BEDU POMPEN

OPERATING AND MAINTENANCE MANUAL

Gear Pumps

BG - BZ - BX - MG series

made for your process

CONTENTS

1. GENERAL INFORMATION

1.1 SUPPLY CONDITIONS

According to Customer's requirements, the pump can be provided both as bare shaft pump and as pump unit. By pump unit it is meant the pump aligned with the engine, including driving elements, baseplate and any auxiliary machinery. The pumping group is supplied with safety coupling guard.

1.2 MANUFACTURER

The pump Manufacturer is Bedu Pompen B.V. You can apply for assistance by sending a request to the following address:

Bedu Pompen B.V.
Poort van Midden Gelderland Rood 10
6666 LT HETEREN, The Netherlands
Tel: +31 (0)88 4802 900 - Fax: +31 (0)88 4802 901
Email: info@bedu.nl

1.3 USER MANUAL CONTENT

This user manual provides all the necessary information to ensure a safe and correct use of the machine. It was written – when applicable – according to point 6.5 of Standard EN ISO 12100-2:2003 – Safety of machinery; according to point 7 of Standard UNI EN 809-2000 Pumps and Pump Units for Liquids - Common Safety Requirements - and according to point 1.7.4 of Directive 2006/42/EC. In this manual it is constantly referred to safety instructions. Such instructions are identified by the following symbols:

	It represents the safety instructions contained in this manual, whose non-observance may compromise safety.
	It is shown when electrical safety is essential to worker protection.
	It indicates the safety instructions which should be taken into account for the safe operation of either the pump, the pump unit or the pump or pump unit protection.

1.4 NAME, TYPE

The standard pump construction is made of cast iron with self-lubricating bushes made in tempered steel and mechanical seal in ceramic/graphite/FPM. The complete series includes several models which vary in size, materials and mechanical seals. Furthermore, the Manufacturer can also provide models with heating jackets, double mechanical seals, packing rings. The pump identification is obtained by an alphanumeric code, an example of which is shown below:

- B0G070WECDN0001: pump type B, cast iron execution, rated capacity 70 l/min. at 1500 rpm (displacement 55,1 cm3/rev), gears and shafts made of tempered steel, standard mechanic seal, equipped with brass safety valve.

1.5 NOISE EMISSIONS

- Reference standard: CEN/TC 197/SC3 N 21 E -fig.8- ISO 3744 on 6 positions
- Measured values:
  1 - Equivalent weighted continuous acoustic pressure level Leq = 79 dB(A);
  2 - Maximum weighted instantaneous acoustic pressure C (peak level) Lpc < 82 dB(C).
- Test conditions: When measuring noise, the pumped liquid (ref. to oil with 30 cP viscosity) must be introduced into the testing system at a speed of less than 0.8 m/s into pipes. It must however reach laminar flow regime (thus the speed must be related to the viscosity) and the conditions outlined in this manual must be respected.

1.6 APPLICATION FIELDS AND LIMITS. ALLOWED AND NOT ALLOWED USES

Each machine shall be used according to the type of application, operating conditions and liquid characteristics provided in contract specifications. Each variation which alters the intended use of the pump is forbidden and the User is fully responsible for it (e.g. the use of a liquid which is corrosive to pump materials rather than the recommended fluid, etc.). For variations in use within the application limits (e.g. fluid viscosity variations) it is advised to contact the Manufacturer in advance.

Max. working pressure, for pumps in standard execution, is <u>15 bar.</u>
In any case, the use of "KK" or alike plastic gears to allow the pump to operate also with poorly lubricating fluids, requires greater attention to avoid excessive or unexpected pressure loads.

It is absolutely forbidden to use the machine in hazardous environments (explosive atmosphere, etc…), the use of hazardous substances (e.g. fluids with dangerous gases), in critical conditions (e.g. abnormal temperatures, etc…), which are not supplied with the pump.

For pumps and pump units intended to be used in potentially explosive environments, please read carefully "Additional instructions for the operation and management of pumps and pump units intended to be used in potentially explosive atmospheres (Directive 94/9/EC)".

Bedu Pompen B.V. declines every responsibility for the consequences arising from an improper use of the machine which does not comply with what prescribed in this manual or specifically requested when ordering.

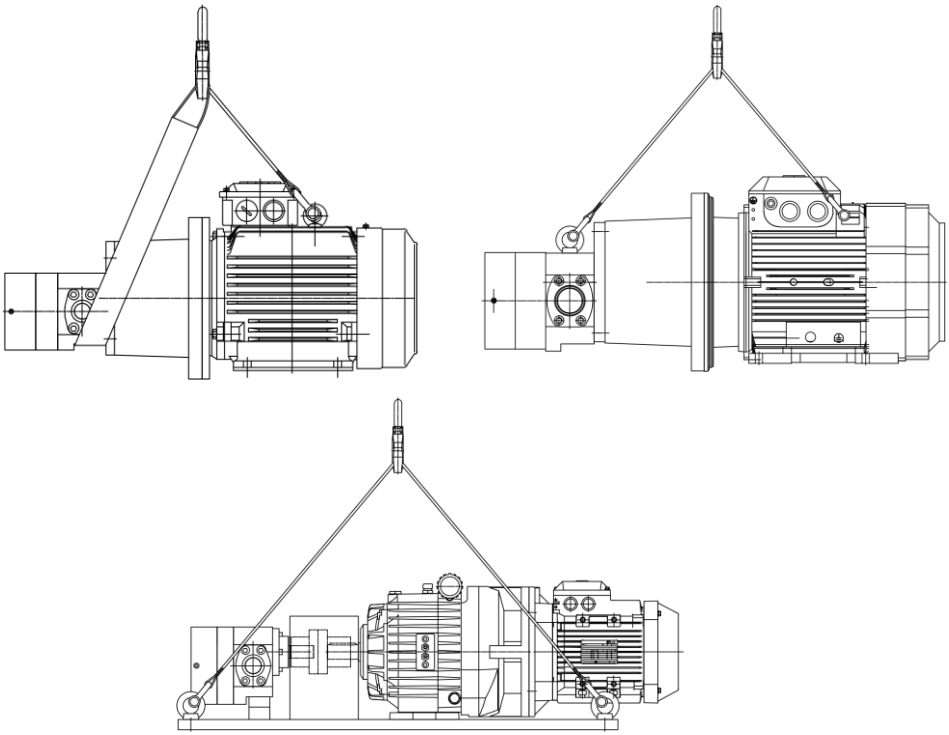
2. TRANSPORT, HANDLING, PACKAGING, STORAGE

2.1 GENERAL

Bedu Pompen sells “ex works”. Consequently, transport from the manufacturing shop to the named place of destination is carried out by the Customer under his own responsibility. For each transport a suitable standard packaging is ensured or established based on Customer requirements who, in any case, must give information about the type of shipment to be performed (by land, air, “overseas“).
In case of long stationary periods under critical environmental conditions (such as: high humidity and/or salinity, etc.) the supply shall be stored in a protected environment.

2.2 MOVING AND LIFTING

For lifting or moving the pump units’, preferentially use the eye bolts, if any always choose slings or lifting bands suitable for the weight of the equipment to more or to liff.
The weight of the units indicated on the package and on the transport document.
Please find here below, some sample pictures showing different ways for lashing the pump unit.



2.3 STORAGE FOR LONG PERIOD

As far as motors are concerned, please consult the operating and maintenance instructions of the Supllier.

Pumps must be stored indoors, in a clean, dry, moisture-free and vibration-less environment. Pump nozzles and other opening must be appropriately plugged and protected against dust entrance. Pumps must be emptied from the process liquid, eventually washed in case of aggressive fluids. Gears must be abundantly lubricated with glycerine oil (or other lubricant fluids, compatible with the pump materials). At lubricating interval and monthly, spin the pump shaft 2 turns, by hand. Before star-up, visually check for the pump unit integrity, verify the pump shaft turns freely by hand and check that all bolts and screws are correctly thightened.

3. DESCRIPTION OF THE PUMP AND THE PUMP UNIT

3.1 GENERAL DESCRIPTION OF THE MACHINE

Essentially the pump consists of two driven pinions which mesh one another inside an investment cast main body, thus creating a flow of liquid between the inlet and the outlet.

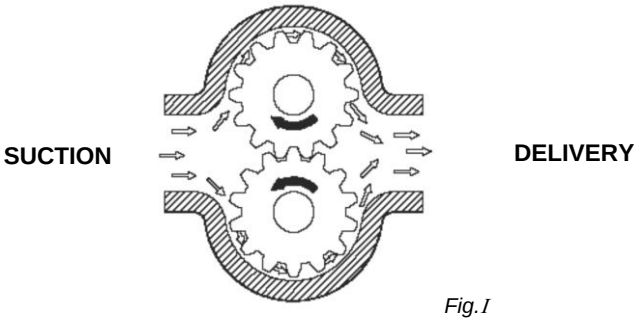


Fig.1

The fluid containment inside the pump is ensured by a suitable seal part as defined in the order.

The pump is attached to the electric motor, EC approved, by flexible coupling.

The access to the coupling and the projecting segments of motor-side and pump-side shafts is prevented by a safety coupling guard.

The pump unit can be equipped with a mechanical speed reducer or an hydraulic speed variator for the adjustment of the rotation speed, EC approved. The assembly rests on a strong metal baseplate.

3.2 WARNINGS

Standard construction pumps, as an indication, require a NPSH of approx. 0.4 bar. Always calculate the maximum available suction lift, in relation to fluid characteristics, suction circuit and operating conditions. Ensure that gears do not operate when dry. Before starting the pump for the first time or after long stationary periods, it is advisable to fill the gear spaces with oil or liquid being pumped through one of the nozzles and rotate the driving shaft by operating manually with a screwdriver on the motor cooling fan. This also makes it possible to check for even and smooth movement of rotary components and excessive friction. It is recommended that an overland cut-out set at approx. 10% above the motor current be installed in the control circuit.

