANYOLES · GIRONA (SPAIN)
Tel. 972 57 52 00 · Fax 972 57 55 02

AÑO

TIPO N° ← Serial number

KW min⁻¹ V Hz

QM³/h Hm øRODETE

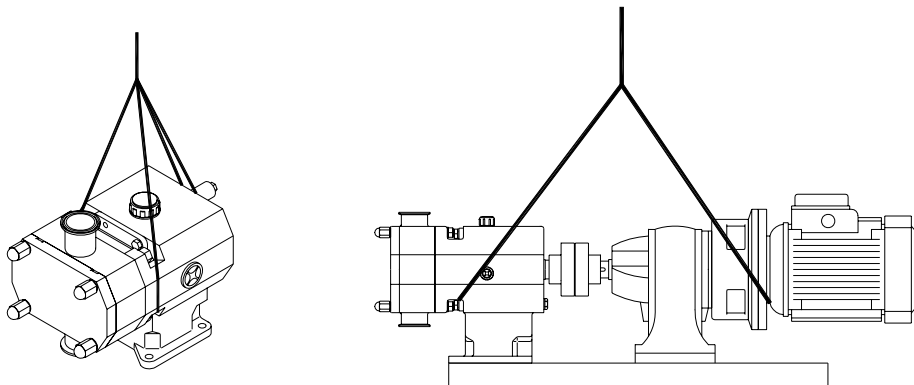
Pump plate

4.2. TRANSPORT AND STORAGE



BCL pumps are often too heavy to be carried to their storage area manually.

Lift the pump as shown below:



4.3. LOCATION

Place the pump as close as possible to the suction tank, and if possible below the fluid level.

Place the pump so as to allow sufficient space around it to access the pump and the motor. (See chapter 8. *Technical specifications* for dimensions and weights).

Set up the pump on a flat, level surface.

The foundation must be rigid, horizontal, flat and vibration-proof.



Install the pump so as to allow sufficient ventilation.

If the pump is installed outdoors, it should be protected by a roof. Its location should enable easy access for any inspection or maintenance operations.

4.4. COUPLING

For the selection and fitting of couplings, please refer to the supplier's manual. In some cases, the starting torque of positive-displacement pumps can be quite high. Therefore, the chosen coupling should be 1.5 to 2 times the recommended torque.

Alignment

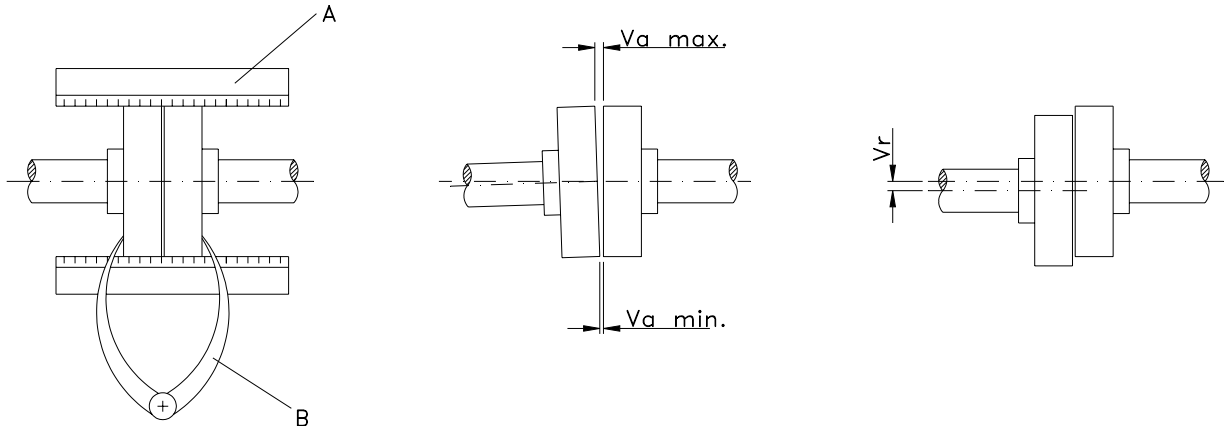
The shafts of the pump unit and the pump transmission are aligned correctly when assembled at our factory.



Check the alignment of the pump unit after installation.

Place a straight-edge ruler (A) on the coupling: the ruler must be in contact with both halves of the coupling over its entire length. See illustration.

Repeat the check, this time on both sides of the coupling, close to the shaft. For the sake of accuracy, this check should also be performed using an outside calliper (B) on two diametrically opposed points on the exterior surfaces of the two halves of the coupling.



Maximum alignment deviations:

Exterior diameter of the coupling (mm)	Minimum Va. [mm]	Maximum Va. [mm]	Max. Va. - Min. Va. [mm]	Var. [mm]
70 - 80	2	4	0,13	0,13
81 - 95	2	4	0,15	0,15
96 - 110	2	4	0,18	0,18
111 - 130	2	4	0,21	0,21
131 - 140	2	4	0,24	0,24
141 - 160	2	6	0,27	0,27
161 - 180	2	6	0,3	0,3
181 - 200	2	6	0,34	0,34
201 - 225	2	6	0,38	0,38

4.5. PIPES

- As a general rule, the suction and discharge pipes should be fitted in straight sections, with the least possible number of bends and accessories, in order to minimise head loss caused by friction.
- Ensure that pump input and output fittings are properly aligned with the pipes and of a similar diameter to the pump connections.
- Place the pump as close as possible to the suction tank, if possible below the fluid level, or even below the tank, to achieve the maximum static suction head.
- Place tube supports as close as possible to the pump's suction inlet and delivery outlet.

4.5.1. Shut-off valves

The pump can be isolated for maintenance purposes. To this end, shut-off valves should be fitted to the pump's suction and delivery connections.

These valves should ALWAYS be open when the pump is operating.

4.6. PRESSURISATION TANK

For models with a dual mechanical seal, a pressurisation tank has to be installed.



ALWAYS install a pressurisation tank 1 to 2 meters above the pump shaft. See Figure 4.6.1.

ALWAYS connect the cooling fluid inlet to the lower connection of the seal chamber. Therefore, the outflow of the cooling liquid will be through the upper connection of the chamber. See Figure 4.6.1.

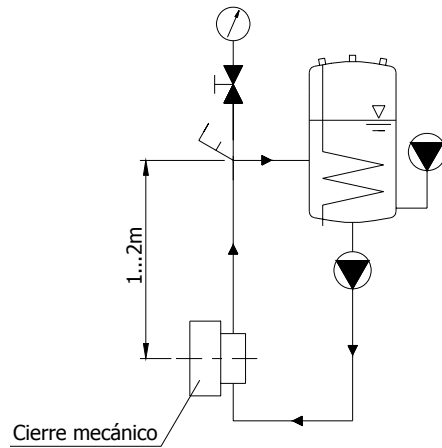


Figure 4.6.1: Pressurisation tank installation diagram

For more information on the pressurisation tank (installation, operation, maintenance, etc.), see the manufacturer's instructions manual.

4.7. ELECTRICAL INSTALLATION



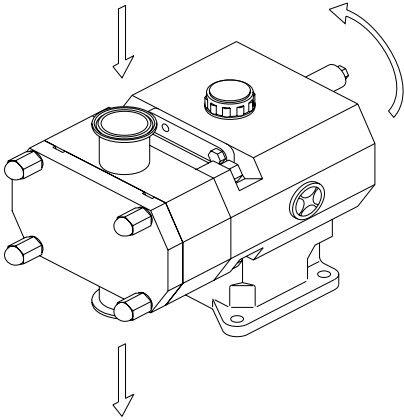
The connection of the electrical motors must be performed by qualified personnel. Take all necessary measures to prevent damage to connections and cables.



The electrical equipment, terminals and components of the control systems may still bear electrical current when switched off. Contact with them may be dangerous for operators or cause irreversible damage to the equipment.

Before opening the pump, make sure that the electrical circuit is switched off.

- Connect the motor following the manufacturer's instructions.
- Check the direction of rotation (see the label on the pump).



To check that the rotation direction is the default rotation, as shown in the diagram: Start up the pump motor briefly. Looking at the back of the pump, the motor's fan rotation direction should be clockwise. The rotation direction can however be inversed without any problem, which will also change the fluid's flow direction.



ALWAYS check the direction of rotation of motor with fluid inside de pump.

For models with a seal chamber, **ALWAYS** make sure that the chamber is full of fluid before checking the rotation direction.

5. Start-up



Before starting the pump, carefully read the instructions provided in Chapter 4. *Installation*.

5.1. START-UP



Read Chapter 8. *Technical specifications* carefully. INOXPA cannot be held responsible for the incorrect use of the equipment.



NEVER touch the pump or the pipes when hot fluid is being pumped.

5.1.1. Checks before starting up the pump

- Fully open the shut-off valves on the suction and delivery pipes.
- Check the pump's oil level. Fill with the requisite amount of oil so that the level is in the centre of the sight glass (If starting up for the first time: pumps are delivered with oil in the box. However, it is important to always remember to conduct this check).
- If the fluid does not flow into the pump, prime the pump with fluid to be pumped.



