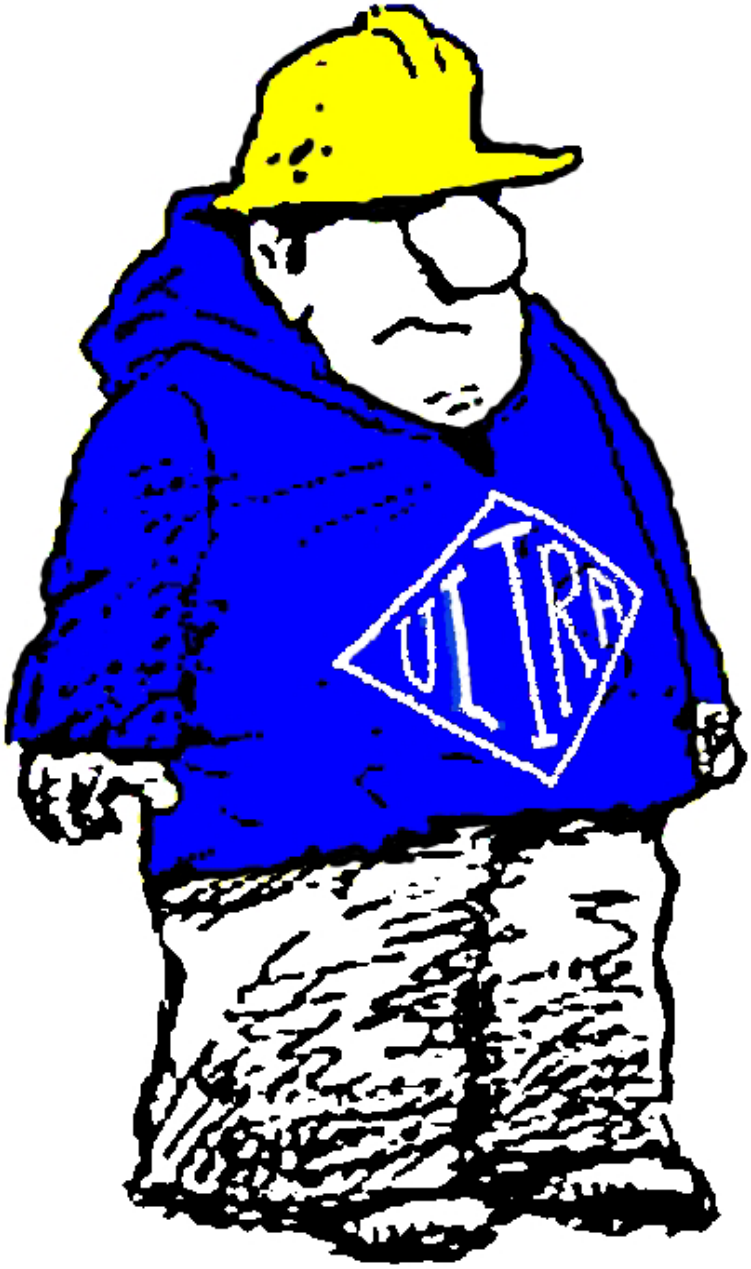
ULTRA POMPE S.r.l.

MANUALE USO & MANUTENZIONE



OPERATING & MAINTENANCE MANUAL

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INTRODUCTION

0.0 GENERAL

You have purchased an external gear pump. This is a rotary volumetric pump. It operates with tight clearances. The parts are made from the best material and precision-machined, as the parts of a watch. We have done our utmost to get this pump to you in perfect condition. Now it is up to you! You will have to assemble the pump and take care of its maintenance for its whole lifetime.

THE ULTRAPOMPE S.r.l. WILL NOT BE HELD RESPONSIBLE FOR ANY CONSEQUENCE DUE TO THE IMPROPER USE OF THE MACHINE

The operating and maintenance manual has been prepared to provide the user with general knowledge about the pumps and to provide transport, start-up, operating, and maintenance instructions, as simple as possible.

DO NOT ALLOW ANYONE TO USE THE PUMP WITHOUT FIRST HAVING CAREFULLY READ AND UNDERSTOOD ALL THE INSTRUCTIONS INDICATED IN THIS OPERATING AND MAINTENANCE MANUAL

Remember that our offices are always at your disposal for any explanations you may require.

0.1 RULES FOR MANUAL

1) Read every page of this manual and don't hesitate to contact us if something don't seem clearly described!

2) This operating and maintenance manual must be considered an integral part of the system and must remain with it for its entire service life.

3) Before carrying out the use, maintenance and repair operations, carefully read this operating and maintenance manual. It contains all the information that are necessary and essential for the correct use and operation of the system in order to avoid accidents.

4) The pumps are always used in combination with other assemblies such as couplings, transmissions and drive motors. The operating and maintenance instructions and the notes on safe operation for these components must also be observed.

INTRODUCTION

0.2 RULES FOR PUMP

1) Welding is very handy, but please do not weld the pump as this would deform the housing and cause the pump to jam. If you weld the piping, close the openings of the pump. Even the teeth of a gear pump can get work, for example due to the scale that forms during welding.

2) Pipes expand as a result of the effects of pressure and temperature. This generates forces. Note and observe this in mind when fixing the pump in place or assembling the piping.

3) Dirt in the liquid being pumped and idle operation will often damage the bearings and the gaskets of the pump. It is necessary to clean the tanks and piping thoroughly before starting, and to make sure that the pump has been purged with product before starting it up.

4) Even people who design systems can make mistakes sometimes. Measure the pressure upstream and downstream of the pump and compare the measured values with the specifications. If in doubt, please ask!

5) The control and maintenance intervals indicated in the operating and maintenance manual are always considered to be minimum time periods that are necessary to guarantee the efficiency, safety and duration of the system under normal operating conditions. Supervision must be constant and prompt action must be taken when problems arise.

6) At some point will be necessary to disassemble the pump in order to check and overhaul it. Follow the operating and maintenance instructions. You have to use a soft face hammer (nylon or similar) while disassembling it. The pump would not stand violent blows.

7) Remember to order spare parts in good time. Preferably, you should purchase spare parts at the time of purchasing the pump itself.

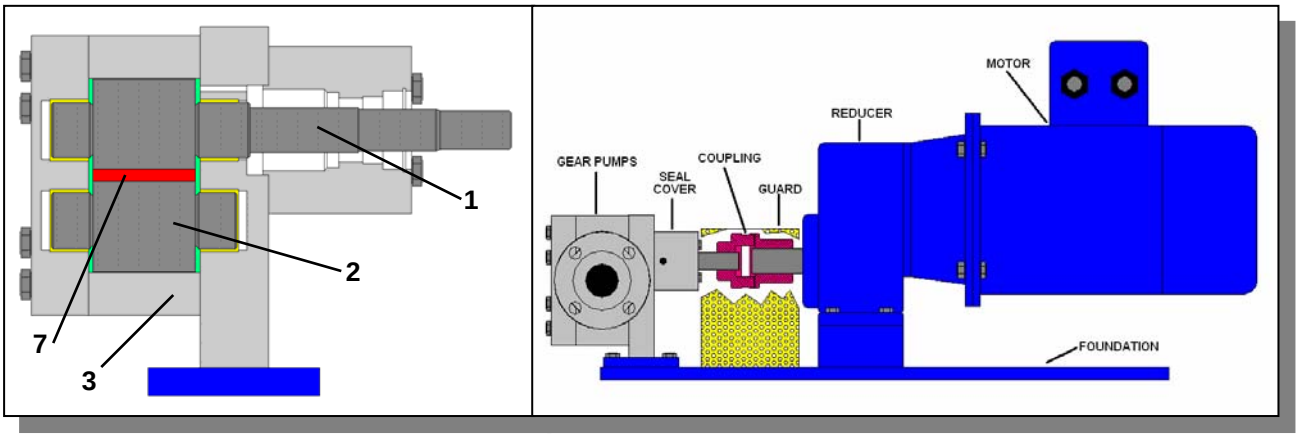
8) Any change (a modification is also understood as non-compliance with instructions, operations that do not conform to what is foreseen and the use of non-original spare parts) made to the system and its devices that may alter the functions designed by the manufacturer. This will be complete responsibility of those who make such changes.