In our pumps the direction of rotation is clearly shown by an arrow marking the right direction.

The pump operating temperature in normal working conditions is about 80°C. In special pump versions, working temperatures of 180°C and more may be achieved. To protect personnel from dangers due to the temperatures reached during the operation of the machine, in the event of accidental contact (burn), the User must reduce the external pump temperature by means of insulation plates, coatings, screens, barriers, etc. As limit reference temperature for the contact surface it is advisable to take 55°C. Below this value, for hot smooth surfaces in bare metal, there is no burn threshold. For a detailed knowledge of this problem in relation to different particular cases, the User can read the standard UNI EN ISO 13732-1:2009, where burn thresholds are specified for several types of surface according to the "surface temperature - contact time" parameters.

Liquids to be pumped must not contain abrasive or solid suspension as this will greatly reduce the pump life. At this purpose we recommend the installation of a properly sized filter on the suction line if solids may be present.

When pumps are installed in parallel, the suction lines should be adequately separated to prevent unnecessary turbulence.

3.3 PROTECTION DEVICE

The coupling guard installed by the Manufacturer is made of a strong metal plate, fastened to the baseplate by screws, duly shaped to prevent fingers from coming into contact with moving parts. It can be removed only by using a proper tool.

3.4 ADDITIONAL DESCRIPTION OF ACCESSORIES

3.4.1 Seal parts

The pump is usually supplied equipped with mechanical seal. If the Customer requires a particular type of seal, Bedu Pompen B.V. installs the desired seal after verifying if its dimensions are compatible with those of the pump. In case the Customer requires only the seal mark, the Company leaves the Manufacturer to select the type of seal, by giving information about the pumped liquid.

Among the seals used we can mention the following:

- Packing rings
- Single mechanical seal
- Double tandem mechanical seals with tank and pressureless flowing liquid
- Double opposed mechanical seals with external pressurized flowing liquid

These last must be installed when the pumped product has characteristics which prevent it from being used as flowing source or for greater safety (visual inspection).

The tank for tandem mechanical seals is not pressurized and it is used to avoid dry operation of the external seal and visually detect any possible leakage of the internal mechanical seal.

3.4.2 Safety valve

The pump can be provided with safety valve, with adjustable calibration, installed on the rear cover.

When the calibration pressure has been reached, overcoming the reaction of the contrast spring, the valve starts to open, letting the pump delivery and suction sides to communicate.

The purpose of the valve is simply to protect the pump from accidental overpressure peaks; its extended opening may damage the pump.

4. INSTALLATION, ASSEMBLY

4.1 SPECIAL ASSEMBLY TOOLS

To assemble the pump you do not need special tools, except for seal extractors (see Maintenance).

4.2 INSTALLATION SITE INFORMATION

4.2.1 Space requirements for operation and installation

The space destined by the Customer to the installation of the machine should be enough to gain access to, install and maintain the pump unit.

4.2.2 Inspection before starting installation

Before installation, the Customer must ensure that the environmental conditions of the selected site comply with requirements specified under the contract.
In particular, unless expressly required and accepted in the order, the installation site should not be exposed to the following environmental conditions:

- abnormal temperature;
- high humidity;
- corrosive atmosphere;
- explosion and/or fire hazard areas;
- dust, sandstorms;
- earthquakes and other similar external conditions;
- high level of vibrations;
- high altitude;
- flood hazard areas.

4.2.3 Baseplate, foundation plate details

The metal base plate shall be of sufficient size and strength to support induced stress.
When the pump unit is installed, it shall be firmly fixed in place by fastening bolts or by using other securing methods.
Ground fastening bolts or other securing methods shall be of sufficient strength to prevent the pump unit from moving accidentally.

4.2.4 Alignment requirements

The alignment operation must not submit the pump unit to axial and radial stress, therefore the offset must always be lower than the tolerance limits expected fot the coupling.

4.2.5 Suction lift

The suction lift, that is the vertical distance between the pump inlet mid-point and the free surface of the tank to which the pump is attached, must not exceed 5 m to allow pump priming and avoid cavitation phenomena.

Otherwise, contact our Technical Department.

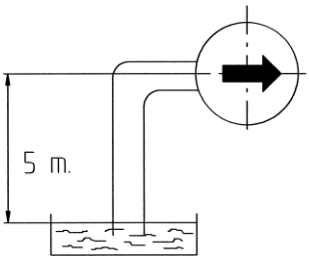


Fig. II

Each pump must have its own suction pipe; the installation of two or more pumps with a common suction pipe length causes the pump to work less efficiently.

The length of the suction pipe must be reduced as much as possible to minimize pressure losses in such segment; higher pressure losses in the discharge line do not adversely affect the correct operation of the pump (if they do not exceed the delivery limits stamped on rating plate).

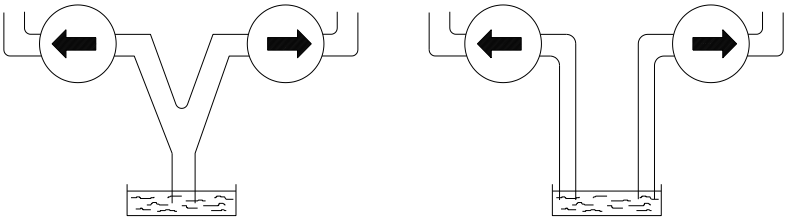


Fig. III

Furthermore, it is necessary to check that siphons are not created in the suction pipe, since the formation of air pockets generates vibrations and stresses which are not compatible with the correct operation of the pump and may obstruct the pump priming at startup.

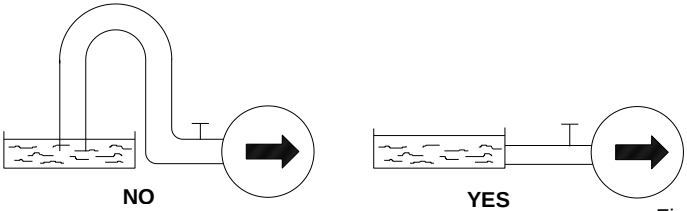


Fig.IV

In case of installation below head, the pump does not ensure to be able to intercept the flow of fluid as a shut-off cock or a proper stop valve.

4.3 INITIAL INSTALLATION

According to the conditions of supply, the pump can be delivered as follows:

4.3.1 Complete pump unit

In this case the Customer must fasten the baseplate to a solid support in order to ensure the correct axis alignment in all operating conditions.

We recommend the use of vibration dampers below the pump base and vibration damping sections on pipes near pump inlets.

Once the pump unit has been positioned, proceed as described below:

a) connect suction and discharge pipes respectively to the pump inlet and outlet;
b) power the motor, by carefully controlling the compatibility of motor voltage and frequency with those of the system;
c) open the intake and discharge pipe valves, if any;
d) run the motor for a while to verify that the pump rotates in the direction indicated by the arrow stamped on the pump.

4.3.2 Bare shaft pump

In this case, before following the steps described at Paragraph 4.3.1, choose the type of motor and align it to the pump on a baseplate.

The motor must be selected by the Customer depending on the type of operation for which it is specifically requested (continuous operation, discontinuous operation, repeated startups, indoor or outdoor installation, explosive atmosphere, critical environmental conditions, altitude, etc.) with power compatible with that required by the pump.

The alignment is performed by flexible or coupling on a baseplate.

To align the *flexible coupling* make the following basic operations:

a) accurately measure the height of the pump axis (h) and the height of the motor axis (**H**);
b) calculate the difference **D = h – H**;

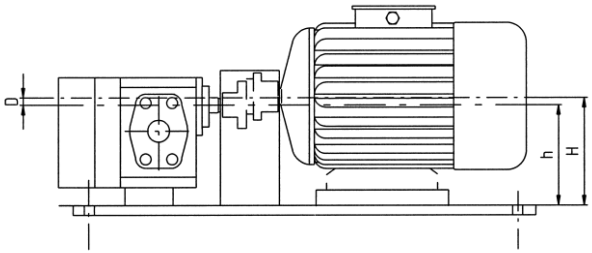


Fig.V

c) prepare some aluminium (or steel) shims with height **D**;
d) place motor and pump on a single plane (verify their flatness), by placing shims where necessary (or under the motor feet or the pump feet);
e) verify that the axes of the two shafts coincide, by measuring the two diameters by difference, that is, by accurately measuring **R, D1 = 2R + d**. If this equality is not verified, properly place calibrated shims so as to align perfectly the pump unit;

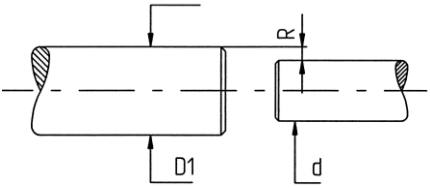
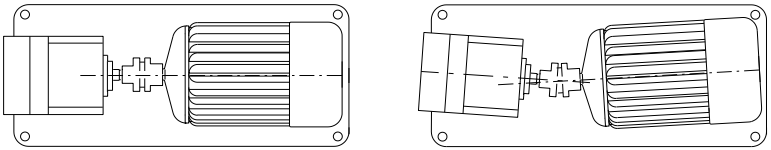


Fig.VI

f) check that the pump axis and the motor axis are perfectly coaxial, since an offset would cause a radial force whose strength may reduce the life of the pump or motor.



YES **NO**

Fig.VII

g) leave an axial clearance of approximately 2 - 3 mm between the 2 couplings, so as to avoid stresses induced by axial forces and thermal expansions.