The pump must **NEVER** be dry run.

- Check that the motor's direction of rotation is correct.

5.1.2. Checks when starting up the pump

- Check that the pump is not making any unusual noises.
- Check that the absolute inlet pressure is high enough to avoid cavitation in the pump. See the curve to determine the minimum pressure required above steam pressure (NPSHr).
- Check the flow pressure.
- Check that there are no leaks through the sealed areas.



A shut-off valve on the suction pipe must not be used to regulate flow. Shut-off valves must be fully open during operation.



Check the motor's power consumption to avoid electric overload. Reduce flow and motor power consumption by reducing the motor speed.

5.2. SAFETY VALVE

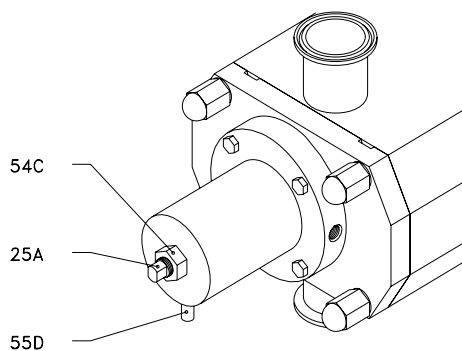
The safety valve opening pressure calibration is conducted at the INOXPA factories. However, the opening pressure depends on the fluid being pumped, its viscosity, the r.p.m., etc., which means that before the pump is started up, the user should adjust the safety valve opening pressure.

5.2.1. Safety valve calibration

When the pump has a safety valve and its calibration pressure is not indicated, it should be set at the pump's maximum operating pressure. The user should check by looking at the position of the pin (55D). At maximum calibrated pressure, the pin is positioned directly facing the pump cover.

To set the correct opening pressure, proceed as follows:

- Loosen the nut (54C).
- Using a key, turn the adjustment screw (25A) to the right in order to reduce the tightness of the spring and obtain the desired opening pressure. Whilst performing this operation, we can see that the position of the pin (55D) falls in the opposite direction to the pump cover.
- When the desired opening pressure has been obtained, tighten the nut (54C).



Types of springs which can be fitted according to the calibration pressure:

PUMP TYPE	2-5 bar	7-10 bar
BCL 1-25	X	X
BCL 1-40	X	
BCL 2-40	X	X
BCL 2-50	X	
BCL 3-50	X	X
BCL 3-80	X	



When checking the safety valve, ensure that the pump pressure **NEVER** exceeds the calibration pressure + 2 bars.



When the safety valve does not function properly, the pump should immediately cut out.

The valve should be checked at an INOXPA technical service.

6. Operating problems

The following table provides solutions to problems that might arise during pump operation. The pump is assumed to have been properly installed and correctly selected for the application. Please contact INOXPA if technical assistance is required.

Operating problems	Probable causes
Motor overload	8, 9, 12, 16, 20, 21, 22, 23, 24, 26.
The pump does not provide enough flow or pressure	2, 4, 5, 7, 9, 10, 11, 13, 14.
No pressure on the delivery side	1, 2, 3, 6, 18.
Uneven delivery flow / pressure	2, 4, 5, 6, 9, 12.
Noise and vibration	2, 4, 5, 6, 7, 8, 9, 11, 12, 13, 16, 19, 20, 21, 22, 23, 24, 25, 26.
The pump gets clogged	8, 9, 11, 16, 19, 20, 21, 22, 24, 25, 26.
Overheated pump	7, 8, 9, 11, 12, 16, 20, 21, 22, 23, 24, 26.
Abnormal wear	4, 5, 11, 15, 16, 19, 24, 25.
The mechanical seal is leaking.	17, 18, 27.

Probable causes	Solutions
1 Wrong direction of rotation	Reverse the direction of rotation.
2 NPSH is not high enough	Increase the available NPSH: - Place the suction tank higher - Place the pump lower - Reduce steam pressure - Increase the diameter of the suction pipe - Shorten and simplify the suction pipe
3 Pump not drained	Drain or fill
4 Cavitation	Increase suction pressure (see also 2)
5 Air is sucked in by the pump.	Check the suction pipe and all its connections
6 Clogged suction tube	Check the suction pipe and all its filters, if any
7 Safety valve has worked loose	Check the tightness of the safety valve
8 Delivery pressure too high	If necessary, reduce load losses, e.g. by increasing the diameter of the tube
9 Fluid viscosity too high	Reduce the viscosity, e.g. by heating the fluid
10 Fluid viscosity too low	Increase the viscosity, e.g. by cooling the fluid
11 Fluid temperature too high	Reduce the temperature by cooling the fluid.
12 Pump speed too high	Reduce the pump speed.
13 Lobes are worn	Replace the lobes
14 Pump speed too low	Increase speed.
15 Fluid is highly abrasive	Fit hardened lobes
16 Bearings are worn.	Replace bearings; service the pump
17 Mechanical seal damaged or worn.	Replace the seal
18 O-rings unsuitable for the fluid.	Fit suitable O-rings after checking with the supplier.
19 Gears are worn.	Replace and adjust gears.
20 Insufficient lubricating oil	Refill with lubricating oil
21 Unsuitable lubricating oil	Use suitable lubricating oil
22 Lobes rub together.	- Reduce temperature - Reduce suction pressure - Adjust play.
23 Misaligned coupling	Align the coupling
24 Taught tubes	Connect the tubing to the pump avoiding taughtness.
25 Foreign particles in the fluid	Fit a filter to the suction tube
26 Pump and/or motor not attached to the bedplate.	Attach the pump and/or motor and check that the tubes are connected without stress and align the coupling
27 The mechanical seal spring tension is too low	Adjust as indicated in this Manual



If the problems persist, stop using the pump immediately. Contact the pump manufacturer or their representative.

7. Maintenance

7.1. GENERAL MAINTENANCE

Like any other machine, this pump requires maintenance. The instructions included in this manual cover the identification and replacement of spare parts. These instructions are intended for the maintenance personnel and those responsible for the supply of spare parts.



Please read **Chapter 8. Technical specifications** carefully.

All replaced parts and materials should be disposed of / recycled in accordance with the applicable local regulations.



ALWAYS disconnect the pump from the power supply before undertaking maintenance work.

7.1.1. Checking the mechanical seal

Regularly check that there are no leaks in the shaft area. If there are leaks through the mechanical seal, replace it following the instructions given under the Assembly and Disassembly section.

7.2. TORQUE VALUE

Material	Torque value [N.m.]				
	M5	M6	M8	M10	M12
8.8	6	10	25	49	86
A2	5	9	21	42	74

7.3. LUBRICATION

The gears and bearings are lubricated by means of an oil bath.

The pumps are supplied with oil.

- Check the oil level regularly, e.g. weekly or after every 150 hours of service.
- The first oil change should be conducted after 150 hours of service.
- Following this, the oil should be changed after every 2,500 hours of service or at least once a year under normal operating conditions.

When the oil is changed, the oil box should be filled up to the level in the centre of the sight-glass.



Do not overfill the support with oil.

Leave the pump in the stop position for a while and then check the oil level; if necessary, add a little more oil.

Oil for ambient temperatures of 5 to 50°C: ISO VG 220.

PUMP TYPE	Support oil capacity [l.]
BCL 1	0.5
BCL 2	0.75
BCL 3	1.75

7.4. STORAGE

The pump must be completely emptied of fluid before storage. If possible, avoid exposing the components of the pump to excessively damp environments.

7.5. CLEANING



The use of aggressive cleaning products, such as caustic soda and nitric acid, can cause skin burns.

Use rubber gloves for cleaning work.



Always use protective goggles.

7.5.1. Automatic CIP (cleaning-in-place)

If the pump is installed in a system with a CIP process, it is not necessary to disassemble the pump.

If there is no automatic cleaning process, disassemble the pump as indicated in the [Assembly and Disassembly](#) section.

Cleaning solutions for CIP processes

Use only clear water (chloride-free) for diluting cleaning agents:

a) Alkaline solution: 1% in weight of caustic soda (NaOH) at 70°C (150°F)

1 Kg NaOH + 100 l. water = cleaning solution

or

2.2 l. NaOH at 33% + 100 l. water = cleaning solution

b) Acid solution: 0.5% in weight of nitric acid (HNO₃) at 70°C (150°F)

0.7 litres HNO₃ at 53% + 100 l. water = cleaning solution



Check the concentration of the cleaning solutions to avoid damaging the pump seals.

To remove any remains of cleaning products, ALWAYS perform a final rinse with clean water on completion of the cleaning process.

7.5.2. Automatic SIP (sterilization-in-place)

The process of sterilization with steam is applied to all the equipment including the pump.



Do NOT start the pump during the process of sterilization with steam.

The parts/materials suffer no damage if the indications specified in this manual are observed.

No cold liquid can enter the pump till the temperature of the pump is lower than 60°C (140°F).