9) Any modification, including even minor changes, must be communicated in writing and approved by the manufacturer, which will give its approval only if such a change does not constitute risks to the system Risk Analysis.

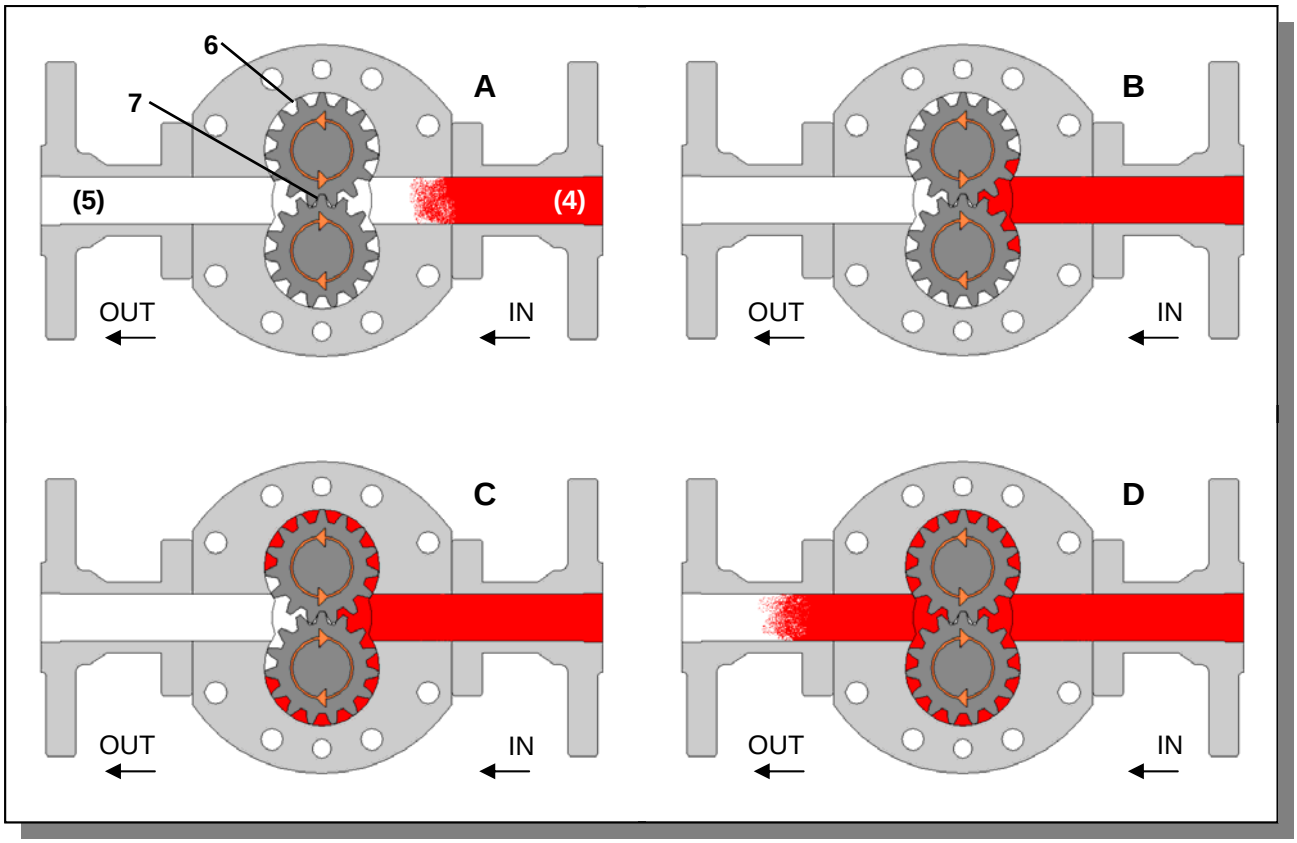
10) Any change that is made, without notifying the manufacturer, will be considered just cause to invalidate the conformity declaration, releasing the manufacturer from any type of responsibility and warranty.

GENERAL

1.0 GENERAL



Into a gear pumps the two **rotors**, that are respectively called **driving (1)** and **driven (2)** rotor, are seated in a **body (3)** that round them from all side. On the both sides of the mesh zone of the teeth there is a hole in the body of the pump. These holes are respectively called **suction (4)** and **discharge (5)**. Spinning the rotors the fluid is moved, through the **chambers between the teeth (6)** of the rotors and the body, from the suction side to the discharge side. A back-flow of the fluid is blocked by the contact of the teeth of the two rotors in the **meshing zone (7)**. The capacity of displace fluids is mostly determined by the operating clearances and the rotors speed. If the suction port has been closed and rotors keep on moving, a certain point of vacuum is generated in the suction side.



GENERAL

1.1 INSTRUCTIONS

The following instructions are only related to the pumps.

THESE INSTRUCTIONS CONTAIN INFORMATION ON INSTALLATION, OPERATION AND MAINTENANCE OF AN ULTRA PUMP. PLEASE READ THIS MANUAL THOROUGHLY BEFORE STARTING TO OPERATE THE PUMP AND FOLLOW THE INSTRUCTIONS.

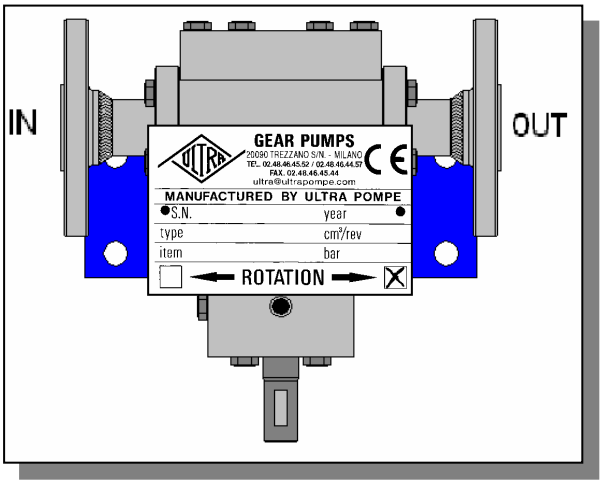
All personnel involved in operation, maintenance and repair of the pump or related equipment must read these instructions before starting work. To read these instructions once work has started is too late. This is especially valid for persons who are working on the pump only occasionally, for example maintenance or repair personnel.

Each pump has been subjected to thorough inspection and function checks before leaving the factory, so remember that correct functioning, long lifetime and high reliability of the pump depend mainly on:

- CORRECT INSTALLATION
- CORRECT USE
- PROPER MAINTENANCE

Inquires concerning after sales service, spare parts and repairs should be address to:

E-MAIL ULTRA@ULTRAPOMPE.IT



And accompanied with the following information:

- (S.N.)Serial number
- (Year) Assembly year
- (Type)ULTRA code
- (Cm³/rev) Capacity revolution
- (Item)Customer identification
- (Bar)Max operating pressure

This information can be found on the nameplate. In the picture is showed as example a CW obligatory rotating sense.

Gear pumps are able to pump CW and CCW, but IF THERE IS INDICATED A ROTATION SENSE (marked with a "X" sign), THIS SENSE IS OBLIGATORY

GENERAL

1.2 WARRANTY

The function of each ULTRA pump is thoroughly tested before the pump leaves the factory. ULTRA POMPE assumes liability for its product according to the effective terms of sales and delivery.
Faults caused by the non-observance of the before mentioned guidelines and notes can only be repaired at the cost of the customer.

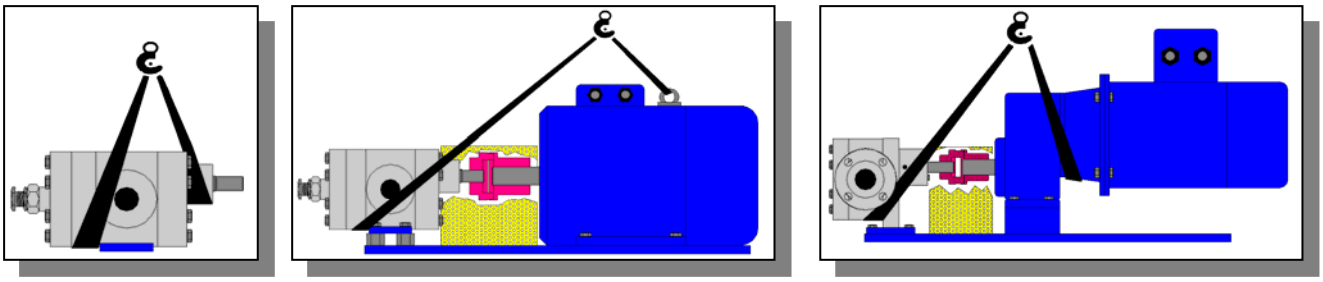
1.3 TRANSPORT & STORAGE

To avoid any problems you must:

- Check the delivered goods against the delivery note for completeness and correctness.
- Check the packaging material for any signs of transport damage.
- Take the pump carefully out of the packaging material.
- Examine the pump for any visible faults and signs of damage.