The User shall place a rigid coupling guard on the flexible coupling: it shall be machined so as to prevent access to moving parts.
Such coupling guard shall be firmly secured to the baseplate.

4.4 DRIVE UNIT AND ACCESSORY ASSEMBLY

4.4.1 Motor

The Company installs EC approved electric motors, of power compatible with that required by the pump, selected according to the desired operating conditions and environmental characteristics. In particular if the pump unit is required to operate in explosive atmosphere, the motor is chosen in explosion-proof execution **(we remind that, to be used within the European Union, also the execution of the pump and the relevant fittings must comply with directive 94/9/EC).**

4.4.2 Installation of safety and control devices

If specifically requested in the order form, the Company provides the pump with the relief valve, which must be calibrated to protect the pump from damage. Once it has been properly calibrated, the valve must not be tampered with in any way, since volumetric pumps can reach quickly, with the delivery closed, extremely high pressure values, with consequent very serious danger.

Any pressure adjustment shall be compulsorily made with the pump stopped and depressurized.

The User shall install a pressure gauge in the pump outlet; it is advisable to install a vacuum gauge near the pump inlet.

In case also a regulating valve is installed on the system, make sure that its calibration pressure differs considerably from the one of the relief valve not to generate dangerous resonance phenomena (pipe and/or valve break).

4.5 ELECTRICAL CONNECTIONS, CONNECTION CABLES

The machine shall be connected to the external ground protection system by the appropriate terminal, which must be identified by the PE letter. Connection cables shall be properly sized and insulated. Before energizing the machine, always verify that the mains voltage and frequency are compatible with those of the motor.

4.6 PIPING

4.6.1 General

Pipes shall have a suitable diameter to allow a regular flow with low pressure losses. Therefore, we recommend to use, at least for the suction line, pipes with inner diameter equal to or greater than that of the pump inlet, mostly when the viscosity level becomes considerable. To minimize pressure losses in the circuit, we recommend to avoid, as much as possible, abrupt variations of section and direction (curves) along the pipe run, particularly in the suction line.

4.6.2 Forces and moments which operate on suction and delivery flanges.

As general rule it would be necessary to interpose flexible vibration damping sections between the pump and the system piping; therefore, we recommend to verify that the flanges of the connection pipes are always placed, in free position, with the planes parallel to those of the flanges of the suction and delivery nozzles to avoid that, after fastening them, forces and moments of excessive value are generated.

In any case, the User shall make sure that the loads induced on the pump flanges, under the most critical operating conditions, do not exceed the values prescribed by Standards UNI EN ISO 14847.

4.6.3 Fastening screw torques

The fastening torque for the screws of our pumps shall be:

- for M6 screws 11-12 Nm
- for M8 screws 20-22 Nm
- for M10 screws 38-40 Nm

For more detailed information, contact our Technical Department.

5. COMMISSIONING, OPERATION, SHUTDOWN

5.1 DOCUMENTATION

Operating and maintenance manual

5.2 PUMP PREPARATION FOR STARTUP

5.2.1 Filling / discharge

To prevent gears from running dry, before starting the pump for the first time or after long stationary periods it is advisable to fill the gear spaces with oil or liquid being pumped through one of the nozzles and rotate the driving shaft by operating manually with a screwdriver on the motor cooling fan. This also makes it possible to check for even and smooth movement of rotary components and excessive friction.

The pump discharge, if it is about toxic, harmful or, in any case, dangerous fluid, shall be carried out with the greatest care. In particular, the pump body shall be emptied with appropriate operating manoeuvres.

5.2.2 Electrical connections

It is necessary to choose wires which satisfy the operating conditions required by the Customer (e.g. voltage, current, electric shock protection, bundle of cables) and can support external influences (e.g. ambient temperature, presence of water or corrosive substances, mechanical stresses, fire hazards). Moreover, we remind that wires must be properly sized to ensure the voltage drop from the power supply inlet to the point of load application does not exceed 4%.

5.2.3 Verifying the direction of rotation

Open the intake and discharge valves. To verify the direction of rotation run the motor for a while only to check that the pump rotates in the direction marked by the arrows.

5.3 SAFETY DEVICES

5.3.1 Mechanical safety devices (guards for rotating parts)

The hazardous area, represented by the projecting sections of pump side and motor side shafts and the coupling, shall be protected against accidental contact using a duly shaped strong metal coupling guard which must be firmly secured to the baseplate.

5.3.2 Acoustic insulation

Sound emission values are specified in this manual. The User should always verify if the regulations of his own country prescribe, in relation to the frequency of exposure to emission values, the use of **individual protection devices**. If it is, he must comply with the requirements contained in the above-mentioned regulations to protect the operator's health and safety.

5.3.3 Splash-proof cover

In the event the liquid being pumped is dangerous, the operator must be in any case protected against the risk of any accidental contact with jets of liquid by wearing appropriate **individual protection devices**.

5.3.4 Regulation on the electric components

We remind that in accordance with Standard EN 60204-1 Ed1998-04, as power disconnecting switch, a plug/socket combination is allowed for a machine with rated power **equal to or lower than 16 A** and a total power **equal to or lower than 3 kW.**

5.4 STARTING THE PUMP

5.4.1 Initial commissioning

- Ensure that the pump unit is properly earthed.
- In case the pump is equipped with heating jacket, it is necessary to operate this last up to reach the normal operating temperature and gradually start the liquid pumping up to reach the operating conditions in thermal equilibrium.
- Verify that suction pipes are properly joined one another to avoid air infiltrations which would prevent the pump from priming.
- Check that siphons are not created in the suction pipes so that pump can completely remove the air. In this case, if the air is not completely removed then the flow rate may decrease and the noise level may increase although the pump has taken in the liquid, with consequent premature deterioration of bearing bushes and moving parts.
- Where applicable, verify that the pipes for the external flow of mechanical seals are properly connected.
- If a packing ring is fitted, verify the amount of dripping (which must occur); if necessary operate the screws ⑦ to adjust the packing ring compression.
- Verify the proper operation of the relief valve; to do so it is necessary to gradually increase pressure, by acting on the valve located on the discharge pipe, up to reach the expected calibration value. Now, after a further rotation of the valve, the discharge pressure shall remain lower than the calibration value. Otherwise, **after stopping the machine and depressurizing the pump,** for pumps MG and B5-150 (see Fig. 1 and Fig. 2**)** it is necessary to disassemble the valve cap ㉓, remove the gasket below ⑱, loosen the nut ㉑ and rotate counterclockwise the spring pre-load adjusting screw ⑲ (clockwise to increase the pre-load). Retighten the lock nut ㉑, interpose the gasket ㉙ and rescrew the protection cap ⑱. For Pump B200-600 (see Fig. 3), it's necessary to loosen the look nut ⑳ and turn the spring pre-load adjusting screw ⑰ (clockwise to increase the pre-load). Them refighten the lock nut ⑳. **The adjusting screw is not equipped with retainer, therefore it is necessary to pay attention, when unscrewing it, not to cause a leakage of the fluid being pumped.**

5.4.2 Startup after shutdowns

The most common case in which the pump may stop working - apart from the power supply failure (black out) – is when the electric motor overcharge protection comes into operation.

In this case, before starting the pump examine the causes which triggered the activation of the protection and remove them.

5.4.3 Pump system requirements

In volumetric pumps, pressure is not related to flow rate and/or rotation speed; therefore, avoid installing shut-off valves on the discharge pipe and, in any case, between the pump and the stop valve a relief valve must always be installed.

5.4.4 Startup/shutdown frequency

Pumps which are expressly requested by the Customer to start frequently and repeatedly do not show any problems for this kind of operation.

5.4.5 Operation and startup with closed valve

It is forbidden to start the pump with the discharge valve closed: such mistake would cause an abrupt pressure rise above the limit values with consequent seizing.

5.5 SHUTDOWN

5.5.1 Decommissioning

In case of decommissioning of the pump unit, it is necessary to disconnect the power supply to make unexpected and accidental startups impossible.

5.5.2 Emptying

A pump or a pump unit which operates with a flammable, toxic, corrosive or, in any way, hazardous fluid, or with a liquid at a temperature higher than 55°C, shall be equipped with a device such as a connection pipe, **to be provided by the User**, to collect and dispose the liquid drained or coming from any possible leakage from the shaft seal or discharged by a pressure relief valve.

6. MAINTENANCE AND INSPECTION

Maintenance operations and pump disassembly must be performed only by authorized and specifically trained people.

6.1 USE PRECAUTIONS

Before performing any maintenance operation, please observe the following safety precautions:

- **Never** execute maintenance operations with the pump running.
- Cut the power supply to the pump unit.
- Wear gloves, glasses, shoes and protective suits adequate to the characteristics of the liquid being pumped.

- Wait until the pump is cooled.
- **Never** open the pump unit and/or the relief valve when the pump is pressurized.

- Close suction and discharge pipe valves, if any.
- Disconnect the pump from suction and discharge pipes, by paying attention to put a collecting basin for the pipe liquid.
- In case externally flowed mechanical seals are used, disconnect the relevant pipes.
- Cut the power supply to the motor and disconnect the earth cable.

- Unscrew anchoring screws and remove the pump unit complete with its baseplate.
- Disassemble the protection coupling guard and disconnect the pump from the motor.
- Disconnect the pump from the baseplate.
- Place a collecting basin for the pump liquid.
- Perform the maintenance operation.
- Align carefully pump and motor and fasten the pump to the baseplate.
- Connect the pump to the motor and assemble the protection coupling guard.
- Secure the baseplate by anchoring screws.
- Connect the pump to suction and discharge pipes.
- Reconnect the power supply to the motor and the earth cable.
- Open suction and discharge pipe valves, if any.
- Reconnect the power supply to the pump unit.