A flow by-pass is recommended to be used in order to assure the flow of sterile product after the pump.

Maximum conditions during the SIP process with steam or overheated water

- | | | |
|----|--------------------------|----------------------------------------------------------|
| a) | Max. temperature: | 140°C / 284°F |
| b) | Max. time: | 30 min |
| c) | Cooling: | Sterile air or inert gas |
| d) | Materials: | EPDM / PTFE (recommended)
FPM / NBR (not recommended) |

7.6. DISASSEMBLY / ASSEMBLY OF THE PUMP

7.6.1. Pump cover and lobes

← Disassembly

Remove the cap nuts (45).

Remove the cover (03). If necessary, use a screwdriver to lever the cover open at the indents.

Remove the seal (80A).

Remove the screws (52A, 52B) and the washers (53B and 35) using a key. In order to prevent the lobes from turning simultaneously, blocks of wood or nylon can be placed between the lobes. (Position of the blocks: one in the lower section for the left-hand lobe and the other in the upper section for the right-hand lobe).

Remove the lobes (02) and the tie bars (29). The rotating part of the seal (08) will remain lodged inside the lobes.

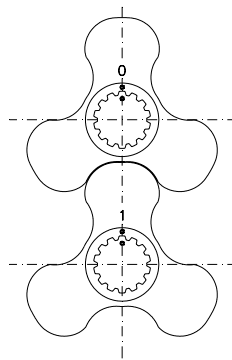
Remove the seals (80).

→ Assembly

Place the seals (80) in their assembly position.

Place all of the lobe/tie-bar units (02, 29) into the shafts (05, 05A) and slide until they stop in the fixed part of the seal (08).

Note the marks (0,1 and .); as illustrated below.

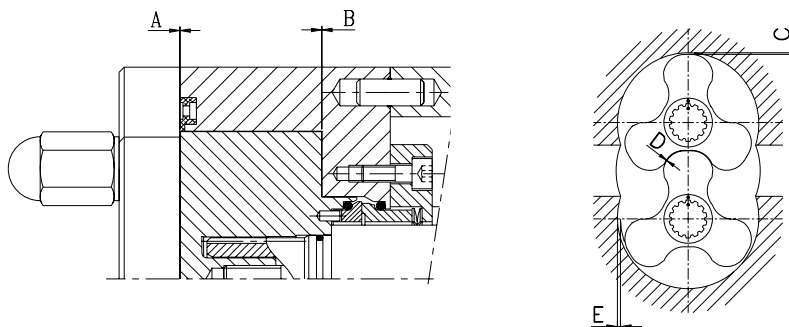


Turn the drive shaft a few times and check that the lobes do not touch. If necessary, see section 7.6.6. *Lobe adjustment*.

Fix the lobes in place with screws (52A, 52B) and the washers (53B, 35). In order to prevent the lobes from turning simultaneously, a block of wood or nylon can be placed between the lobes.

Check that the front section of each lobe is aligned.

Check the frontal and rear clearance between the lobes and between the lobe and the housing. It should resemble the measurements shown in the following table.



[mm]	A	B	C	D	E
BCL 1-25	0.15 ±0.05	0.1 ±0.05	0.15 ±0.05	0.15 ±0.05	0.35 ±0.05
BCL 1-40	0.15 ±0.05	0.1 ±0.05	0.2 ±0.05	0.15 ±0.05	0.4 ±0.05
BCL 2-40	0.2 ±0.05	0.15 ±0.05	0.15 ±0.05	0.15 ±0.05	0.35 ±0.05
BCL 2-50	0.2 ±0.05	0.15 ±0.05	0.2 ±0.05	0.15 ±0.05	0.4 ±0.05
BCL 3-50	0.25 ±0.05	0.2 ±0.05	0.2 ±0.05	0.2 ±0.05	0.4 ±0.05
BCL 3-80	0.3 ±0.05	0.2 ±0.05	0.3 ±0.05	0.2 ±0.05	0.5 ±0.05

A = axial clearance between the lobe and the cover.

B = axial clearance between the lobe and the rear of the housing.

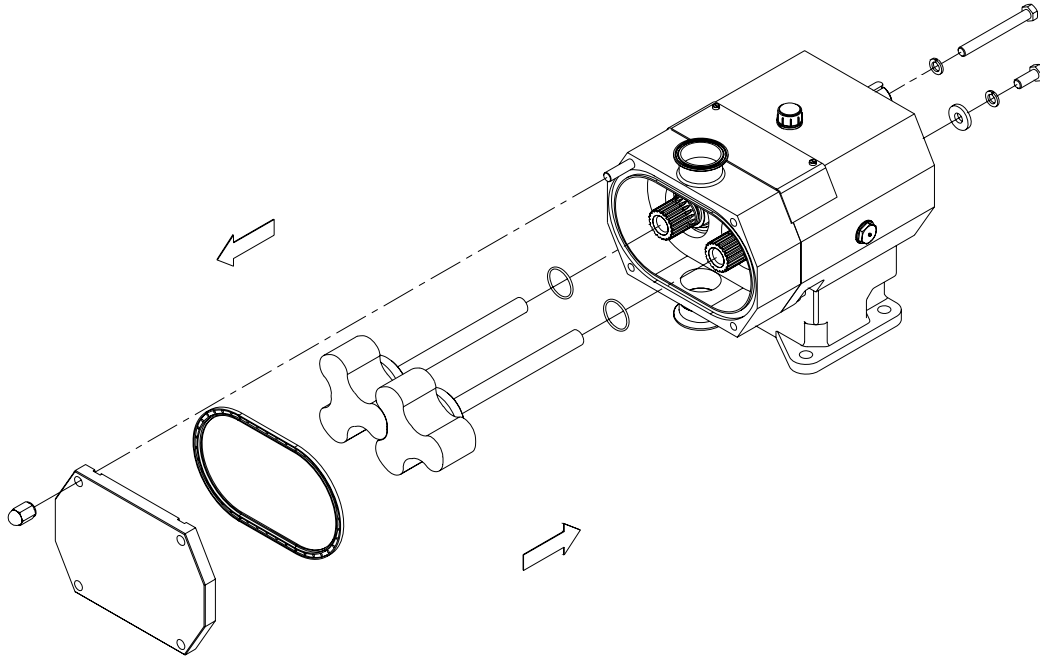
C = radial clearance between the lobe and the housing.

D = radial clearance between the lobes.

E = radial clearance between the lobe and the housing on the suction side.

Dimensions in mm

Place the seal (80A) in its assembly position.
Place the cover (03) on the housing (01).
Fix the cover (03) using the cap nuts (45). Tighten the nuts diagonally.



7.6.2. Single mechanical seal

⇐ Disassembly

Remove the rotating part of the mechanical seal (08) from inside the lobe (02).

Remove the stationary part of the seal (08) from inside the housing (01). Check that the gasket from the stationary part does not remain lodged in the housing. If so, remove it.

Remove the screws (50A) and the protector (47A).

Remove the nuts (54A) and the washers (53).

Remove the housing (01).

Remove the screws (51B) and the seal cover (09).

Remove the seal springs (08) from the seal cover (09).

⇒ Assembly

Place the seal springs (08) inside the seal cover (09).

Place the seal cover (09) on the housing (01). For supports 2 and 3, include the pins (56B).

Fix the seal cover using the screws (51B).

Position the housing-cover assembly on the support (06), taking into account the pins (56).

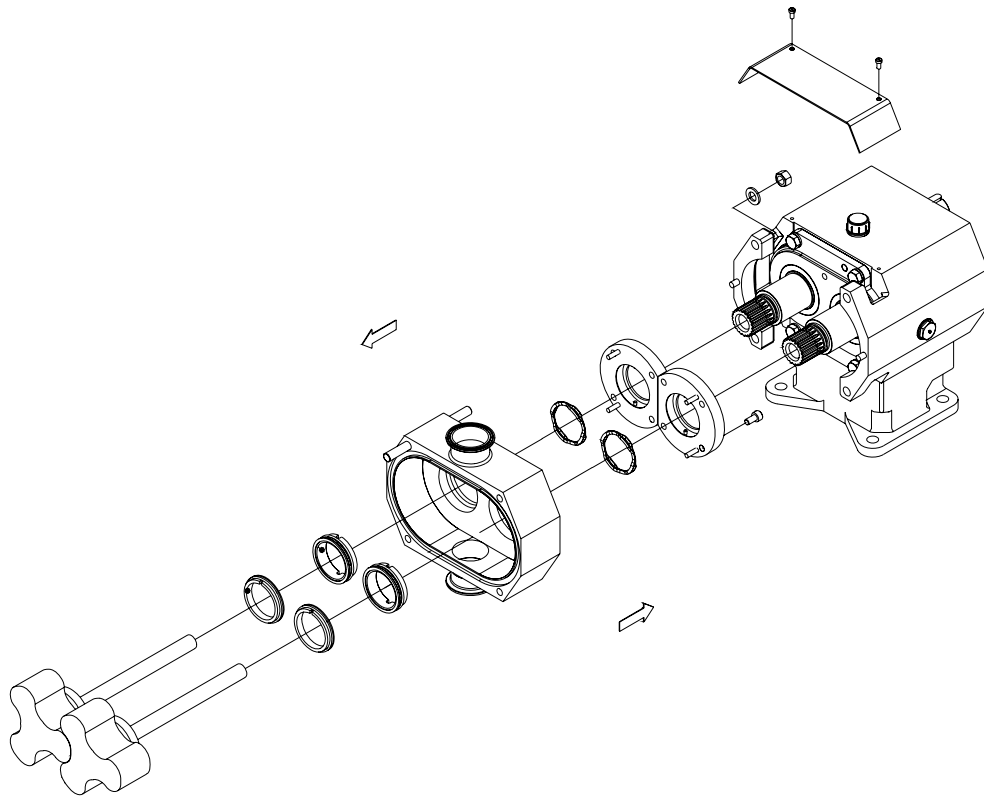
Fix in place with the washers (53) and nuts (54A).