**BEFORE LIFTING THE PUMP CONSIDER THE INDICATED WEIGHT.
USE ONLY LIFTING TACKLE OF SUFFICIENT LIFTING CAPACITY.
DON'T STEP UNDER LOADS BEING LIFTED.**

Attach the lifting tackle in such a way, that the pump (or pump with drive unit) can be lifted safely.
Bare shaft pumps: **The lifting rope must be looped around the pump body and the seal cover.**
Pumps with drive: **The lifting rope must be looped around the pump body and the lift-ring of the motor.**



TO AVOID SLIPPING OF THE LOOP, THE ROPE MUST BE CROSSED OVER ON THE HOOK.

If the pump is not going to be installed immediately, it must be packed again and stored in a suitable place, which is non-humid and/or non-corrosive.

SAFETY

2.0 GENERAL

The installation of the pump must be in accordance with applicable national safety regulations. Please observe all relevant accident prevention regulations and installation requirements.

The following precaution measures must be applied before starting maintenance work:

- If the product to be pumped is a hazardous or noxious substance, the system should be neutralised and ventilated
- Disconnect driver from the main supply
- Depressurise the pump
- Disconnect the pump from the main drive

Severe damage to health and property can be caused by:

- No permitted removal of covering material
- Not intended use of the pump
- Insufficient maintenance

The pump shall never be operated after removing any part. When cleaning the pump manually make sure that all necessary safety measures are applied.

The non-observance of relevant safety measures can cause injuries. All covering parts must be correctly installed before restarting the pump.

2.1 SAFETY RESPONSIBILITY

Every infraction, misunderstanding, lack of understanding or wrong understanding of these safety instructions, is responsibility only of the customer, because ULTRA refuse every responsibility.

2.2 SYMBOLS AND SAFETY GUIDELINES

DANGER NOTE: The non-observance could immediately lead to severe injuries or to the loss of life. Insecure handling could cause injuries or extensive damage to property.

DANGEROUS ELECTRIC POWER NOTE: Touching parts, which are connected to the electric power supply, can cause immediate loss life.

SAFE OPERATION OF EQUIPMENT: The non-observance of this note will impair the operational reliability and can cause severe damage to the pump.

SAFETY

2.3 BASIC SAFETY INFORMATION

Alterations and conversions to the pump ARE prohibited.
This includes minor changes, which modify the safe operation of the pump or of the safety measures.

ALL MACHINES, INCLUDING PUMPS, IF NOT PROPERLY INSTALLED, INCORRECTLY OPERATED OR INSUFFICIENTLY SERVICED, ARE POTENTIAL DANGER SOURCES.

Repairs and maintenance works must only be carried out by qualified and authorised personnel. The result of this work must be approved by a qualified and responsible specialist.

KEEP UNAUTHORISED PERSONS AWAY FROM THE PUMP. THE CUSTOMER (OR A PERSON AUTHORISED BY THE CUSTOMER) IS RESPONSIBLE FOR THE APPLICATION OF ALL NECESSARY SAFETY MEASURES ARE APPLIED.

To avoid any injuries to persons and damages to pumps only permitted and suitable tools must be used for maintenance or repair works.

Before starting maintenance or repair work, the equipment must be switched off and secured against unintentional or unauthorised starting. Rotating or moving parts must be stopped before starting maintenance work. It must be insured that these parts will not start to move during maintenance work.

IN ANY CASE DO NOT TOUCH ROTATING PARTS AND KEEP A SAFE DISTANCE TO PREVENT CLOTHES OR HAIR FROM BEING CAUGHT.

DON'T TRY TO INSERT OBJECTS THROUGH THE OPENINGS ON THE PUMP OR ON ATTACHED EQUIPMENT, AS THIS WILL CAUSE BLOCKAGE, EXPLOSION OR SHORT CIRCUITS AND ELECTRIC SHOCKS WITH DANGER TO LIFE.

Always wear protective clothing, suitable for the job. If the face could come in contact with heavy chemical, metal splinters or dust during work, wear a full-face protection with protective goggles. In case of skin contact, inhalation of dangerous vapours or if the eyes come in contact with dangerous fluids consult a doctor immediately.

Always wear safety boots if there is a risk that heavy objects may turn over, slip off or fall down causing a hazard for feet.

Depending on operating conditions the pump may develop very high temperatures, so before touching the pump stop it and let it cool down. **ALWAYS ASSUME THE EQUIPMENT IS HOT**

SAFETY

2.4 ADDITIONAL INFORMATION FOR WORK ON ELECTRICAL EQUIPMENT

Electronics ancillaries materials (as electric motor) during operation can have electrically conductive parts. So always check that the system has been disconnected from the mains supply before starting to work on electric components and electric equipment.

Burned fuses must never be repaired or bridged. They must be replaced by fuses of the same type. The function of cooling facilities, such as ventilation slots, must never be interrupted.

All removed electrics materials have to been stored for a longer period of time into operation. Always check the insulation before taking electrical components which have been stored for a longer period of time.

IF ELECTRICAL COMPONENTS ARE WET, THE PARTS THAT NORMALLY ARE NOT CONDUCTIVE MAY BE UNDER VOLTAGE.

When working on high voltage assembly groups, connect the mains supply cable to earth grid, after switching the electric power supply off, and discharge components such as capacitors by means of a discharging combination.

Motor overloads are normally set for maximum pump flow and pressure conditions. Where variable speed drives are used, at lower flows and pressures, the degree of protection offered by the motor overload may be reduced.

2.5 ADDITIONAL INFORMATION FOR WORK ON PRESSURIZED LINES

Always relieve the pressure before starting to work on pressure lines and:

- Close the shut-off valves
- Bleed the lines

ALWAYS BE CAREFUL WHEN CHECKING PRESSURISED LINES FOR LEAKS. FLUIDS ESCAPING UNDER PRESSURE CAN PENETRATE CLOTHES AND SKIN.

Before starting to work on hydraulic or pneumatic equipment, this must always be to take the pressure.
In case of certain liquids, such as corrosive fluids, observe their special safety instructions relating to their increased toxicity.

SAFETY

2.6 ADDITIONAL INFORMATION FOR LUBRICATION

When working on assembly groups and components (as motors, transmissions), all specific regulations and lubrication instructions for these parts must also be observed.

KEEP OPEN FIRE OR GLOWING PARTS AWAY FROM LUBRICANTS AND OILS

Always ensure strict cleanliness during initial filling or refilling of the lubricant, to prevent contamination with solid particles. Avoid overflowing and spillage of oil. Wipe off excessive grease.
In case of certain lubricants, such as low viscosity hydraulic fluid, observe their special safety instructions relating to their increased inflammability.

2.7 NOISE

The noise level in a room with several pumps may be very high. Depending on the sound pressure level, the following measures should be applied:

- Below 70 dB (A): No special measures required
- Above 70 dB (A): Persons who have to be permanently in the room must wear ear defenders.
- Above 85 dB (A): Room with dangerous noise level! Each door must have a warning sign, which warns people from entering the room without ear defenders.

Measured sound pressure level ≤85dB(A) depends on the point of operation, according to ISO 3746.

2.8 SYMBOLS FOR SAFETY

For your safety, pay attention also at these symbols!

ATTENTION! DANGER!

OBLIGATORY!

PROHIBITED!

INSTALLATION

3.0 GENERAL

THE INSTALLATION MUST BE CARRIED OUT ONLY BY TRAINED AND SPECIALIZED PERSONNEL, and the safety instructions (see chapter 2) must be diligently observed.