6.2 WEARABLE MATERIALS

The normal wear parts, included as spares in the 2-year warranty are the following:

- bearing bushes;
- seal parts (mechanical seal, packing rings, gaskets);
- gears;
- shafts.

6.3 SURVEILLANCE DURING OPERATION

The pump unit does not need the presence of an Operator during the work cycle. It is up to the User to provide or not a periodic surveillance depending on the importance and seriousness of the operation. The relevant checks shall be aimed to periodically adjust the packing rings compression and to detect abnormal noise, vibration, temperature levels and/or some dripping from the mechanical seals, variations of pressure and/or flow rate, etc.

6.4 PREVENTIVE MAINTENANCE

It is always advisable, for a reliable and cost-effective operation, to adopt a policy of preventive maintenance. The service time specified for wearable component parts in this manual can be used as reference for the first period of operation. Later the user will be able to improve the MTBM (Mean Time Between Maintenance) as a result of the acquired experience.

6.5 PUMP DISASSEMBLY AND REASSEMBLY

6.5.1 Tools

No special tools are requested, except for seal extractors.

6.5.2 Disassembly/reassembly procedure

Before disassembling the pump, it is necessary to perform the operations mentioned at point 6.1 "USE PRECAUTIONS".
Refer to the drawings and nomenclature attached at the end of the manual.

Pumps MG and B5-150 (See Fig. 1-2)

1) Single mechanical seal

a) Access to the mechanical seal

After having taken the tab ㉛ out of its seat, unscrew the hex head screws ㉕ of the seal-packer lid ㉔ and take it out, being careful not to ruin the static part of the seal ㉒, housed in the lid itself. It is thereby possible to check the wear conditions of the seal's contact surfaces. When putting it back in, be careful not to pinch the sealing O-ring ㉗ housed in the lid.

b) Replacing the static seal

To take the static part of the seal ㉒ out of the seal-packer lid ㉔, you need to press on the outside of the seal. When you have positioned the seal-packer lid on a flat surface, after greasing its walls to facilitate assembly, insert the new static seal with relative O-ring; use a pad with a soft cushion placed in between to press perpendicularly on the lid.

c) Replacing the dynamic seal

To take out the dynamic part of the seal ㉒ it is a good idea to use an iron wire bent by 90° on one end to hook onto the first or second spiral of the seal spring ㉒. Pull parallel to the axis of the shaft ⑧, being careful not to scratch it. After greasing the shaft to facilitate assembly, put in the new mechanical seal by turning the spring in the opposite direction of the spiral; use a pad with a soft cushion placed in between to press on the head until the spring ㉒ is touching the edge (or seeger ㉘) of the shaft.

2) Packing seal

a) *Replacing the packing seal*

After taking the tab ㉛ out of its seat, unscrew the hex head screws ⑦ with the washers ⑨ and take out the stuffing box ⑩. Using a screwdriver, take the packing seal ⑤ out of its seat. Make sure that the shaft ⑧ does not have any scratches on the sliding area. When this zone has been lubricated, put in the new packing seal ⑤ taking care to offset the notch on each ring by 90°; after the insertion of every ring in, press the packing seal with a pad. Put the stuffing box back in ⑩ and press the packing seal by alternately and equally turning the screws ⑦ with washer ⑨.

Remember that for normal operation the packing seal must drip slightly.

d) Replacing supporting bushings

Proceed as described in points *a)*, *b), c)*, *e)*. Then, to take the bushings out you need to bend them with a chisel or similar, being very careful not to ruin the diameter of the bushing seat. To replace the supporting bushings ⑰, after taking them out, their seats need to be cleaned carefully with alcohol to remove any debris, and dried thoroughly. Put new bushings in, all the way in. For re-assembly, follow the descriptions in points *e), c), b), a).*

e)* Replacing *gears and shafts

Proceed as described in points *a)*, *b), c)*. After marking the relative position between the rear lid ② and the pump body ⑫, pull out the hex head screws ⑮ that secure the lid and remove it, bearing in mind that the operation may be difficult due to the precision of the shafts and centring pins ⑥. Pull out the flat P.T.F.E. gasket ㉘ and, if necessary, remove the centring pins ⑯. Take out the driven shaft ⑭, slide the driven gear ⑯ off the shaft and remove the tab ⑬; do the same with the driven shaft ⑧ and driven gear ④. During re-assembly, be careful not to change the position of the helical gears, to avoid reversing the direction of the axial thrust.

Proceed in reverse order, for re-assembly, being careful to position the gasket exactly ㉘ and not turning the rear lid ②.

Tighten the screws ⑮ that secure the lid, in a cross pattern, turning the driven shaft at the same time 8, so as to avoid differentiated pressures on the gears that could increase friction: refer to point **4.6.3** for the torques. Then proceed as described in points *c), a)*.

f) Replacing the safety valve

Unscrew the cap ⑱ and take down the external seal washer ㉙. Move the nut ㉑ and completely unscrew the adjustment ring nut ⑲, being careful of the pressure applied to the spring ⑳; take down the internal seal washer ㉙.
Take out the spring ⑳ with the shutter installed on it①.

Pump B200-600 (see Fig.3)

1) Single mechanical seal

a) Access to the mechanical seal

After having taken the tab ㉛㉞ out of its seat, unscrew the hex head screws ㉕ of the seal-packer lid ㉔ and take it out, being careful not to ruin the static part of the seal ㉒, housed in the lid itself. It is thereby possible to check the wear conditions of the seal's contact surfaces. When putting it back in, be careful not to pinch the sealing O-ring ㉖ housed in the lid.

b) Replacing the static seal

To take the static part of the seal ㉒ out of the seal-packer lid ㉔, you need to press on the outside of the seal. When you have positioned the seal-packer lid on a flat surface, after greasing its walls to facilitate assembly, insert the new static seal with relative O-ring; use a pad with a soft cushion placed in between to press perpendicularly on the lid.

c) Replacing the dynamic seal

To take out the dynamic part of the seal ㉒ it is a good idea to use an iron wire bent by 90° on one end to hook onto the first or second spiral of the seal spring ㉒. Pull parallel to the axis of the shaft ⑬, being careful not to scratch it. After greasing the shaft to facilitate assembly, put in the new mechanical seal by turning the spring in the opposite direction of the spiral; use a pad with a soft cushion placed in between to press on the head until the spring ㉒ is touching the edge of the shaft.

2) Packing seal

a) Replacing the packing seal

After taking the tab ㉞ out of its seat, unscrew the hex head screws ⑥ with the washers ⑦ and take out the stuffing box ⑤. Using a screwdriver, take the packing seal ㉙ out of its seat. Make sure that the shaft ⑬ does not have any scratches on the sliding area. When this zone has been lubricated, put in the new packing seal ⑤ taking care to offset the notch on each ring by 90°; after the insertion of every ring in, press the packing seal with a pad. Put the stuffing box back in ⑤ and press the packing seal by alternately and equally turning the screws ⑥ with washer ⑦.
Remember that for normal operation the packing seal must drip slightly.

d) Replacing supporting bushings

Proceed as described in points *a), b), c) e)* and then, to take the bushings out you need to bend them with a chisel or similar, being very careful not to ruin the diameter of the bushing seat. To replace the supporting bushings ⑩, after taking them out, their seats need to be cleaned carefully with alcohol to remove any debris, and dried thoroughly. Put new bushings in, all the way in. For re-assembly, follow the descriptions in points *c), b), a).*

e) Replacing gears and shafts

Proceed as described in points *a)*, *b), c)*. After marking the relative position between the rear lid ① and the pump body ③, pull out the hex head screws ② that secure the lid and remove it, bearing in mind that the operation may be difficult due to the precision of the shafts and centring pins ⑫. Pull out the flat P.T.F.E. gasket ㉗ and, if necessary, remove the centring pins ⑫. Take out the driven shaft ⑨ and the driving shaft ⑬.

Proceed with re-assembly, being careful to position the gasket exactly ㉗ and not turning the rear lid ①.

☞ Tighten the screws ② that secure the lid, in a cross pattern, turning the driven shaft at the same time ⑬, so as to avoid differentiated pressures on the gears that could increase friction: refer to point **4.6.3** for the torques. Then proceed as described in points *c), a)*.

f) <u>Replacing the safety valve</u>

For safety/convenience and to facilitate the following operations we strongly recommend removing the valve body ⑱ from the rear lid, even if everything can be carried out with it screwed on, unscrew the hex head screws ㉝ and, being careful not to pinch the two o-rings ㉘ installed in their relative seats, move it off of the lid surface.

☞ Unscrew the nut ⑳ for a couple of centimetres, with the external sealing washer ㉟. Then perform the same procedure with the long screw ⑰ which extends out of the tapered valve cover ⑲, while proceeding with this operation, be careful of the pressure applied by the spring ⑮; Completely unscrew the tapered valve cover ⑲ being careful not to pinch the sealing o-ring ㉑ and, once it is completely unscrewed, take the spring ⑮ out of its seat as well as the surface of the initial spring ⑯.

Put in the new components according to their previous installation, ensuring that the shutter ⑭ is coupled correctly with the seat in the valve body ⑱.

Then proceed in the reverse order for re-assembling.

7. FAULTS: CAUSES AND SOLUTIONS

Here below the most common causes of malfunctions in the operation of pumps are shortly listed together with the possible solutions.