Place the gasket of the stationary part of the seal (08) inside the housing (01).

Slide the stationary part of the seal (08) into the shafts (05, 05A) until it stops against the seal springs, taking into account the position of the pins.

Place the rotating part of the seal (08) in its corresponding position in the lobe (02), taking into account the position of the pins.

Then fit the lobes.



!CAUTION! When fitting the new seal, take care to first dip the parts and seals into soapy water in order to facilitate the sliding of both the fixed part and the rotating part on the shaft.

7.6.3. Single cooled seal

Assemble and disassemble in the same way as for the single seal..

7.6.4. Double mechanical seal

⇐ Disassembly

Remove the rotating part of the mechanical seal (08) from inside the lobe (02).

Remove the stationary part of the seal (08) from inside the housing (01). Check that the gasket from the stationary part does not remain lodged in the housing. If so, remove it.

Remove the screws (50A) and the protector (47A).

Remove the nuts (54A) and the washers (53).

Remove the housing (01).

Remove the stationary part of the exterior seal (08A) from the double seal cover (09A). In this way, the springs can be removed from the interior seal.

Remove the gasket of the stationary part of the exterior seal (08A) from the interior of the double seal cover (09A).

Remove the screws (51B), remove the double seal cover (09A) and remove the gasket (80C).

Remove the rotary part of the exterior seal (08A).

Loosen the setbolts (55) and slide until the double seal sleeve is removed (13).

Remove the gasket (80D).

⇒ Assembly

Place the gasket (80D) inside the double seal sleeve (13).

Slide until the double seal sleeve (13) stops against the shafts (05, 05A) and fix in place with the pins (55).

Assemble the exterior rotating part of the seal (08A) on the double seal sleeve, taking into account the position of the pins.

Place the gasket (80C) in the double seal cover (09A) and assemble this on top of the housing (01). Fix in place with the screws (51B).

Place the interior seal springs (08) inside the stationary part of the exterior seal (08A).

Place the gasket of the stationary part of the exterior seal (08A) in its assembly position in the double seal cover.

Position the stationary part of the seal (08A) inside the double seal cover, taking into account the pins.

Position the housing-cover assembly on the support (06), taking into account the pins (56).

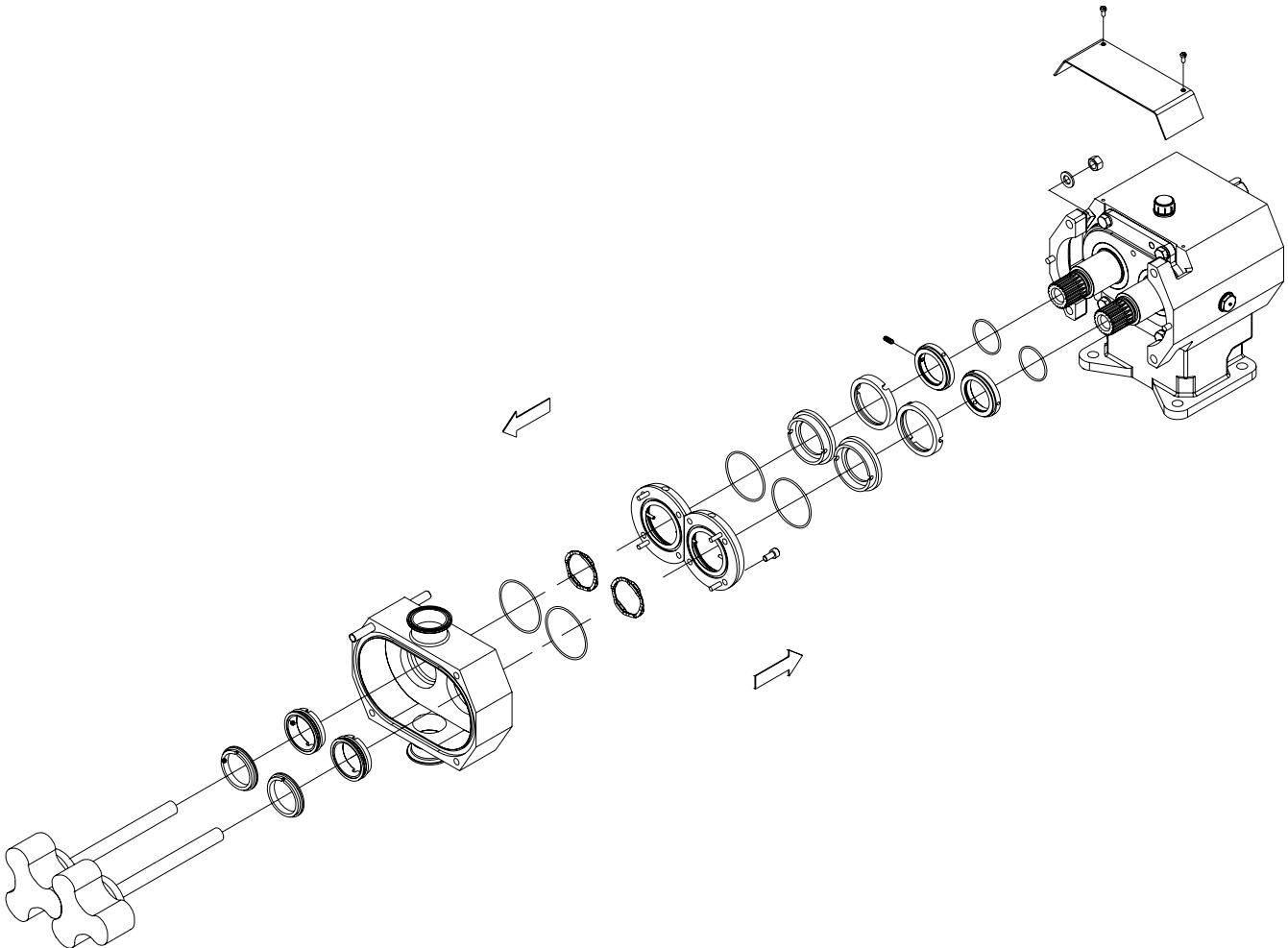
Fix in place with the washers (53) and nuts (54A).

Place the gasket of the stationary part of the seal (08) inside the housing (01).

Slide the stationary part of the seal (08) into the shafts (05, 05A) until it stops against the seal springs, taking into account the position of the pins.

Place the rotating part of the seal (08) in its corresponding position in the lobe (02), taking into account the position of the pins.

Then fit the lobes.



7.6.5. Bearings cover, shafts and gears unit

⇐ Disassembly

Empty the oil from the support, remove the oil plug (85) and the drain plug (87).

If necessary, disassemble the drive shaft coupling half and remove the key (61A).

Remove the screws (52, 51D) and the washers (53A), which fix the bearings cover (12) to the support (06). These are centred in relation to each other by means of two centring pins (56, 56A).

Gently tap with a plastic hammer against the end of the shaft on the drive side. When the bearings cover loosens slightly from the support, check that the gasket (18A) does not stick to both sides, releasing the gasket if necessary.

⇒ Assembly

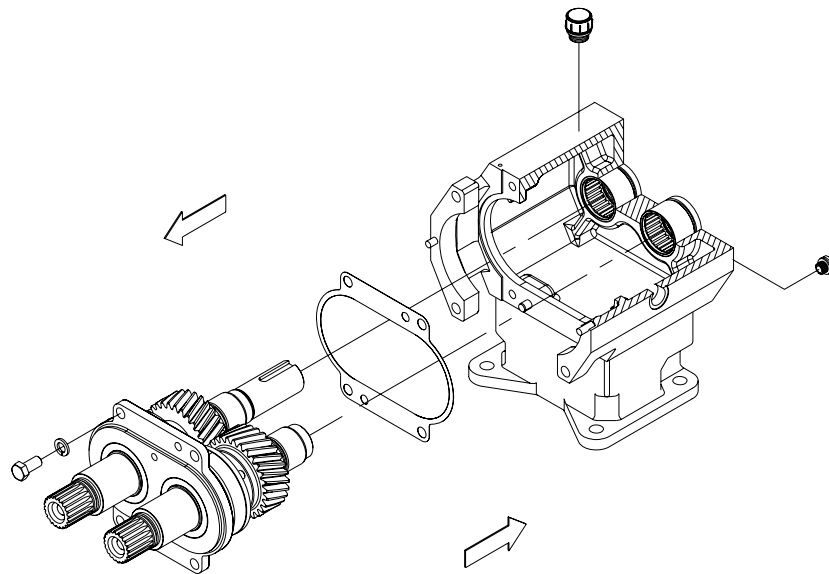
Check that the bearings cover gasket (18A) has not ruptured and fix it in its correct position on the bearings cover flange using a little grease or oil.