ULTRA gear pumps must only be used to pump non-abrasive liquids, free of solid substance. Abrasive fluids are those with a content of solids (sands, slag, metal particles etc.), which will cause premature wear of pump components.

DON'T INTEND THE PUMP TO THE PUMPING OF A FLUID DIFFERENT FROM THE INTENDED FLUID. DON'T CHANGE THE PUMPING CONDITION (viscosity, temperature, etc.)

Follow also these recommendations:

- If the fluid to be pumped contains dirt, crystals or other contaminants, a filter should be used. The dimension of the filter must ensure that the resistance at the pump inlet changes only slightly (cavitation). The filter must be permanently monitored and periodically cleaned.
- Fluids with a tendency to precipitation or to viscosity changes should always be stirred and warmed before pumping, to ensure complete dilution and to avoid the formation of aggressive particles. In case of viscosity changes, the pump speed must be checked and reduced with increasing viscosity. This results in a different pumping performance (capacity and/or pressure).
- If the pump is arranged below the level of the container or tank, the intake opening of the suction pipe should be at least 100 - 200 mm above the bottom of the container or tank to avoid that any solids are sucked into the pump.
- Since Ultra gear pumps are positive displacement pumps, considerations should be given to protection of the pump in the event of blockage in the system or accidental operation against a closed valve. Installation of pressure relief valves, bursting discs, pressure switches and flow monitoring systems is recommended.
- Non-return valves must be arranged as close to the pump as possible, to allow unrestricted flow to the pump. A pressure gauge should be installed to monitor the suction resistance. The installation of the suction line must ensure, that no gas can be trapped in the pipe system.
- The fluid capacity must be sufficient for the respective pump size and the rotational speed, to avoid development of vapour bubbles. If the fluid supply on the suction side cannot be kept at a constant level, or the fluid capacity is not in accordance with the displacement of the pump at a predetermined speed, an intermediate storage container should be provided for evaporation or vacuum distillation systems. Such container can be emptied periodically at normal pump speed.

INSTALLATION

3.1 INSTALLATION

Equipment installation:

1) Before connecting the pump to the pipe system, remove all protective caps and plugs from suction and pressure ports. Clean all connections with a cleansing agent.

OPEN THE PUMP TO CLEAN IT OR TO USE CLEANING AGENTS THAT DAMAGED THE PUMP IN ANY WAY (paint included) WILL CAUSE THE FALL DOWN OF THE WARRANTY!

2) Suction and pressure pipes must be screwed into the respective pump. The pump must be fastened with suitable screws and bolts.

IN CASE, INSTALL ADEGUATED PIPE EXPANSION JOINT AND ANTI-VIBRATIONS SUPPORT

3) Check the direction of rotation of the drive motor. The direction of rotation of the drive shaft dictates the suction and discharge direction of the pump.
4) Check that all connections and joints are tight and leak-free. Where possible check the system with a compatible non-hazardous liquid.
5) Check the lubrication of the driver unit. Check that all guards are installed and secure.

Pump control:

6) Before commissioning care should be taken that pump and drive unit are correctly aligned and fastened without distortion to avoid a premature wear.

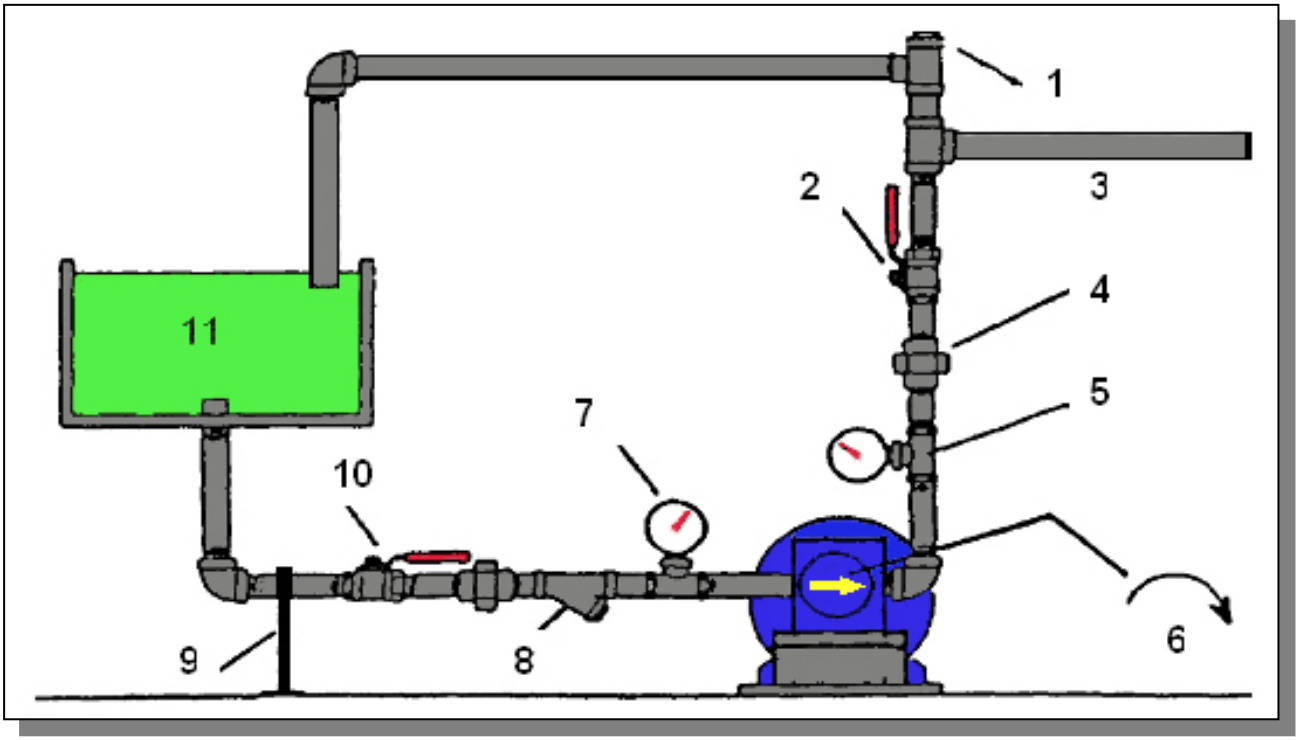
ALL THE INTERSTED PIPES MUST BE CORRECTLY ALIGNED, INDEPENDENTLY SUPPORTED AND THEIR WEIGHT MUST NOT REST ON THE PUMP.

7) Check that the pump rotation is correct (see section 1.1 for help), fill pump and pipes with a test fluid before connecting the electric power supply. The test fluid has the additional effect of flushing the pump and cleaning it from any residuals from the previous run test.
8) On new installations, it is good practice to flush through the suction pipe work and the tank prior to running the pump to clear the system of any debris that may have collected during assembly and installation.
9) If specified for the seal ensure that all flushing connections are correctly fitted, tight and leak-free. And that the recommended flushing fluid is at correct pressure and flow rate.

INSTALLATION

3.2 STANDARD INSTALLATION SCHEME

(1) Overflow valve (by-pass control) (2) Discharge isolation valve (3) Discharge line
(4) Fitting (5) Discharge pressure gauge(6) Drive shaft
(7) Suction pressure gauge (8) Filter (9) Pipe support
(10) Suction isolation valve (11) Tank



3.6 START UP

1) Open all valves in the system and make sure that there are no obstructions in the circuit before starting the pump. Gear pumps must never be operated against closed shut-off valves.

2) Start the pump for a moment and check the sense of rotation.

3) Start the pump and check that liquid is being pumped. ULTRA gear pumps are self-priming under most application conditions of service. If the suction operation is interrupted or if pumping vaporising liquids, the pump must be filled before starting to operate (the pump must never run dry). If pumping does not occur, refer to the “trouble shooting” chapter to find and eliminate the fault.

4) The overflow valve on the pressure side must be initially be adjusted to a lower pressure value when commissioning the pump. After commissioning the valve must be adjusted with the pump running, to a value approx. 20% higher than the maximum discharge pressure.

OPERATING & MAINTENANCE

4.0 GENERAL

THE MAINTENANCE SHOULD ONLY BE CARRIED OUT BY TRAINED AND SPECIALIZED PERSONNEL, and the safety instructions (see chapter 2) must be diligently observed.

Check all pipes and fittings regularly, eliminate faults immediately!