FAULT	ORIGIN	CAUSE	SOLUTION
The pump does not start	Electrical	The motor is not powered	Verify electrical connections and thermal protections
	Electrical	Incorrect supply voltage	Verify rating and type of (star - delta) motor connection
	Electrical	Excessive power consumption	Reduce the inverter start ramp
	Mechanical	Mechanical lock of motor and/or pump shafts	Verify that shafts rotate freely
	Mechanical	The coupling detachment	Verify that the pump shaft rotates freely
The pump does not suck liquid at startup	Electrical	Direction of rotation reversed	Reverse electric motor connections
	Hydraulic	Valves on suction and/or discharge pipes closed	Open valves
	Hydraulic	Suction filter clogged	Disassemble and clean the filter
	Hydraulic	Presence of air in the suction pipe	Drain pipes. Remove siphons. Tighten fittings and flanges
	Hydraulic	High pressure losses in the suction line	Increase the pipe diameter. Remove abrupt variations of section and direction
	Hydraulic	Fluid too viscous	Preheat the fluid. Decrease the speed of rotation.
Pressure and/or flow rate pulses in the discharge line	Electrical	Overvoltage and/or overcurrent	Stabilize the mains voltage
	Electrical	Feedback electric circuit too sensitive	Stabilize the electric circuit
	Hydraulic	Feedback hydraulic circuit too sensitive	Increase the inertia of the hydraulic circuit
	Hydraulic	Presence of air in pipes	Drain pipes. Remove siphons. Tighten fittings and flanges
	Hydraulic	Intermittent opening of the relief valve	Increase the valve operating pressure
	Hydraulic	Foot valve not working properly or of the type with plate and spring	Replace with free ball foot valve

FAULT	ORIGIN	CAUSE	SOLUTION
The pump is noisy and vibrates	Hydraulic	Presence of air in pipes	Drain pipes. Remove siphons. Tighten fittings and flanges
	Hydraulic	Cavitation	Decrease pressure losses in the suction line. Reduce the speed of rotation. Change fluid temperature
	Mechanical	Ball bearing and/or bush failure	Replace ball bearing and/or bushes
The flow rate does not increase as the speed of rotation increases	Hydraulic	Pump saturation	Decrease pressure losses in pipes. Reduce fluid viscosity
	Hydraulic	Excessive speed of rotation in relation to the fluid viscosity	Decrease the speed of rotation or increase the fluid temperature
	Hydraulic	Relief valve opening	Increase relief valve spring pre-load
	Hydraulic	Cavitation	Decrease pressure losses in the suction line. Change fluid temperature. Decrease speed of rotation.
Progressive reduction of the discharge flow rate and/or pressure, with constant speed of rotation	Hydraulic	Relief valve opening	Increase relief valve spring pre-load
	Mechanical	Friction increase by thermal effect	Cool the fluid
	Mechanical	Gear shim adjustment to a given clearance gear	Grind rear cover
	Hydraulic	Decrease in viscosity due to the temperature increase	Decrease the fluid temperature

8. WARRANTY CONDITIONS

Bedu Pompen B.V. guarantees that pumps and pump units are free from defects in material, construction, workmanship and assembly for a period of 12 (twelve) months from the delivery date (specified on the D.D.T.).

Purchaser's warranty covers only free replacement of components whose defectiveness is proven. Such warranty excludes the purchaser's right to claim for rescission of contract, price reduction or further damages.

Warranty is void in case of misuse or improper use of the pump by the User. The pump shall be used according to what expressly requested in the order or based on the instructions contained in this manual.

Any damages resulting from shocks and/or tampering are not covered by this warranty.
Warranty does not apply to normal wear parts and damages due to negligence and poor maintenance.
For the application of the warranty it is necessary that:

- the Customer informs immediately Bedu Pompen B.V. about the pump defect causing the trouble;
- the pump was not tampered with;
- the pump is returned to Bedu Pompen B.V. clean, after removing any trace of the process fluid and in a proper packaging;
- **the pump is equipped with its nameplate**;
- a short description of the fault is provided in writing together with the operating parameters of the pump or the pump unit;
- if required, a chemical analysis or a sample of the process fluid is provided.

Pumps which have not been emptied of the process fluid or installations outside the pump unit will not be taken into account.

In the event Bedu Pompen B.V. acknowledges the defect under warranty, no charge will be made to the Customer both for the replaced material and the workmanship.
The forwarding charges from the Customer to Bedu Pompen B.V. remain to the Sender's (Customer) account.

9. ALLEGATI/ANNEXES

Maintenance operations and pump disassembly must be performed only by authorized and specifically trained people.

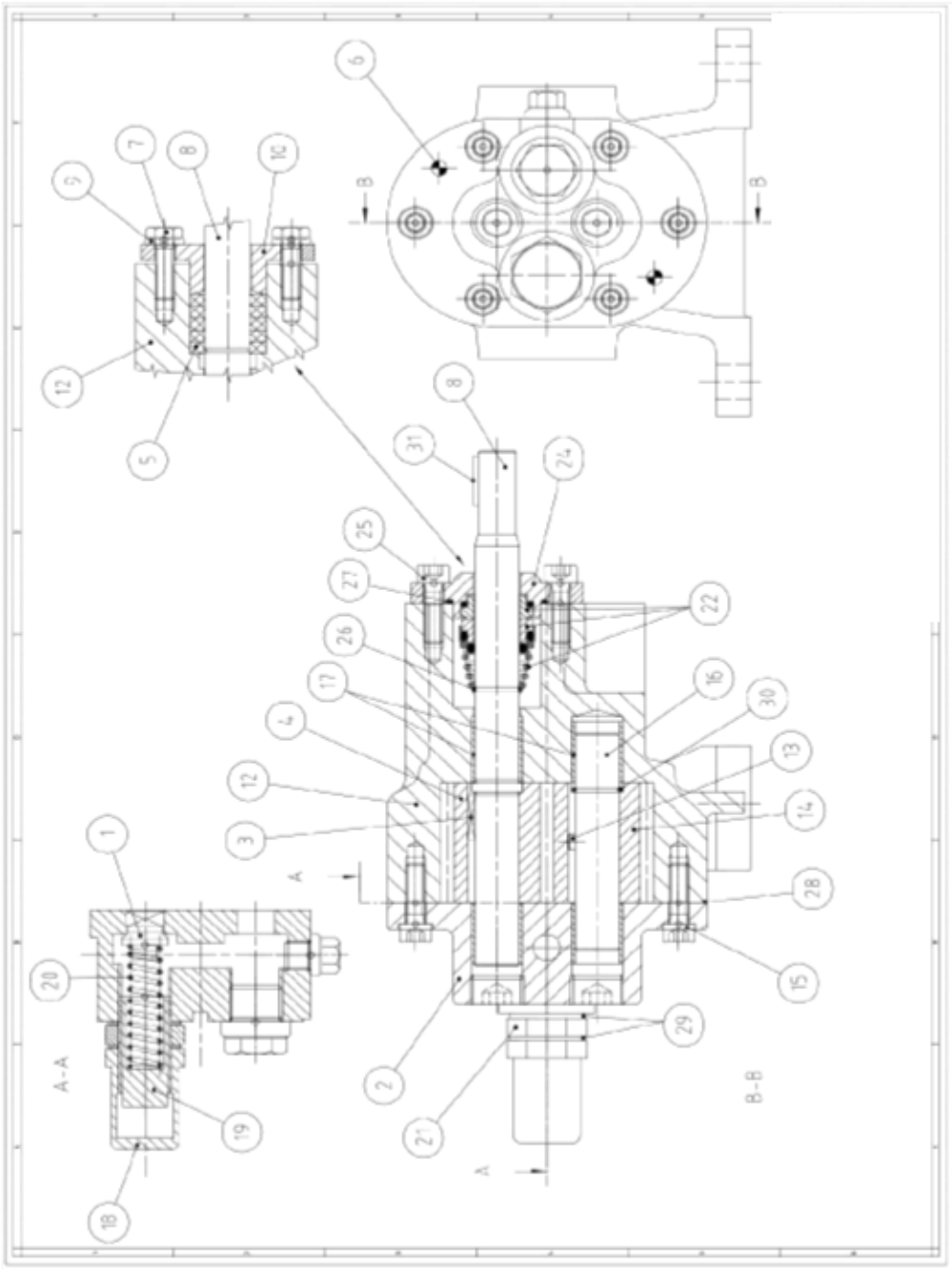

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Fig. 1

GEAR PUMP RANGE B5-B40 – Part List			
ITEM	**Q.TY**		**DESCRIPTION**
1	1		Sutter
2	1		Rear Cover
3	1		Father Key
4	1		Drive Gear
5	5		Packing rings
6	2		Dowel Pin
7	2		Hexagonal head screw
8	1		Drive shaft
9	2		Washer
10	1		Stuffing box
12	1		Pump Body
13	1		Pin
14	1		Driven gear
15	6		Socket Screw
16	1		Driven shaft
17	4		Self-lubrificating bush
18	1		Security Cap
19	1		Adjusting screw
20	1		Valve spring
21	1		Nut
22	1		Mechanical Seal
24	1		Seal Cover
25	2		Socjet screw
26	1		External retaining ring
27	1		O-ring
28	1		Gasket
29	2		Gasket
30	1		Circlip
31	1		Father Key