Lubricate the shafts a little where they meet the seals (88).

Slide the shafts, gears and bearings unit into the support. At the same time, note the centring pins (56, 56A), the needle bearings (70A) and the seals (88).

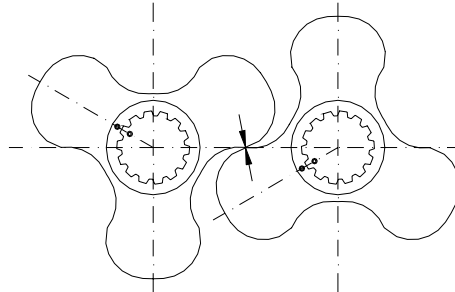
Fit the screws (51D, 52) with their washers (53A) and tighten them with the torque value indicated in section 7.2. *Torque value*

Fill the support with the recommended type of oil, see section 7.3. *Lubrication*

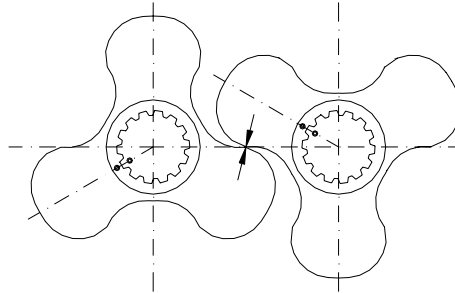


7.6.6. Lobe adjustment

Remove the bearings cover, shafts and gears unit and place it in a vice. Remove the gasket (18A) beforehand. Loosen the tightening screws from the adjustable fastening mechanism for the driven gear (19A). In principle, the tension unit has an automatic release. It is now possible to rotate the drive shaft whilst holding the driven shaft still. Slide the lobes onto the shafts as indicated in the assembly section 7.6.1., *Pump cover and lobes*. Press the lobes with the shaft sleeve. Now turn the lobes to the position indicated in the diagram below. Then turn both lobes together slightly, to create the gap (clearance) indicated in the table in section 7.6.1. *Pump cover and lobes*.



Tighten manually several tightening screws in the adjustable fastening mechanism. Now turn the left lobe 60° to the left, as indicated in the diagram below. Check that the gap in this position is equal to that of the previous rotation position.



If not, these gaps should be equalised by turning one lobe slightly whilst holding the other still. Tighten the screws diagonally in the adjustable fastening mechanism by 2 or 3 turns at a time, taking care that the gears do not move in relation to one another. This can be avoided by placing a wooden wedge between the gears. Check again that the gap between the lobes is the same and turn the drive shaft a few times, in order to check that the lobes do not rub against one another at any point. Remove the lobes from the shafts. Assemble the bearings cover, shafts and gears unit.

8. Technical specifications

8.1. TECHNICAL SPECIFICATIONS

Type	N _{max.} [min ⁻¹]	B ₁ [mm]	D ₁ [mm]	V _{s-100} [l]	Q _{th} [m ³ /h]	P _{max.} [bar]	V _u [m/s]	V _i [m/s]
BCL 1-25	950	24	69.15	9.96	5.67	10	3.44	2.97
BCL 1-40		30		13.94	7.94	5		1.95
BCL 2-40		42	87.65	23.39	13.33	10	4.36	3.27
BCL 2-50		54		30.08	17.14	5		2.43
BCL 3-50	720	54	131.5	67.7	29.25	10	4.96	4.14
BCL 3-80	720	76		95.28	41.16	5		2.22

N _{max.}	Maximum operating speed
B ₁	Lobe thickness
D ₁	Lobe diameter
V _{s-100}	Flow rate at 100 revolutions
Q _{th}	Maximum flow rate at maximum speed
P _{max.}	Maximum operating pressure
V _u	Peripheral speed
V _i	Maximum suction speed

Maximum temperature	-10°C to +140°C (EPDM) 14°F to 284°F (EPDM)
Noise level	60-80 dB(A)
Suction / delivery connections	Clamp-ISO 2852 (standard)



Use special protection when the noise level in the operation area exceeds 85 dB(A).

Particle size



Caution! Soft particles only.

Type	Interior diameter of connections [mm]	Maximum nominal sphere size [mm]	Maximum recommended nominal sphere size [mm]
BCL 1-25	22.4	20.6	7
BCL 1-40	35.1		
BCL 2-40		47.8	25.6
BCL 2-50	72.2		38.5
BCL 3-50			
BCL 3-80			

Materials

Parts in contact with medium.....	AISI 316L
Other parts in stainless steel.....	AISI 304
Gaskets in contact with fluid.....	EPDM (standard)
Other materials for optional gaskets	Check with the supplier
Surface finish.....	Standard polishing

Mechanical seal

Type of seal Single interior seal SiC/SiC/EPDM

Cooled mechanical seal

Maximum pressure..... 1 bar (14.5 PSI)

Consumption 6-10 l/min

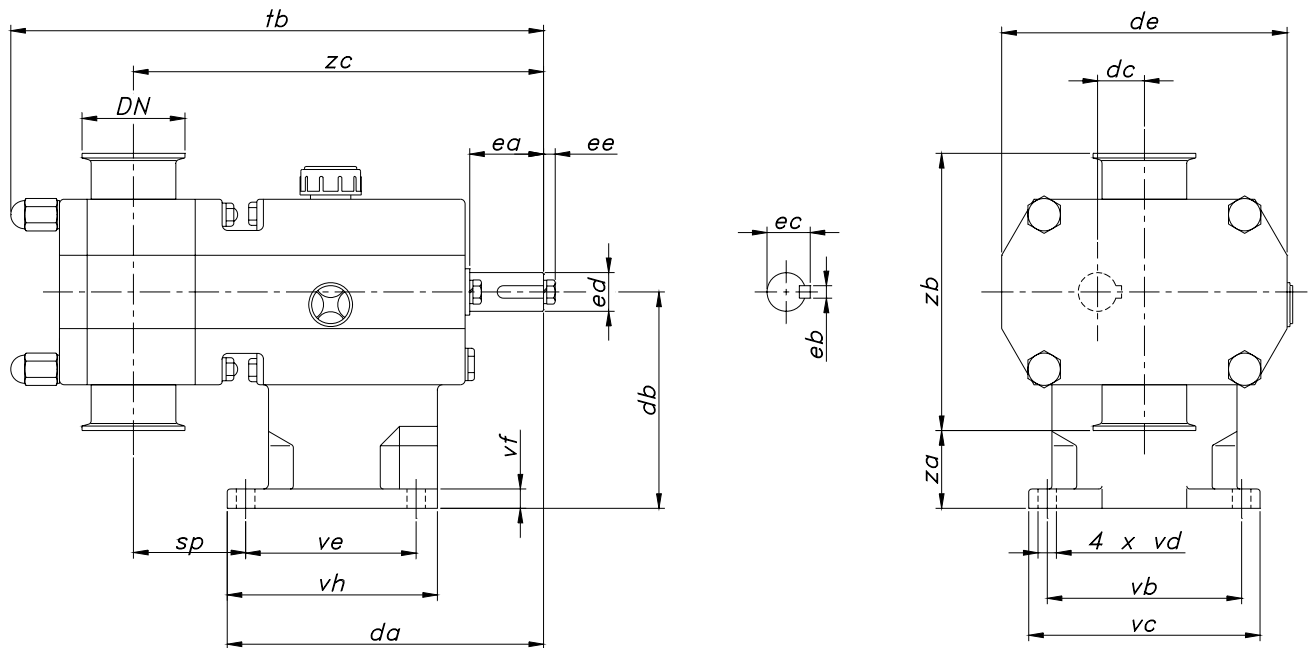
Double mechanical seal

Operating pressure 1.5~2 bar (22~29 PSI) above the operating pressure of the pump