BEFORE OPENING THE PUMP, IT MUST BE THOROUGHLY FLUSHED WITH A NEUTRAL FLUSHING AGENT IF IT HAS BEEN USED WITH AGGRESSIVE, CAUSTIC OR TOXIC PRODUCT.

4.1 CLEANING

Mechanical cleaning procedures should preferably be applied instead of cleaning with chemical cleansing agents.

ALWAYS WEAR PROTECTIVE CLOTHES WHEN WORKING WITH SOLVENTS OR CLEANSING AGENTS.

Case, cooling tins, openings and covers of components do not only serve as protection, sometimes have additional functions such as cooling, insulation, noise reduction, splashing protection etc. The efficiency of this function can be reduced or impaired by presence of dirt.
Do not blow electrical components (as motors and switches) with compressed air in order to make them dry, because water particles may then enter unprotected areas, thereby impairing insulation and function of the equipment.

IF PARTS OF THE EQUIPMENT OR CERTAIN COMPONENTS COME IN CONTACT WITH WATER, THESE PARTS MAY BE ELECTRICALLY ENERGISED, EVEN THOUGH THEY ARE NOT CONDUCTIVE WHEN THEY ARE DRY.

Before touching wet or damp electric components, check first if the respective part is not electrically energised.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

Before disassembly the pump should be examined thoroughly to be able to determine all necessary repair measures.

OPERATING & MAINTENANCE

4.2 SERVICE PLAN AND RECORDS

In general, ULTRA gear pumps do not require preventive maintenance. However a regular inspection is recommend. Maintenance operations are distinguished in external maintenance (no pump disassembly required) and in internal maintenance (pump disassembly required).

TO DO NOT TO DO

EXTERNAL MAINTENANCE:

N°	OPERATION	FREQUENCY				
		1 DAY	*1 MONTH*	*3 MONTH*	*6 MONTH*	*2 YEARS*
A	OPERATIONAL PARAMETERS					
1	*Pressure suction side*					
2	*Pressure discharge side*					
3	*Temperature*					
B	PUMP CAPACITY					
1	*Throughput*					
C	RUNNING NOISE					
1	*Pump noises*					
2	*Drive and coupling noise*					
3	*Noises in pipe system*					
D	LEAKS INSPECTIONS					
1	*Leaks at pump and seal*					
2	*Leak at feed pipes*					
3	*Check of tightening torque of all screw*					

INTERNAL MAINTENANCE:

N°	OPERATION	FREQUENCY				
		1 DAY	*1 MONTH*	*3 MONTH*	*1 YEAR*	*2 YEARS*
E	REPLACEMENT					
1	*Internal inspection*					
2	*Replacement of seal system*					
3	*Replacement rotors*					
4	*Replacement bearing*					
5	*Replacement wear plate*					
6	*Replacement plane gasket*					

Note:
After reassembling of the pump in the group, during re-start-up check for:

- Capacity
- Noise
- Leaks

OPERATING & MAINTENANCE

4.3 TAKING OUT OF SERVICE

IF THE PUMP HAS TO BE TAKEN OUT OF SERVICE FOR MAINTENANCE OR REPAIR WORK, THIS MUST ONLY BE CARRIED OUT BY AUTHORISED AND TRAINED PERSONNEL, and the safety instructions (see chapter 2) must be diligently observed.

1 Switch the electric power supply off and secure it against unintended activation.
2 Close the isolation valves for suction and pressure lines.
3 Depressurise suction and pressure lines.

Fluids splashing under pressure can cause severe injuries. Care should be taken when releasing pressure fittings. Be extremely careful when handling hazardous fluids. In case of contact with such substances consult a doctor immediately.

4 Be careful when releasing fittings in the suction and pressure lines. The system may still be under pressure or tension.
5 Disconnect suction and pressure lines from the pump and remove the flushing line (if installed).
6 Remove the pump from coupling and the base plate or the lantern.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

- **DON'T HESITATE TO CONTACT US IN CASE OF HELP NEDDED!**

4.4 OPERATING & MAINTENANCE FOR SEAL

See chapter **5** for operating & maintenance for mechanical seal
See chapter **6** for operating & maintenance for packed gland seal maintenance
See chapter **7** for operating & maintenance for lip seal maintenance

4.5 OPERATING & MAINTENANCE FOR SAFETY VALVE

See chapter **8** for operating & maintenance for safety valve maintenance

MECHANICAL SEAL

5.0 MECHANICAL SEAL OPERATION

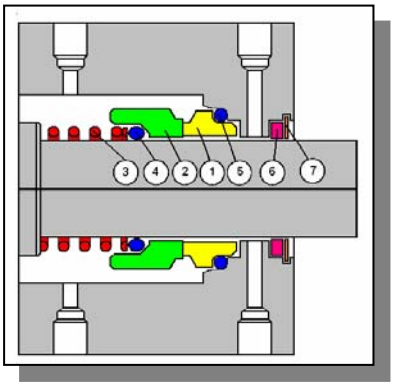
ULTRA gear pumps can be equipped with single mechanical seals or double mechanical seals. All mechanical seals on pumps consist of:

- Rotary face member, fixed to drive shaft
- Stationary face member, fixed to the seal cover.

Many people believe that there is no leakage with mechanical seal: this is practically impossible. On the contrary it's desirable a controlled leakage to have a long life seal. Frequently leakage is not visible since vaporization occurs or it escapes outside as mist, and this leads to erroneous interpretation about the correct seal operation. Among the factors having influence on a bigger or lower leakage the flatness of the seal faces plays an important role. Other factors are the face finishing, the machine vibration (due for example to misalignments, cavitation or forced piping), the corrected seal mounting, the peripheral speed, the fluid characteristics, planarity deviations due to thermal stress or high pressures, etc. Mechanical seals can leak initially more than foreseen. This is due to a phase of run-in during which the mating faces are "bedding-in" together. The leakage should decrease in a certain period leaving space to physiological leakage. Obviously this "bed-in" period is longer whit hard faces combination (i.e. tungsten carbides). In some application, not even small leakage are allowed, due to product contamination or to the toxicity of the leaking liquid. These problems can be surpassed using double seals or leakage traps which avoid the contact with the atmosphere or with the product being sealed, it's a important then, that all the information are transferred to seal selector, in order to avoid misunderstanding later.
The sealing system follows:**API 610**, **PLAN 13**, **DIN 24960** on **C**, **P**, **N** e **F** series.
API 610, **PLAN 13** on **D** series.
Flushing holes (**PLAN 54**) as option on **C**, **P**, **N**, **F** and **D** series

5.1 PUMPS WITH SINGLE MECHANICAL SEAL

As **standard** on **C series**, **P series**, **N series**, **F series** and **D series**, single mechanical seal and external lip seal is used. However please refer to operating instructions manual of a qualified mechanical seal manufacturer.

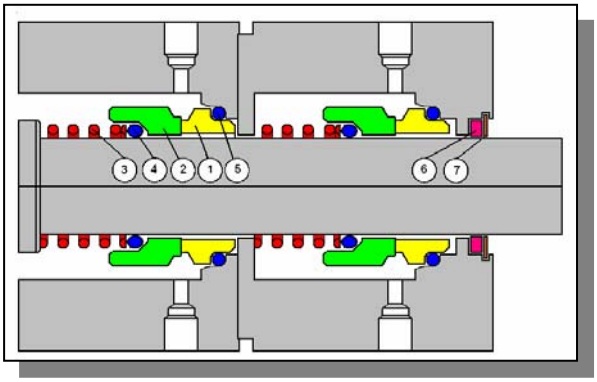


(1) Stationary face member
(2) Rotating face member
(3) Spring
(4) Rotary gasket
(5) Stationary gasket
(6) Lip seal
(7) Snap ring

MECHANICAL SEAL

5.2 PUMPS WITH DOUBLE MECHANICAL SEAL

Optional on **C series**.
However please refer to operating instructions manual of a qualified mechanical seal manufacturer.