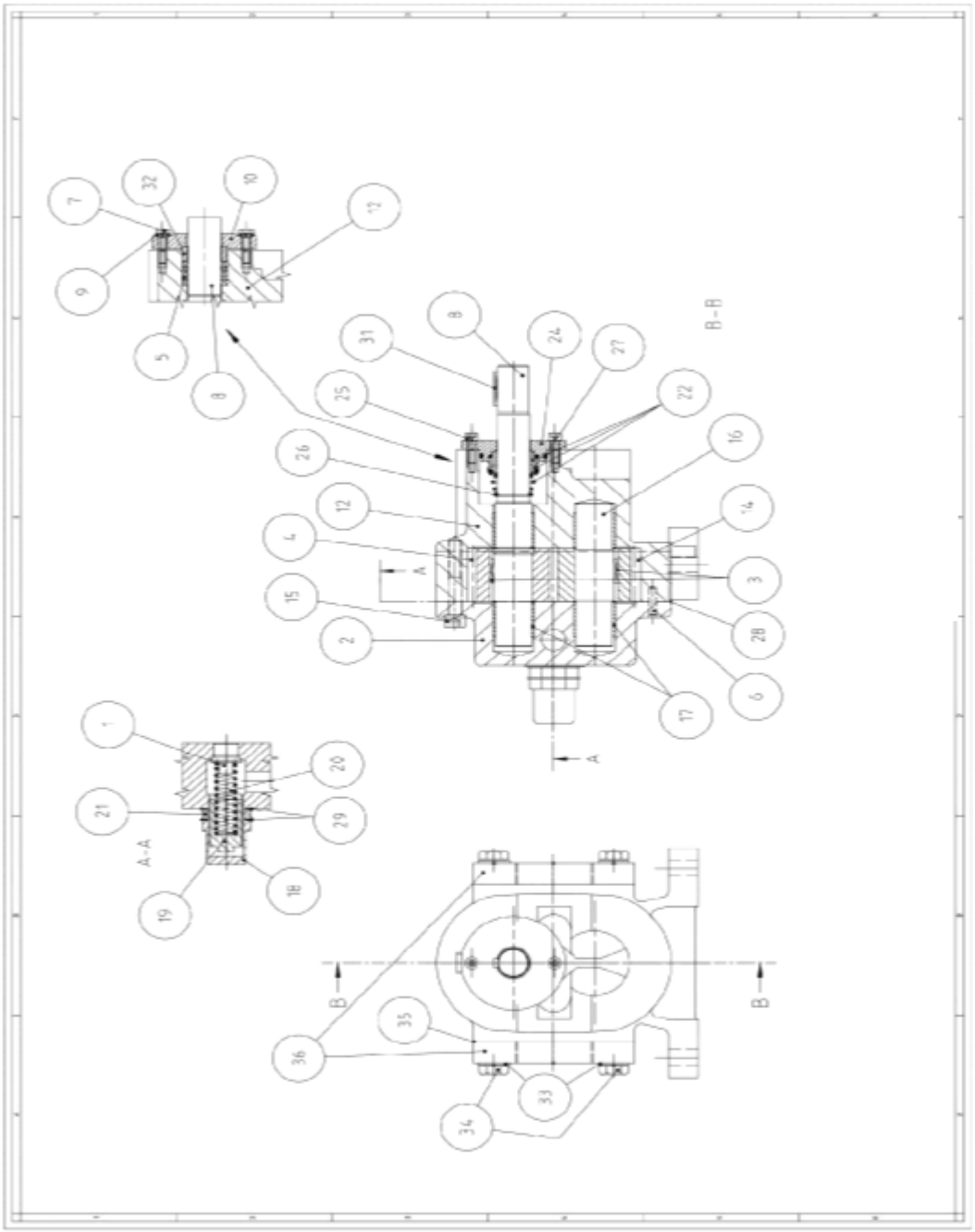

Fig. 2

GEAR PUMP RANGE B50-B150 – Part List			
ITEM	**Q.TY**		**DESCRIPTION**
1	1		Sutter
2	1		Rear Cover
3	2		Father Key
4	1		Drive Gear
5	5		Packing rings
6	2		Dowel Pin
7	2		Hexagonal head screw
8	1		Drive shaft
9	2		Washer
10	1		Stuffing box cover
12	1		Pump Body
14	1		Driven gear
15	6 - 8		Socket Screw
16	1		Driven shaft
17	4		Self lubrification bush
18	1		Security Cap
19	1		Adjusting screw
20	1		Valve spring
21	1		Nut
22	1		Mechanical Seal
24	1		Seal Cover
25	2		Socjet screw
26	1		External retaining ring
27	1		O-ring
28	1		Gasket
29	2		Gasket
31	1		Father Key
32	1		Stuffing box
33	4		Washer
34	4		Hexagonal head screw
35	2		O-ring
36	2		Counterflange

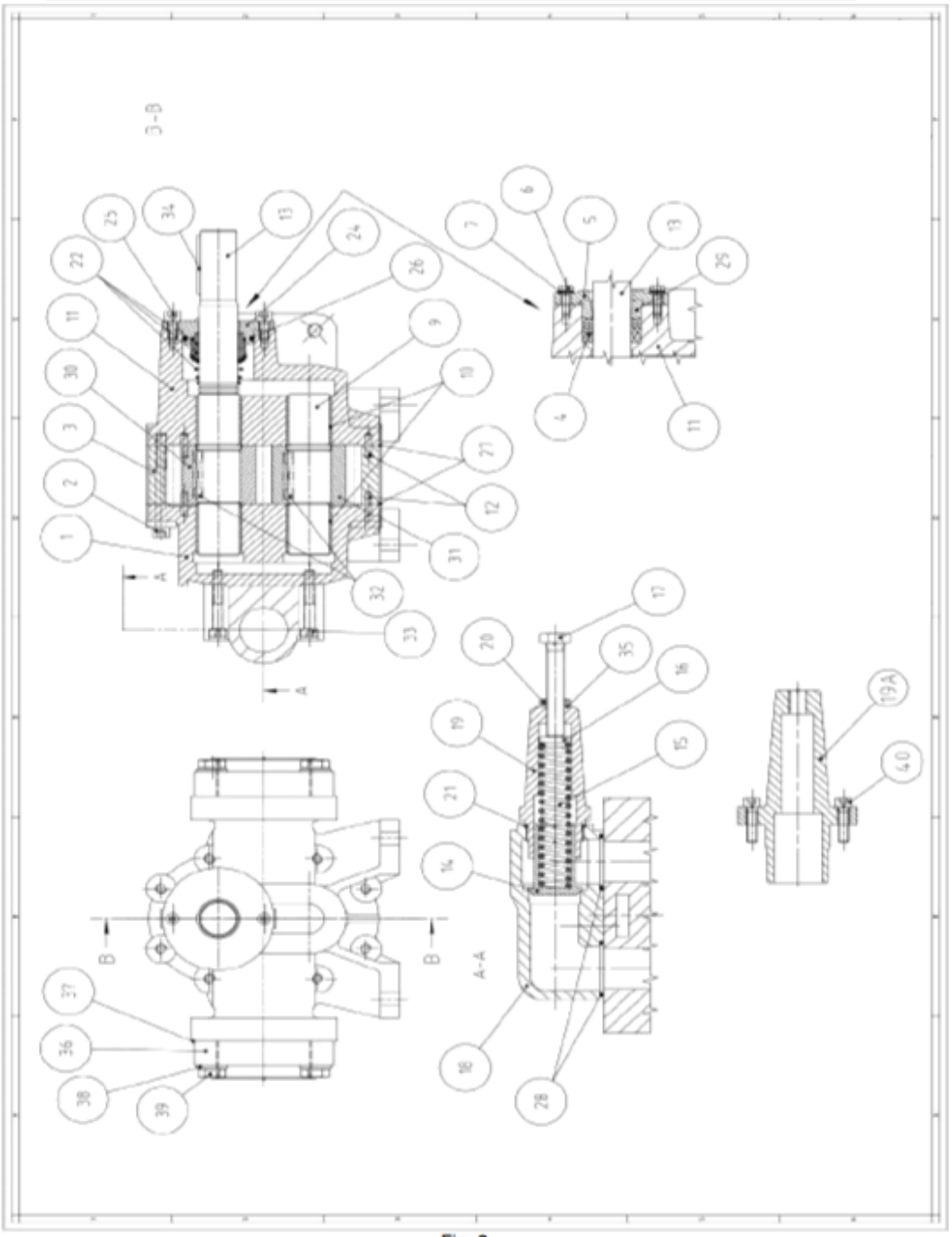
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Fig. 3

GEAR PUMP RANGE B200 - B600 – Part List			
ITEM	**Q.TY**		**DESCRIPTION**
1	1		Rear Cover
2	12		Socket screw
3	1		Pump central body
4	1		Packing ring
5	1		Stuffing box cover
6	2		Hexagonal head screw
7	2		Washer
9	1		Driven shaft
10	4		Self-lubricating bush
11	1		Pump front body
12	4		Dowel Pin
13	1		Drive shaft
14	1		Sshutter
15	1		Valve spring
16	1		Spring plate
17	1		Adjusting screw
18	1		Valve body
19 / 19A*	1		Valve cover
20	1		Nut
21	1		O-ring
22	1		Mechanical seal
24	1		Seal Cover
25	2		Socket screw
26	1		O-ring
27	2		Gasket
28	2		O-ring
29	1		Stuffing box
30	1		Driving gear
31	1		Driven gear
32	2		Father Key
33	4 / 5*		Socket Screw
34	1		Father Key
35	1		Gasket
36	2		Counter-flange
37	1		O-ring
38	8		Washer
39	8		Hexagonal head screw
40*	4		Hexagonal head screw
*Solo per B450/600 – Only for B450/600			

Supplementary maintenance instructions for Bear pumps BG900 —BG1200 - BG1900

Ref. Drawing N. 4P02171

The recommended wearable spare parts consist in:

- bushes
- shafts with gears
- mechanical seal, lip seal and gaskets.

Assembling and disassembling instructions

For replacing bushes and shafts with gears, you must loose screws item 16 of the back side of the pump and dismantle the by-pass cover item 4 and the back cover item 2. Then, after leaving off the feather key item 11 and loosing screws item 20 and item 18, dismantle the mechanical seal cover item 5 and the front cover item 3. After dismantling the rotating ring with spring of the mechanical seal item 6, it is possible to replace bushes item 28 and the shafts with gears item 9 and item 10.