8.2. WEIGHTS

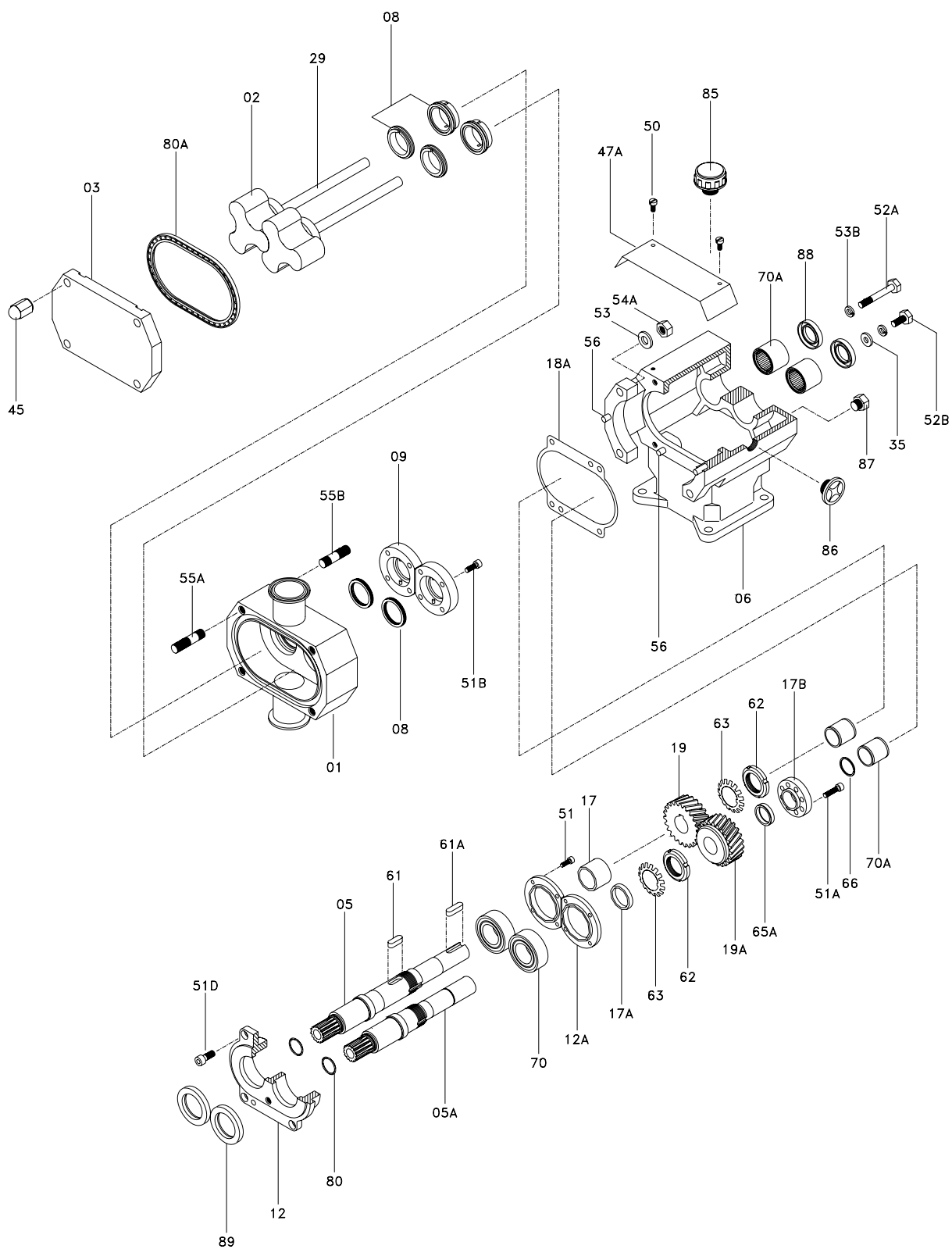
Pump type - Bare shaft -	Weight [Kg]
<i>BCL 1-25</i>	16
BCL 1-40	17
BCL 2-40	26
BCL 2-50	28
BCL 3-50	61
BCL 3-80	65

8.3. BCL DIMENSIONS



BCL	DN	da	db	dc	de	ea	eb	ec	ed	ee	sp	tb	vb	vc	vd	ve	vf	vh	za	zb	zc
1-25	1"	165	112	25	160	40	6	21,6	19	6	71	287	115	135	9	85	10	105	31	162	225
1-40	1 1/2"										77	299									231
2-40	1 1/2"	200	140	31	190	50	8	27	24	8	76	339	125	150	11	105	12	130	51,5	177	263
2-50	2"										82	351									269
3-50	2"	280	190	46,5	250	80	10	41,4	38	12	91	430	170	210	13	130	14	170	74	232	348
3-80	3"										101	452									360

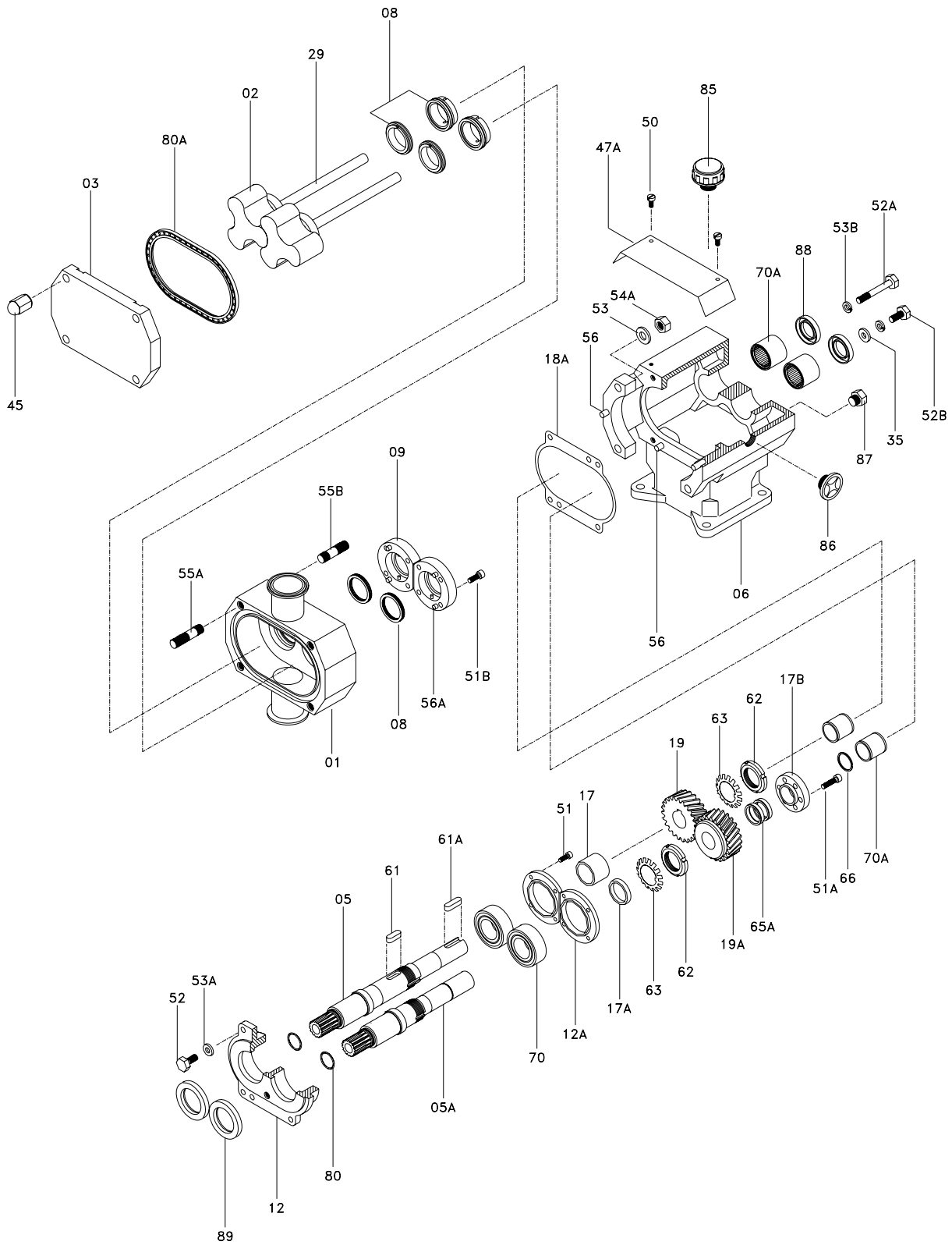
8.4. BCL 1-25 / 1-40 EXPLODED PARTS DIAGRAM