(1) Stationary face member
(2) Rotating face member
(3) Spring
(4) Rotary gasket
(5) Stationary gasket
(6) Lip seal
(7) Snap ring

5.3 MAINTENANCE FOR PUMPS WITH MECHANICAL SEAL

For maintenance the pump should be disassembled in a clean, bright work place.
Rotary face and sealing seats must be thoroughly examined once they are disassembled. The driving shaft must be examined too and replaced if the surface shows signs of damage. The sealing seat must be checked for scratches, eccentric running patterns or other signs of damage. The inner diameter of the seal must be checked for damage caused by the shaft. The face of the rotary face member must be examined for damage and replaced if necessary.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

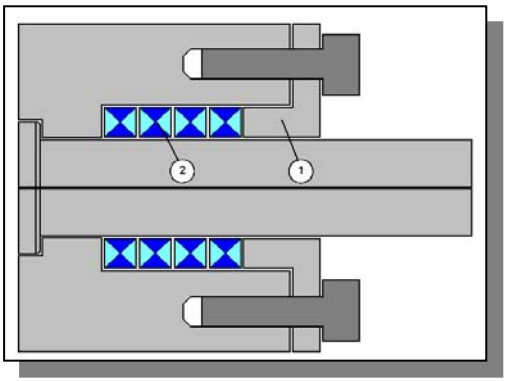
General maintenance instructions:

1 According to pump type, unscrew the mechanical seal cover bolts or turn the mechanical seal cover in counter clock wise rotation for take it off.
2 Remove the stationary face member and check for damage.
3 Remove the rotary face member and check for damage.
4 Clean housing and shaft thoroughly before assembling a new seal.
5 Lubricate the rotary face member surface with oil or spray it with Teflon-lubricant and slide it carefully over the shaft.
6 Lubricate the stationary face member surface with oil or spray it with Teflon-lubricant and slide it carefully into the cover.
7 Assemble and secure the mechanical seal cover on the front cover.

PACKED GLAND SEAL

6.0 PUMPS WITH PACKED GLANDS SEAL

Optional on **C series**, **P series**, **N series** and **D series**.
ULTRA gear pumps are delivered with loosely assembled packed glands. After the pump has been commissioned the packed gland cover must be tightened, until the leakage rate is only 5-6 drops per minute. However please refer to operating instructions manual of a qualified packed glands seal manufacturer.



(1) Packed gland cover
(2) Packed gland seal

6.1 MAINTENANCE FOR PUMPS WITH PACKED GLAND SEAL

For maintenance the pump should be disassembled in a clean, bright work place.
Once the packed gland cover is taken off by the front cover, make sure that the gland housing is clean and free of any foreign particles. The shaft must be free of damage and must not show any signs of wear.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

General maintenance instructions:

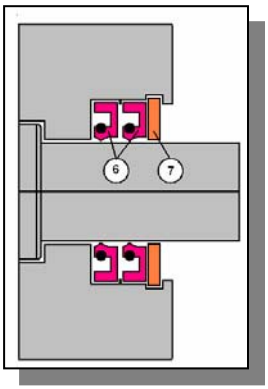
1 According to pump type, unscrew the packed gland cover bolts or turn the packed gland cover in counter clock wise rotation for take it off.
2 Remove the packing ring one by one.
3 Clean housing and shaft thoroughly before assembling a new seal.
4 Assemble new packing rings and fit the packed gland (check the number of rings). Packed gland must be mounted lubricating accurately the area between the shaft and the packing ring. This operation must be repeat for each ring slide on the shaft.
5 Tighten the packed gland cover by hand tight and start the pump. The leakage should be about 5-6 drops per minutes. Once the packed gland hand tight is correct, secure the packed gland cover.

EXCESSIVE PACKED GLAND COMPRESSION WILL CAUSE OVERHEATING OF PUMP SHAFT AND PACKED GLAND.

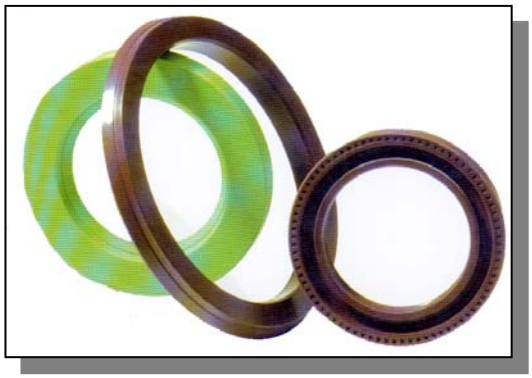
LIP SEAL

7.0 PUMPS WITH LIP SEAL

As **standard** on **L series**.
Standard version with two FPM lip seals.
However please refer to operating instructions manual of a qualified lip seal manufacturer.



(6) Lip seal
(7) Clip ring



7.1 MAINTENANCE FOR PUMPS WITH LIP SEAL

For maintenance the pump should be disassembled in a clean, bright work place.
Once the two lip seal are taken off by the front cover, make sure that the lip seal seat is clean and free of any foreign particles. The shaft must be free of damage and should not show any signs of wear.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

General maintenance instructions:

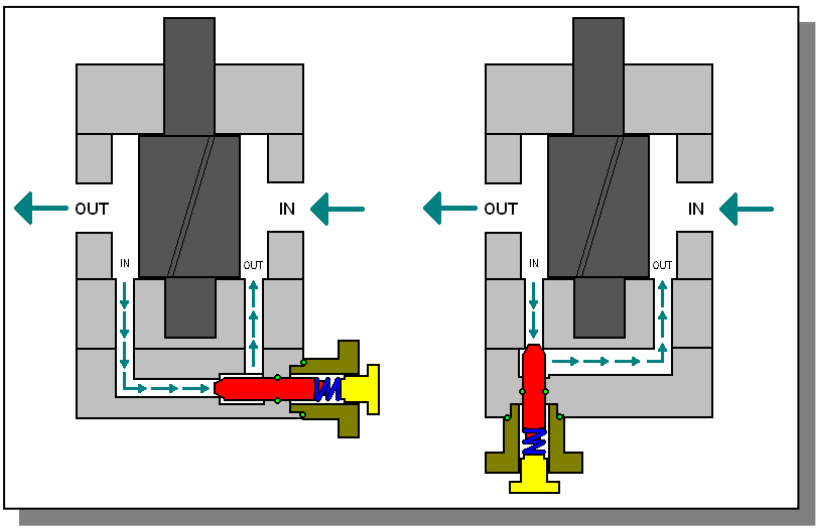
1 Disassembly the pump.
2 Remove the clip ring by the front cover.
3 Remove the two lip seal by the front cover, clean and insert the new seal.
4 Position the clip ring in the front cover.
5 Lubricate the lip seal seat and the shaft surface, then slide carefully the front cover over the shaft without radial movements.

RELIEF VALVE

8.0 PUMPS WITH RELIEF VALVE

The pump can be supplied with an internal recirculation relief valve (By-pass). The relief valve is designed to protect the pump from the damage that can be caused by overpressure.

THE RELIEF VALVE (BY-PASS) MUST NOT BE USED AS A FLOW/CAPACITY REGULATOR VALVE



The relief valve is composed of a plug, activated by a calibrated spring.
The plug is seated on a hole, on the pump outlet, oriented in the opposite sense of the fluid.
According to the setting point of the spring, overpressure moves the plug backwards, letting the product back to pump inlet.

OVERPRESSURE WILL OCCUR IF:

1. **Valve is closed against the pump discharge.**
2. **The product viscosity in the system is increased significantly.**
3. **The pump speed is increased.**

Valve pressure range:
Is dependent on actual application and selection of the required spring strength:
1-10, 10-20, 20-30, 30-40 or 40-50 ate.
Please advise serial number of pump when ordering spare parts.

Adjusting the relief valve:
Prior to despatch of the pump, the relief valve is tested on oil to the customer specified maximum working pressure.
If the maximum system pressure, pump speed or product viscosity are changed, the valve will require resetting and valve springs may have to be changed to suit the new duty. Contact our offices for any clarifications.

IF THE RELIEF VALVE WILL REQUIRE SETTING TO SUIT THE SISTEM CONDITION, ATTENTION! THE PUMP MUST NOT BE IN OPERATION AND PRESSURE.

RELIEF VALVE

8.1 MAINTENANCE FOR PUMPS WITH RELIEF VALVE

IF THE PUMP HAS TO BE TAKEN OUT OF SERVICE FOR MAINTENANCE OR REPAIR WORK, THIS MUST ONLY BE CARRIED OUT BY AUTHORISED AND TRAINED PERSONNEL, and the safety instructions (see chapter 2) must be diligently observed.