After replacing bushes and/or shafts with gears, reassemble the pump, taking care gaskets item 12 are well positioned, centring the covers with dowel pins item 22.

Tighten screws item 16 and item 18 in cross-wise, in order to avoid unbalanced pressures on the gears faces, checking by hand the free rotation of the driving shaft.

After lightly greasing the shaft item 9, mount the rotating ring with spring of the mechanical seal item 6, rotating according to the spring winding.

Before reassembling the seal cover item 5, place into position the gasket item 12 and slightly grease the shaft surface in correspondence of the lip seal item 8, then tighten screws item 20 in cross-wise.

For regulating the relief valve, **after stopping and depressurizing the pump**, it is necessary to loose the nut item 23 and regulate the screw item 24 for increasing or decreasing the load on the spring item 25.

Pay attention because the regulating screw item 24 is not equipped with retainer!

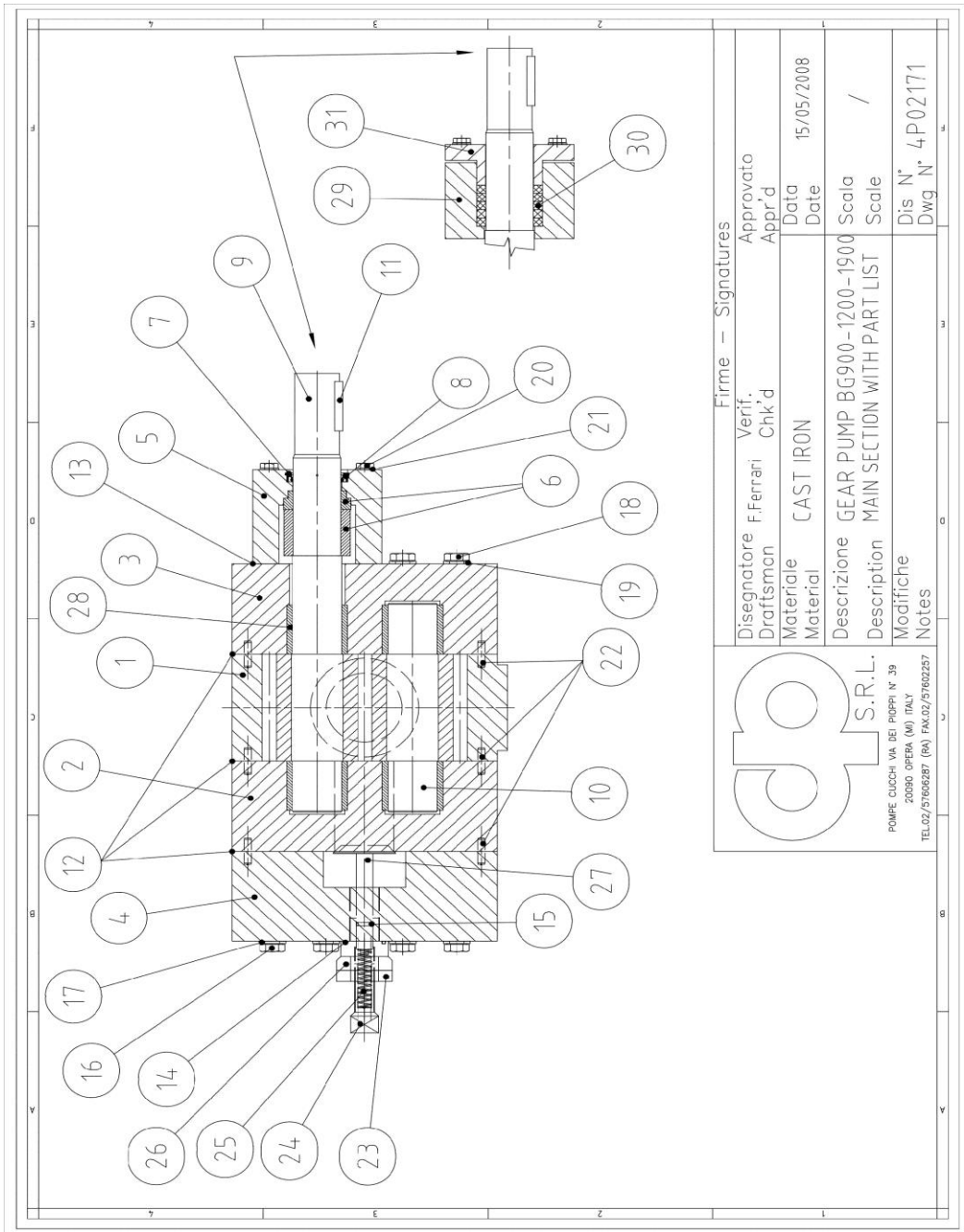
After regulation, tighten the nut item 23 again.

For dismantling the relief valve, it is necessary to remove the by-pass cover item 4.

For dismantling the packing item 30, please follow the same instructions of other pumps range B.

In case of pump configuration with internal by-pass valve you can change the sense of rotation of the pump as follow:

Unscrew the screws pos.16 in the rear cover of the pump and remove the cover with bypass pos.4. Then reverse upside down the cover removed (of 180°), align the reference pins pos.22 with holes in the rear cover and tighten again in cross sequence the screws, pos.16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Date
Descrizione GEAR PUMP BG900-1200-1900
Description MAIN SECTION WITH PART LIST
Scala /
Scale
Modifiche
Notes
Dis N° 4P02171
Dwg N° 4P02171
S.R.L.
POMPE CUCCHI VIA DEI PIOPPI N° 39
20090 OPERA (MI) ITALY
TEL.02/57606287 (RA) FAX.02/57602257

Gear Pumps Range BG900-BG1900		
ITEM	**DESCRIZIONE**	**DESCRIPTION**
1	Corpo Centrale	Main body
2	Coperchio posteriore	Rear cover
3	Coperchio anteriore	Front Cover
4	Coperchio by-pass	By-pass Cover
5	Premitenuta	Mechanical seal cover
6	Tenuta meccanica	Mechanical seal
7	Anello elastico	Retaining Ring
8	Guarnizione a labbro	Lip seal
9	Albero conduttore con Ingranaggio	Drive shaft with gear
10	Albero condotto con ingranaggio	Driven shaft with gear
11	Linguetta	Father Key
12	Guarnizione	Gasket
13	Guarnizione	Gasket
14	O-ring	O-ring
15	O-ring	O-ring
16	Vite T.E.	Hexagonal-head screw
17	Rosetta	Washer
18	Vite T.E.	Hexagonal-head screw
19	Rosetta	Washer
20	Vite T.E.	Hexagonal-head screw
21	Rosetta	Washer
22	Spina di riferimento	Dowel pin
23	Dado	Nut
24	Vite di regolazione	Regulation screw
25	Molla valvola	Valve spring
26	Boccola	Bushig
27	Otturatore	Shutter
28	Boccola di supporto	Supporting bushing
29	Sede per baderna	Stuffing box
30	Baderna	Packing
31	Premitreccia	Stuffing box head

Supplementary instructions for operation and maintenance of pumps and pumping sets which work in potentially explosive atmospheres (Directive 2014/34/EU)

Directive 2014/34/EU (that replaces Directive 94/9/EC, also known as ATEX), came into force on 30/04/2014 and concerns "equipment and protective systems intended for use in potentially explosive atmospheres". Equipment ad units intended for use in potentially explosive atmospheres are classified in groups and categories on the basis of the degree of safety they offer, so to their suitability to operate in locations with different classifications:

<table>
<tr><td colspan="2"><u>Group I</u>
(mines and related surface plants exposed to risk of release of firedamp and/or combustible dust)</td><td colspan="6"><u>Group II</u>
(other locations with potentially esplosive atmospheres)</td></tr>
<tr><td><u>Category M1</u>
(very high protection level)</td><td><u>Category M2</u>
(high protection level)</td><td colspan="2"><u>Category 1</u>
(very high protection level)</td><td colspan="2"><u>Category 2</u>
(high protection level)</td><td colspan="2"><u>Category 3</u>
(normal protection level)</td></tr>
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<tr><td>Zone 0</td><td>Zone 20</td><td>Zone 1</td><td>Zone 21</td><td>Zone 2</td><td>Zone 22</td></tr>
<tr><td colspan="2">environments where explosive atmospheres are detected for long periods of time</td><td colspan="2">environments where explosive atmospheres are probably detected</td><td colspan="2">environments where explosive atmospheres are rarely detected and, however, for short periods of time</td></tr>
</table>

For each zone, there are 6 classes of temperature, which have been stated depending on the minimum ignition temperature of the explosive mixture:

Temperature Class	Max. Surface Temperature
T1	450°C
T2	300°C
T3	200°C
T4	135°C
T5	100°C
T6	85°C

At the order, the Customer must define:

- working conditions of the pump (capacity, head, NPSH, local temperature,…);
- chemical and physical characteristics of fluid to be pumped;
- classification of dangerous area;
- temperature class.

Pumps cannot operate with working conditions different from the ones defined in the order, unless not expressly authorized and written by the Manufacturer.

PUMPS TYPE B - MG

The marking of the pumps intended for use in potentially explosive atmospheres is as follows:

ATTENTION

II 2 G c TX (or II 2 G c b TX)
and
II 3 G c TX (or II 3 G c b TX)

The first ones are classified as belonging to Group II, Category 2, with constructional safety **c** (eventually completed with **compulsory** monitoring of surface temperature **b**), for atmospheres with presence of gas, vapour or fog (**not dust**), suitable to be used in zones 1 and 2, with temperature class depending on the temperature of the pumped fluid (in any case not higher than T4).
The second ones are classified as belonging to Group II, Category 3, with constructional safety **c** (eventually completed with **compulsory** monitoring of surface temperature **b**), for atmospheres with presence of gas, vapour or fog (**not dust**), suitable to be used in zone 2, with temperature class depending on the temperature of the pumped fluid (in any case not higher than T4).