8.5. BCL 1-25 / 1-40 PARTS LIST

Position	Quantity	Description	Material
01	1	Housing	CF-3M
02	2	Lobe	AISI 316L
03	1	Pump cover	AISI 316L
05	1	Drive shaft	AISI 329
05A	1	Driven shaft	AISI 329
06	1	Support	GG-15
08	2	Mechanical seal	-
09	2	Seal cover	AISI 316L
12	1	Bearing cover	GG-15
12A	2	Bearings back cover	F-114
17	1	Drive shaft bushing	ST-35
17A	1	Idler shaft bushing	ST-35
17B	1	Dragging bushing	F-114
18A	1	Front support gasket	Gasket cardboard
19	1	Drive shaft gear	F-154
19A	1	Driven shaft gear	F-154
29	2	Lobe tie bar	AISI 316L
35	1	Driven shaft washer	AISI 304
45	4	Cap nut	AISI 304
47A	1	Protector	Plastic
50	2	Screw	A2
51	8	Allen screw	8.8
51A	8	Allen screw	8.8
51B	8	Allen screw	A2
51D	4	Allen screw	8.8
52A	1	Hexagonal screw	A2
52B	1	Hexagonal screw	A2
53	4	Flat washer	A2
53B	2	Grower washer	A2
54A	4	Hexagonal nut	A2
55A	4	Pin	A2
55B	4	Pin	A2
56	4	Pin	F-522
61	1	Key	F-114
61A	1	Key	AISI 304
62	2	Safety nut	Steel
63	2	Safety washer	Steel
65A	1	Conical tightening ring	Steel
66	1	Elastic ring	Steel
70	2	Ball bearing	Steel
70A	2	Needle bearing	Steel
80	2	O-ring	EPDM
80A	1	Housing gasket	EPDM
85	1	Oil plug	Plastic
86	1	Sight-glass	Plastic
87	1	Drain plug	Plastic
88	2	Lip seal	NBR
89	2	Lip seal	NBR

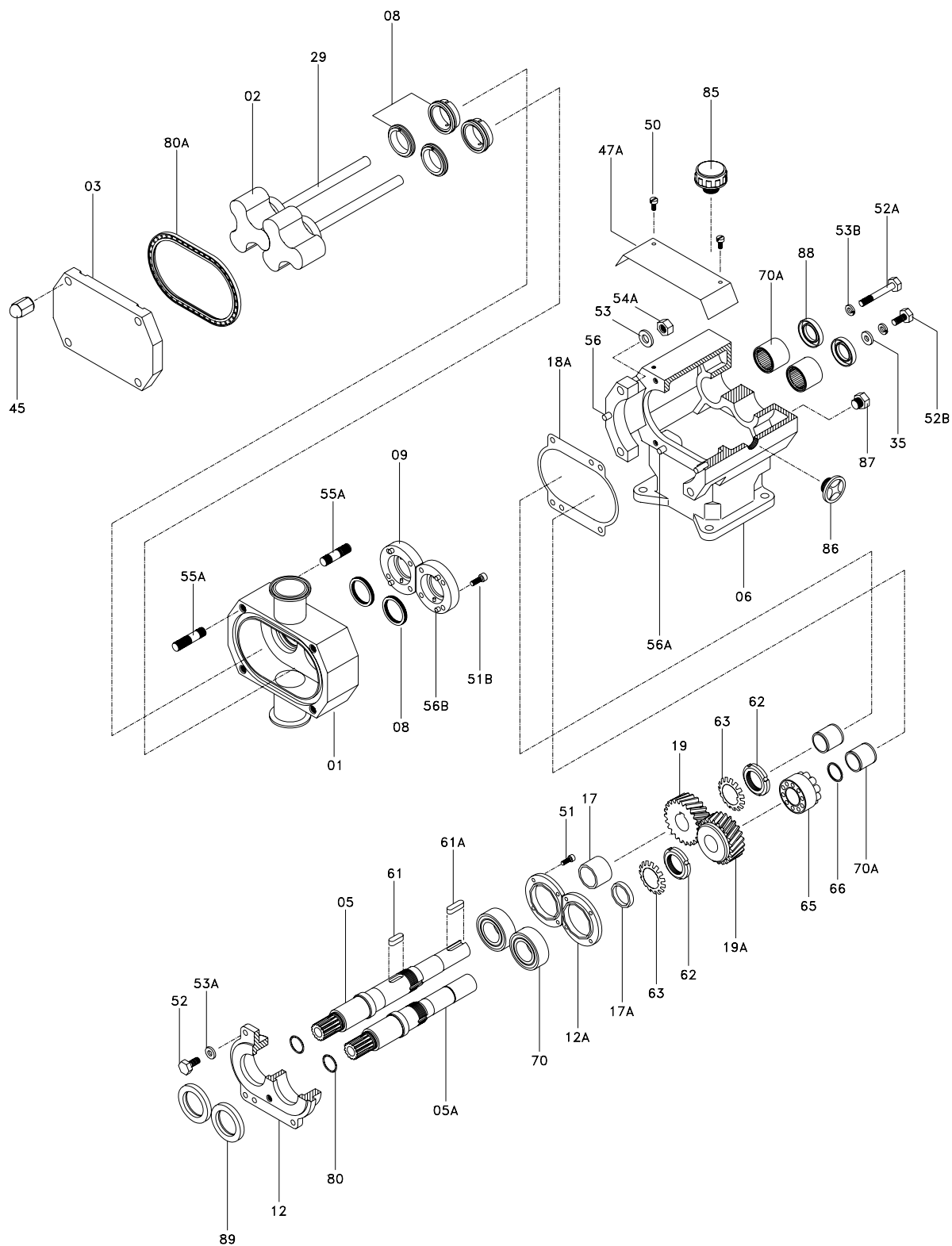
8.6. BCL 2-40 / 2-50 EXPLODED PARTS DIAGRAM



8.7. BCL 2-40 / 2-50 PARTS LIST

Position	Quantity	Description	Material
01	1	Housing	CF-3M
02	2	Lobe	AISI 316L
03	1	Pump cover	AISI 316L
05	1	Drive shaft	AISI 329
05A	1	Driven shaft	AISI 329
06	1	Support	GG-15
08	2	Mechanical seal	-
09	2	Seal cover	AISI 316L
12	1	Bearings cover	GG-15
12A	2	Bearings back cover	F-114
17	1	Drive shaft bushing	ST-35
17A	1	Driven shaft bushing	ST-35
17B	1	Dragging bushing	F-114
18A	1	Front support gasket	Gasket cardboard
19	1	Drive shaft gear	F-154
19A	1	Driven shaft gear	F-154
29	2	Lobe tie bar	AISI 316L
35	1	Driven shaft washer	AISI 304
45	4	Cap nut	AISI 304
47A	1	Protector	Plastic
50	2	Screw	A2
51	8	Allen screw	8.8
51A	6	Allen screw	8.8
51B	8	Allen screw	A2
52	4	Hexagonal screw	8.8
52A	1	Hexagonal screw	A2
52B	1	Hexagonal screw	A2
53	4	Flat washer	A2
53A	4	Grower washer	Steel
53B	2	Grower washer	A2
54A	4	Hexagonal nut	A2
55A	4	Pin	A2
55B	4	Pin	A2
56	4	Pin	F-522
56A	4	Pin	A2
61	1	Key	F-114
61A	1	Key	AISI 304
62	2	Safety nut	Steel
63	2	Safety washer	Steel
65A	2	Conical tightening ring	Steel
66	1	Elastic ring	Steel
70	2	Ball bearing	Steel
70A	2	Needle bearing	Steel
80	2	O-ring	EPDM
80A	1	Housing gasket	EPDM
85	1	Oil plug	Plastic
86	1	Sight-glass	Plastic
87	1	Drain plug	Plastic
88	2	Lip seal	NBR
89	2	Lip seal	NBR

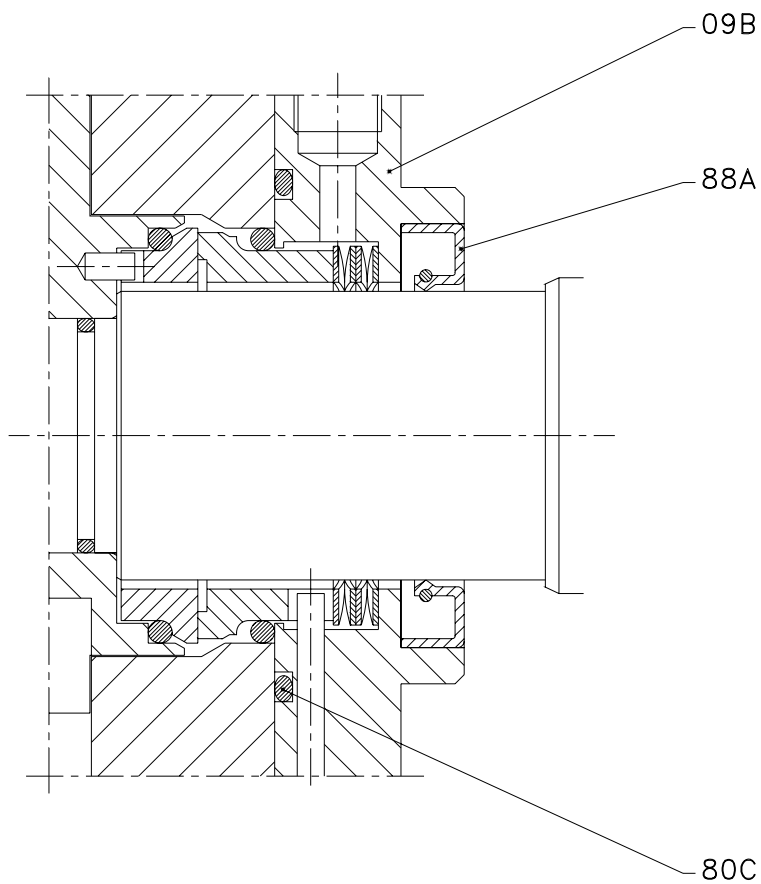
8.8. BCL 3-50 / 3-80 EXPLODED PARTS DIAGRAM