It should only be necessary to completely dismantle the valve if “O”-ring has to be inspected and replaced, or spring has to be replaced for a different pressure rating.

General dismantling instruction:

1 Loosen the **nut** (1) by counter clockwise rotation.
2 Loosen the **setting screw** (2) to decompress the **springs** (3) that compress the **plug** (5).
3 Remove the **bushing** (4)
4 Remove the **spring** (3) and the **plug** (5).
5 Inspect the **“bushing” o-ring** (6) and the **“plug” o-ring** (7), and replaced as necessary.

IF ANY SIGNS OF WEAR ARE NOTICED WHEN CHECKING THE PUMP, REPLACE THE RESPECTIVE PARTS. FOR THIS WORK THE PUMP MUST BE REMOVED FROM THE SYSTEM.

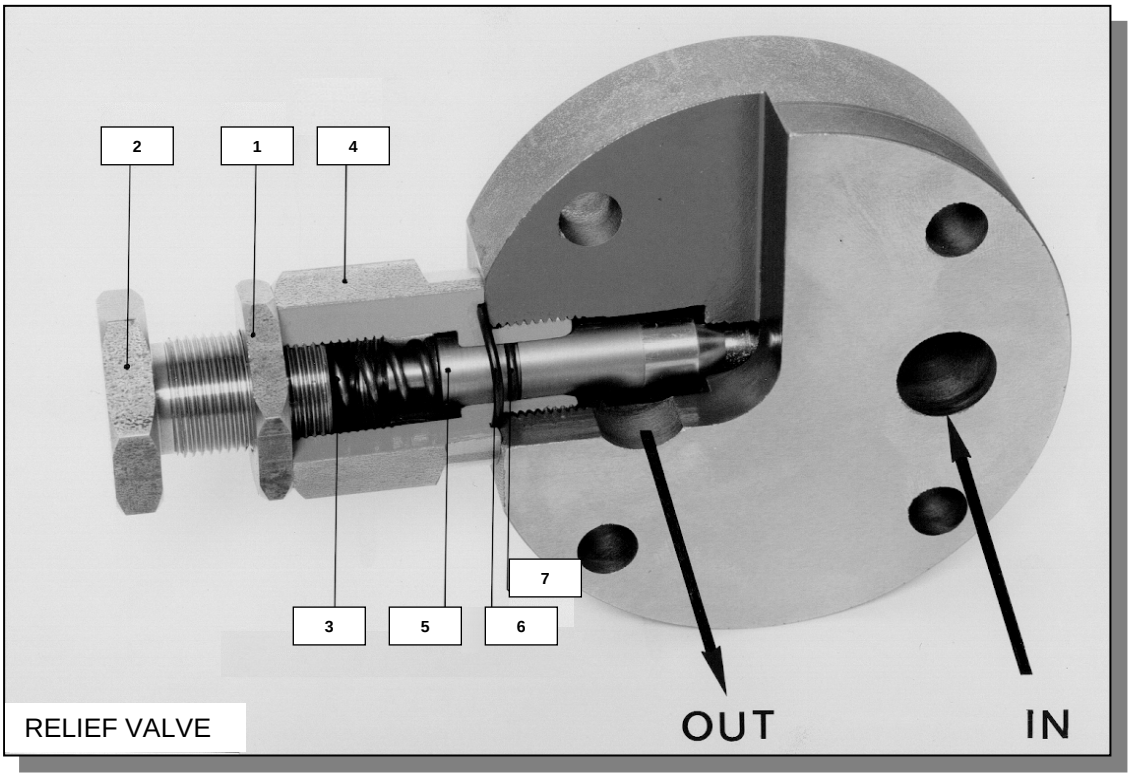
When ordering spare parts the complete pump identification number on the nameplate must be mentioned on the order form.

General assembly instruction:

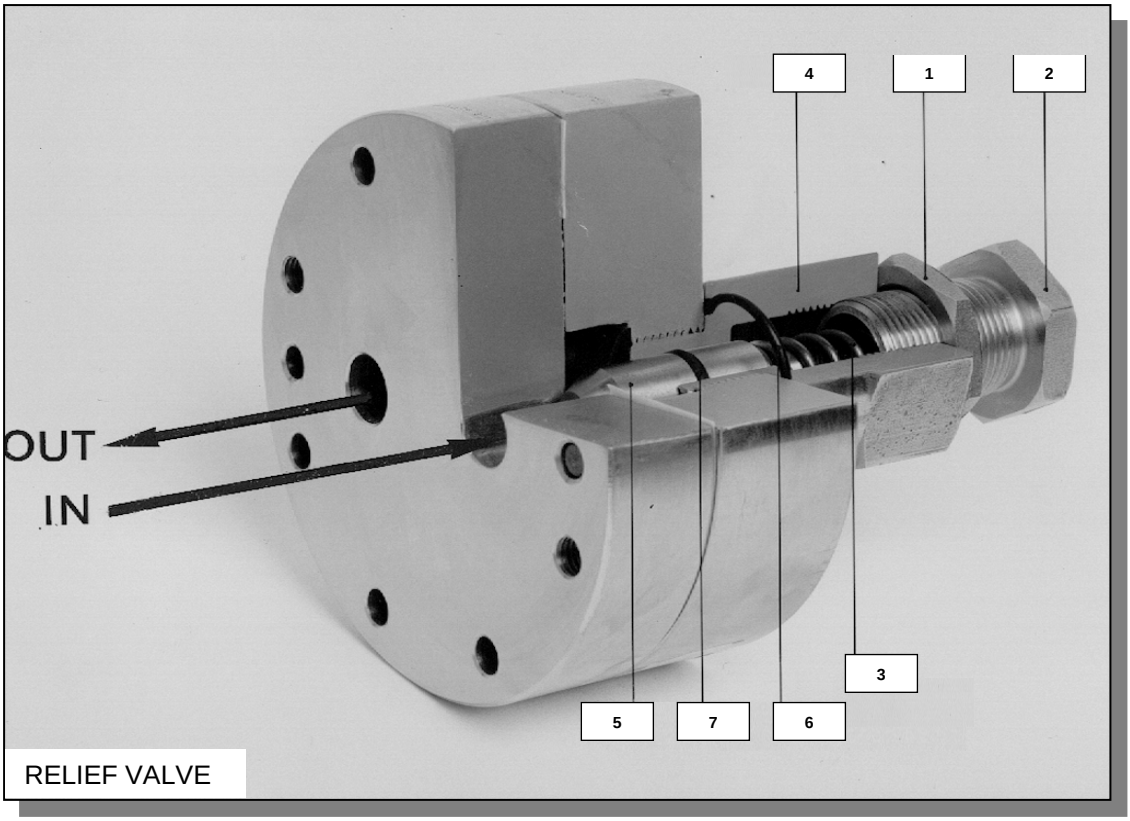
1. Position the **“plug” o-ring** (7) in the seat of the **plug** (5).
2. Position the **“bushing” o-ring** (6) in the seat of the **bushing** (4).
3. Insert the **plug** (5) into the **bushing** (4).
4. Spread a small quantity of lubricating grease on the thread and screw the **bushing** (4) onto the By-pass cover.
5. Fit the **spring** (3) onto the **plug** (5).
6. Screw the **nut** (1) on the **setting screw** (2).
7. Spread a small quantity of lubricating grease on the thread and screw the **setting screw** (2) on the **bushing** (4).
8. Adjust the load using **setting screw** (2) and secure the **nut** (1), keeping in mind that during the compression phase to each screw (thread 1,5mm) rotation will occur a pressure increment of about 1-1,5 ate.

RELIEF VALVE

8.2 RELIEF VALVE PICTURE



RELIEF VALVE



RELIEF VALVE

DIRECTIVE 94/9/EC (ATEX)

(page 1 of 2)

9.0 ADDENDUM ATEX

This document describes the specific criteria to be adopted for the installation, operation and maintenance of the above-mentioned pump types, when installed in zones classified as hazardous due to the presence of potentially explosive atmospheres.
These pumps are manufactured and certified in compliance with:

Directive 94/9/EC (ATEX) Group II – Category 3

This document is an integral part of the Instruction and Operation Manual. For pumps in potentially explosive atmospheres, operation and maintenance shall be performed in strict adherence to the Manual and to this Addendum ATEX.