ATTENTION

Users must check the pump so that it always works within the foreseen operating parameters.
Local temperature range for operation is from –20°C to +40°C.
The symbol "TX" depending on the max temperature of the pumped fluid, indicates the Temperature Class, according to the following table:

ATTENTION

Max. Fluid Temperature	Temperature Class
80°C	T4
140°C	T3
230°C	T2
300°C	T1

For operating in a defined temperature class with fluids that have higher temperatures than the ones written in the table above, or however with dangerous fluids, pumps must necessarily be equipped with special devices for continuous checking of the surface temperatures near the mechanical seal chamber. **The outlet electric signals must be transmitted to a processing unit for continuous monitoring and for shutting off the pump with a safety margin of at least 20°C with respect to the max. surface temperature of the relevant temperature class.**
In standard executions, the max. differential pressure of the pumps is 10 bar; the max. outlet pressure is 12 bar. In particular conditions such limits can be raised up by the Manufacturer; however, such values are marked on the nameplate of the pumps.
The rotation speed of pumps shall not exceed the value stated in the order, unless not expressly authorized and written by the Manufacturer; in no case, however, it will exceed 1750 rpm.

ATTENTION

We remind you that every protection device, safety component and safety, control and regulating device installed by the Customer, must be in accordance with requirements of the directive 2014/34/EU(ATEX).

PRELIMINARY REMARK

ATTENTION

Here below we will also briefly outline some advice which, even if it does not directly concern the pump and/or the pump unit, nevertheless can affect, sometimes significantly, its right operation.

It is clear that the Manufacturer neither can foresee the numberless possible applications in which pumps can be involved, nor can take into account, in particularly complicated installations, all the possible interactions that the malfunction of any component can have on the pump operation.

The User, on the basis of the information given by the Manufacturers of the single components (or of the sub-assemblies) shall however carry out a careful assessment of the **plant risks** and take the proper further safety measures where they need.

WARNINGS

ATTENTION

All operations concerning installation, commissioning and maintenance must be done by expert personnel authorized by the Customer to work on such equipment.

It is Customer's care, on the basis of the process fluid characteristics, to adopt all the measures (including use of suitable PPE) so that maintenance operators can work in full safety conditions.

Installation, commissioning, operation

ATTENTION

Carefully check that marks stamped on the nameplates of electric motors, of pumps and, if any, of speed reducers or of hydraulic speed variators, correspond with the category and the temperature class required.

ATTENTION

Read carefully the instructions of the operating handbook of the pump, these supplementary instructions and further possible instructions provided by the Manufacturers of the mechanical seal or magnetic coupling, of the flexible coupling, of the electric motor, of the speed reducer or of the hydraulic speed variator.

Attend to the connection of motors and pumps to the earth circuit. In case, use the arrangements fitted on the motor frame and on the rear cover of the pump (yellow screw).

ATTENTION

Check the right alignment between pump and electric motor, following the instructions of the operating handbook of the pump and the warnings of the Manufacturer of the flexible coupling or of the magnetic coupling.

ATTENTION

Be sure that pipes have proper inner diameters (on the suction side, in particular, inner diameter must not be less than the nominal value of the pump connection), there is no syphon in piping at suction side and there are not air admissions.

ATTENTION

Wherever foreseen, check the connection of the thermocouples and of their related accessories with detecting equipment and with alarm signal and stop device of the pump and of the motor. **We remind you that every protection device, safety component and safety, control and regulating device installed by the Customer, must be in accordance with requirements of the directive 2014/34/EU(ATEX).**

We remind you that continuous checking of the surface temperature, connected to an alarm system and to a stop device of the motor **with a safety margin of at least 20°C** with respect to the relevant temperature class, **is mandatory** in the following cases:

- pumps with magnetic couplings);
- pumps with packing rings;

- pumps with internal by-pass valve (if it is not excluded that the full flow by-pass can last more than 60 s.);
- fluids with higher temperature than the one shown in table at page **65**.

Check that there are not solid particles in suspension in the fluid or welding wastes inside pipes (they must be flushed). In fact, if they enter the pump, they could seriously damage both bushings and gears; so it is mandatory to provide suction piping with a filter properly dimensioned, taking into account both the capacity of the pump and the head losses of the filter. Choosing the filter, evaluate also the risk due to the generation of electrostatic charges inside (see rule IEC CLC/TR 50404).

If the pump is equipped with a built-in safety valve, check periodically its calibration value. In case safety valve starts working, you must stop the pump as soon as possible (60s max.), and eliminate the anomaly which caused the valve operation, before starting the pump again. Continuous operation in such conditions could cause an unacceptable rising up of surface temperatures. An equipment for detecting outlet flow, joined to an alarm signal and a stop device of the pump, is recommended.

ATTENTION

We remind you that every protection device, safety component and safety, control and regulating device installed by the Customer, must be in accordance with requirements of the Directive 2014/34/EU

ATTENTION

Always provide pressure piping (upstream of the stopcock) with an external by-pass valve, joined to the upstream tank. If the pump is already provided with internal relief valve, check that it is calibrated at a pressure value at least 2 bar higher than the by-pass valve.

ATTENTION

Before starting the pump, be always sure that there are no gas or air bubble inside. For this purpose, fill in the pump with fluid, and vent the pump body and connected pipes. **Beware of performing this operation only when pump is stopped and depressurized.** It is a Customer's care, as he well knows the process fluid characteristics, to arrange suitable pipes and devices in order to perform the a.m operations in safety conditions.

Never start the pump when dry. Pumped liquid, other than lubricating gears, also acts as lubricating and cooling fluid for bushings and mechanical seal or the inner magnet and the "canister".
Then, it is a good rule to locate pumps with a positive suction head. In case of negative suction head, whenever the pump starts on, check that it self-primes in 10s max., after that it must be stopped to avoid to damage mechanical parts and overheat bushings and mechanical seal.
This advice must be also adopted during the tests for checking the direction of rotation of the pump.
An equipment for detecting outlet flow, joined to an alarm signal and a stop device of the pump, is recommended.

Before starting on, be sure that both upstream and downstream stop cocks are open and filter is not stopped up. We recommend you to witness every start up.

ATTENTION

At every start, check the mechanical seal, that must not have any loss, check the right operation of thermal sensors and of alarm and stop devices. Verify that in no case the rotation speed exceed 1750 rpm (that is the rotation speed of a 4 poles motor at 60 Hz).

ATTENTION

At every start, check the packing ring, if any. We remind you that during normal operation a little leakage must occur (few drops for minute). Tighten the screws of the stuffing box, if necessary, and/or replace the packing rings.

Even when the check of the temperature is not mandatory, every half an hour during the commissioning and, then, every hour during normal operation, record both the surface temperatures near the bushings and the mechanical seal and the electric absorption of the motor. Shut off the pump as soon as a sudden change happens on the outline of the curve of the recorded values. Check also that the ambient temperature and the fluid temperature remain in the range indicated at pag. **65**.

ATTENTION

In case double mechanical seals (in tandem or in back to back arrangement) are installed, it is a Customer's charge to provide for their flushing with a fluid compatible with the pumped liquid.
In back to back arrangement, flushing must be done at a higher pressure level than the process fluid, while in tandem arrangement the outer mechanical seal must be flushed by a pressureless fluid (or with a pressure level lower than the process fluid).

Maintenance

ATTENTION

A correct and frequent maintenance is the basis for a right operation of the pump.
Maintenance must be done, whenever possible, in unclassified zones, or with no-sparking equipments and tools (see UNI EN 11271 – Annex 2).
Apart from carefully following the instructions supplied by the Manufacturers of the electric motor, of the speed reducer or hydraulic speed variator, the following operations of routine maintenance must be carried out:

- daily (or at every start up) check there are not losses of liquid from the static seals of the pump and of the valve;
- daily (or at every start up) check the tightness of the mechanical seal or of the stuffing box;
- monthly check the wear rate of the radial ball bearing;
- every 2 months check the wear rate on the packing rings;
- every 3 months check the wear rate of the supporting bushes and the gap between the gears and the body;
- every 4 months replace the packing rings;
- every 6 months check the wear rate of the flexible joint;
- every 6 months check the wear rate of the gears;
- every 24 months change the radial ball bearing;
- every 24 months change the supporting bushes;
- every 24 months change all the gaskets.

ATTENTION

Routine maintenance must be supported by extra maintenance to be done every time one detects there is something wrong with the pump (e.g. vibrations, overheating, too large clearances, loss of efficiency,…).

EC - Declaration of Conformity

Manufacturer Details

Tradename
Bedu Pompen BV

Address
Poort van Midden Gelderland Rood 10, 6666 LT, Heteren, Netherlands

Product Details

Product Name
Gear pumps

Model (+series) Name
B, MG series

Applicable Standards Details

Directives	Standards
2006/42/EC (Machinery Directive)	EN-ISO 12100:2010
2014/35/EU (Low Voltage Directive)	EN-IEC 60204-1:2006
2014/30/EU (Electromagnetic compatibility)	EN 809+A1/C1

Additional information

No further details.

Declaration

We hereby declare under our sole responsibility that the product(s) mentioned above to which this declaration relates complies with the above mentioned standards and Directives.

Name Director(s): Marco van Damme

Issued Date: **01**/**10**/2024

Signature of representative(s)

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