8.9. BCL 3-50 / 3-80 PARTS LIST

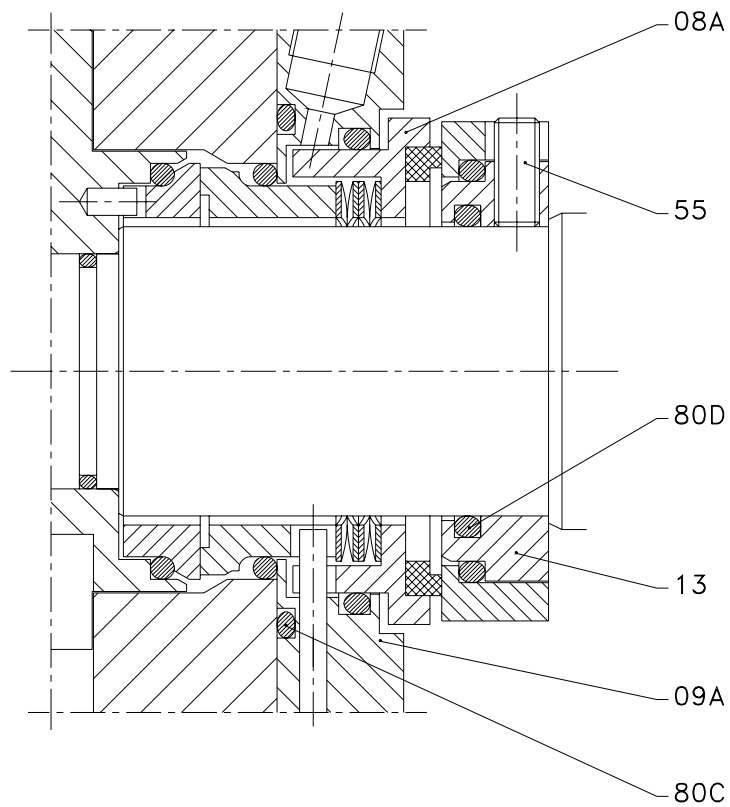
Position	Quantity	Description	Material
01	1	Housing	CF-3M
02	2	Lobe	AISI 316L
03	1	Pump cover	AISI 316L
05	1	Drive shaft	AISI 329
05A	1	Driven shaft	AISI 329
06	1	Support	GG-15
08	2	Mechanical seal	-
09	2	Seal cover	AISI 316L
12	1	Bearing cover	GG-15
12A	2	Bearings back cover	F-114
17	1	Drive shaft bushing	ST-35
17A	1	Driven shaft bushing	ST-35
18A	1	Front support gasket	Gasket cardboard
19	1	Drive shaft gear	F-154
19A	1	Driven shaft gear	F-154
29	2	Lobe tie bar	AISI 316L
35	1	Driven shaft washer	AISI 304
45	4	Cap nut	AISI 304
47A	1	Protector	Plastic
50	2	Screw	A2
51	8	Allen screw	8.8
51B	8	Allen screw	A2
52	4	Hexagonal screw	8.8
52A	1	Hexagonal screw	A2
52B	1	Hexagonal screw	A2
53	4	Flat washer	A2
53A	4	Grower washer	Steel
53B	2	Grower washer	A2
54A	4	Hexagonal nut	A2
55A	8	Pin	A2
56	2	Pin	F-522
56A	2	Pin	F-522
56B	4	Pin	A2
61	1	Key	F-114
61A	1	Key	AISI 304
62	2	Safety nut	Steel
63	2	Safety washer	Steel
65	1	Conical tightening ring	Steel
66	1	Elastic ring	Steel
70	2	Ball bearing	Steel
70A	2	Needle bearing	Steel
80	2	O-ring	EPDM
80A	1	Housing gasket	EPDM
85	1	Oil plug	Plastic
86	1	Sight-glass	Plastic
87	1	Drain plug	Plastic
88	2	Lip seal	NBR
89	2	Lip seal	NBR

8.10. DETAIL OF THE BCL COOLED SEAL



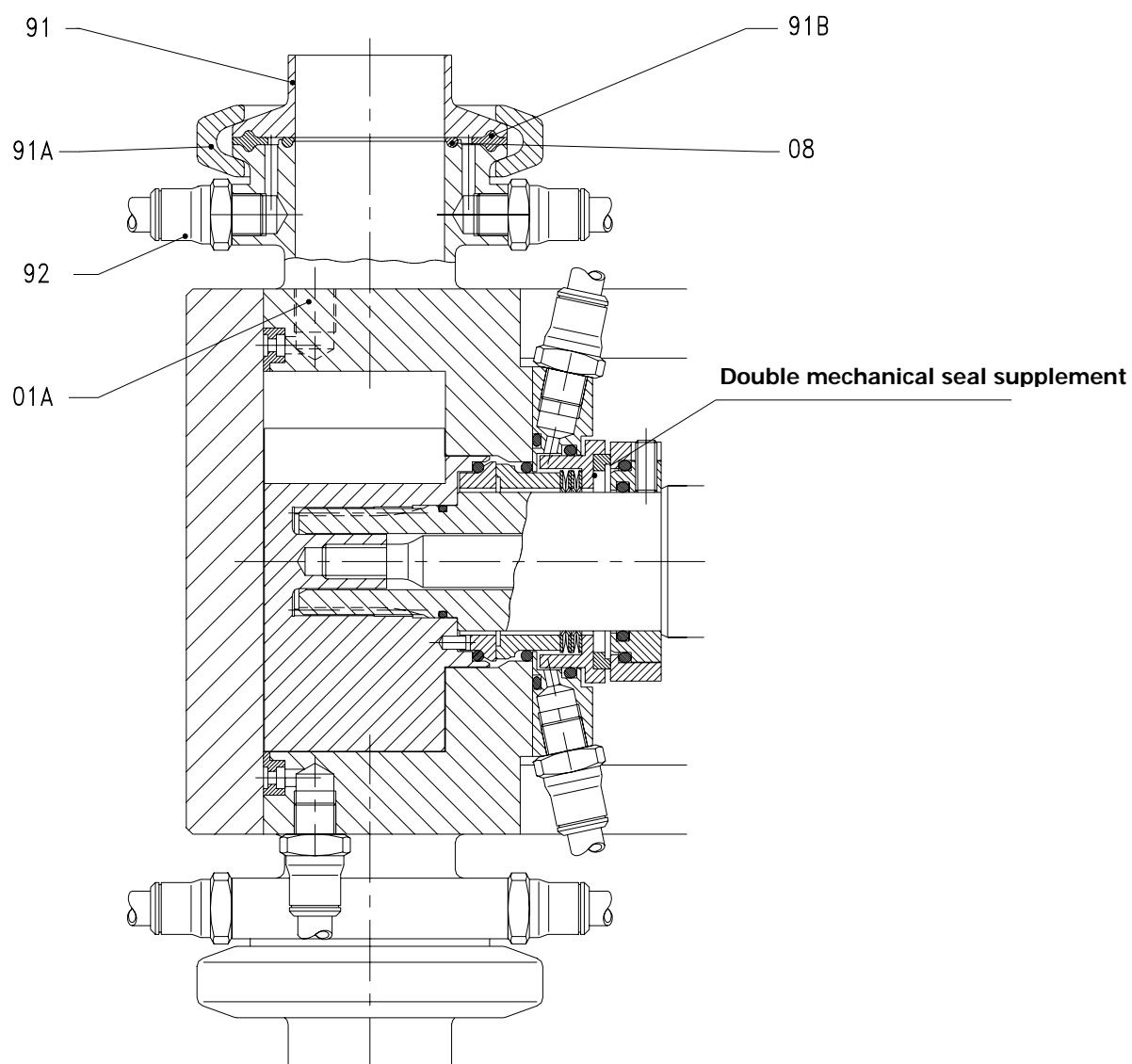
Position	Quantity	Description	Material
09B	2	Flushing seal cover	AISI 316
80C	2	O-ring	EPDM
88A	2	Gasket	NBR

8.11. DETAIL OF THE BCL DOUBLE MECHANICAL SEAL



Position	Quantity	Description	Material
08A	2	Double seal	-
09A	2	Double seal cover	AISI 316
13	2	Double seal sleeve	AISI 316
55	6	Pin	A2
80C	2	O-ring	EPDM
80D	2	O-ring	EPDM

8.12. DETAIL OF THE BCL ASEPTIC VERSION



Position	Quantity	Description	Material
01A	1	Aseptic housing	CF-3M
08	2	O-ring	EPDM
91	2	Clamp bushing	AISI 316L
91A	2	Clamp	AISI 304
91B	2	Clamp gasket	EPDM
92	10	Straight adapter	Inox

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Замечания

Условия поставки: DDP склад г. Киев

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