1) The pumps, to which reference is made in this **"Addendum ATEX",** are ATEX certified:
   - For the conditions of service and the operating range specified in the Purchase Order
   - For the class of temperature shown on the nameplate and on the declaration of conformity. This temperature is compatible with the temperature of the pumped liquid and with the ignition temperature of the explosive atmosphere specified in the inquiry and on the order acknowledgement.

Operation of the pump outside the specified range, in terms of pressure and temperature, or with liquids different from those indicated in the purchase order is not permitted, unless the manufacturer is consulted and gives specific approval. In this case the manufacturer will provide a new declaration of conformity and a new nameplate.

2) The pump must be correctly earthed, using the earthling boss provided and marked on the pump pedestal, in order to avoid any ignition risk connected with electrostatic charges.

3) Components and accessories such as electric motor, coupling, mechanical seal etc. must be used in accordance to their instruction manuals.

4) When required and specified on the purchase order, a flushing line may be installed to flush the mechanical seal. It is the user's responsibility to ensure that the mechanical seal is constantly flushed with liquid, the user shall install on the line a visual flow indicator or, eventually, a flow switch.

Prior to pump start-up, open the valve on the flushing line and check the flow of the flushing liquid to the mechanical seal.

DIRECTIVE 94/9/EC (ATEX)

(page 2 of 2)

9.0 ADDENDUM ATEX

5) In case of soft packing, the user shall install on the flushing line a visual flow indicator or a flow switch, to ensure that the seal cavity is constantly flushed with liquid.

Prior to pump start-up, open the valve on the flushing line and check the flow of the flushing liquid to the seal area.

6) When required and specified on the purchase order, the pump may be fitted with a cooling or heating jacket, connected through an external line to a source of cooling/heating medium. It is the user's responsibility to install a flow indicator or a flow switch on the line to ensure that the cooling/heating jacket is constantly filled with liquid.

Prior to pump start-up, open the valve on the cooling/heating line and check the flow of the liquid to the cooling/heating jacket.

7) Pump bearings (if any) must be regularly inspected.

It is the user's responsibility to prepare a Service Plan specifying periodic inspections of the bearings and recording of the bearing temperatures.

8) Misalignment between pump shaft and motor shaft may determine overheating of the pump bearings.

Pump and motor shaft alignment shall be systematically checked and the readings recorded on the Service Plan.

9) Rotation of the pump must be checked at pump start-up.

During this operation pump running time shall be limited to 2 ÷ 3 seconds.

TROUBLE SHOOTING

10.0 ANOMALY-CAUSE-REMEDY

ANOMALY	CAUSE	REMEDY
Pump don't pump	• Pump not filled with product • Discharge and suction valves are closed • Wrong rotation sense • Suction line blocked • Suction line not air-tight • Motor incorrectly connected	• Fill the pump • Open valves • Reverse sense of rotation • Remove the blockage • Find leakage and seal properly • Check connection
Pump with irregular delivery capacity or with air bubbles (loud noise)	• Shaft seal or pipelines are not watertight. • Pressure in suction lower than vapour tension of the pumped liquid	• Check the seal and change if necessary. Make the pipe watertight. • Increase pressure in suction
Delivery capacity or pressure are too low	• Viscosity or speed are too low • Due to over load or dirt in bearings, the shaft and the teeth sides are used up	• Increase viscosity or speed • According to the wear change the bearings or the gears or both of them. Filter better in suction
Loud noise in starting with high differential pressure (cavitation)	• The pump don't fill itself completely	• Increase pressure in suction. Check the filter
Delivery capacity humbles itself in case of emptiness in suction	• In suction head too low or hydraulic resistance too high (the pump doesn't fill itself properly)	• Increase the head in suction. If necessary reduce speed. Increase pipe section in suction
Pump with emptiness in suction lets air in	• Free batch outflow in discharge line (without opposite pressure) without slope of pipe	• The outflow pipe has to be put in slope or insert a siphon. Sometimes it is sufficient to a low opposite pressure with a valve in the batch pipe.
Pump has blocked	• Due to overload or thermal shock the gears are seized	• Let it cool and try to turn its shaft. If necessary dismantle the damage pieces. In case increase radial and floats clearance
The seal doesn't hold anymore	• Seal spoiled by wire product	• Clean carefully parts of the seal. Replace damaged pieces

Statistically speaking, about 85% of all cases of failures of gear pumps are caused by the presence of dirt and particles in the product being pumped.
Only 15 % are due to other causes, such as incorrect installation, water hammer, over temperature, thermal shock or overloading.
Priority must be given not to repairing or replacing the pump but to analyzing the cause of failure and remedying the problem that occurred.

WARRANTY & ASSISTANCE

(page 1 of 2)

11.0 GENERAL

- ULTRA POMPE SRL undertakes to supply systems in accordance with the agreements reached and with no defects that might prejudice use of these systems as intended. The company will accept no liability for defects due to normal deterioration of those parts that are subject to normal wear and tear. The seller cannot be held liable for damages caused by improper use, negligence or incorrect use by the purchaser who is liable to all effects and purposes.
- The system is covered by a warranty for a period of 12 (twelve) months from the start-up of the system and in any case not longer than 18 months from the date of delivery indicated on the document of sale. Any parts replaced during the warranty period are warranted until the end of the warranty period of the system.
- After ascertaining the defect, the seller may, at his own expense, arrange for the following :
  A)Replacement of the faulty component
  B)Repair by third parties.
- Delivery of the replacement parts will be made free seller's factory. If the intervention of a technician is required, the relevant out-of-pocket expenses incurred will be debited (travelling, technical services, etc.) in accordance with the ANIMA statistic.
- Subject to the liability of the seller, indemnification of any damage may not exceed the amounts referred to under point A) above.
- However, the Client will be obliged to send a written report within 10 (ten) days from the fault's discovery and permit any reasonable control, if required, from the seller's part, furtherly, the Client is asked to send the defective piece/s directly, free of charge, to ULTRA POMPE, who, after inspection, may replace or repair the faulty parts at their own charge.
- After test start-up, the Client must send ULTRA POMPE by return mail or fax the following declaration, duly completed and signed; in doing so, the warranty procedure start will take place and go on until its contractual expiration (see after-sales service and warranty)

11.1 RESIDUAL RISK

Thanks to the type of construction and operating functions, the system cannot cause or generate any direct fire danger. In any case, the following general instructions are provided to deal with and handle fires:

- Water should not be used to extinguish fires, because it might react with the materials it comes in contact with, thus significantly increasing the temperature or emission of Inflammable and/or harmful gases.
- If a fire breaks out, use CO2 extinguishers to put out the hot spots, and it is recommended to install such devices close to the machine operating area.
- The minimum characteristics and specifications of the fire-fighting equipment must be evaluated in relation to the environment in which the machine is used and to the operator risk factors.
- The characteristics and specifications of the fire-fighting equipment, as indicated in this operating and maintenance manual, are minimum and not binding, and do not exempt the buyer (in the country where the machine is used) from any obligations regarding any current standards and/or laws concerning fire prevention and protection.

11.2 DISPOSAL

If the system is to be dismantled, the owner must comply with some basic rules aimed at protecting health and the environment:

- Electric cables, sheathes, plastic parts must be disposed of separately from all the other materials.
- The casing and all the structural metal parts must be separated by type of material and demolished.

SIGNATURE:_____

WARRANTY & ASSISTANCE

(page 2 of 2)

11.3 "WARRANTY & ASSISTANCE" DECLARATION

READ, SIGN AND SEND TO ULTRA!

GEAR PUMPS	ULTRA POMPE S.R.L Via C.GOLDONI n°37 – 20090 TREZZANO S/N – MILAN – ITALY e-mail: ULTRA@ULTRAPOMPE.IT - http//: WWW.ULTRAPOMPE.IT P.IVA - VAT N. IT 00210510152 C.C.I.A.A. REG.DITTE 539358 ISCR.TRIB.MILANO N. MI 146-239495 T:**39-(0)2-48-46-45-52 F:**39-(0)2-48-46-45-44

S.N.		**year**	
type		**Cm^3/rev**	
item		**bar**	
I undersigned		Work level in factory	
On behalf of		Dated	

See chapter **1.1** for find all necessary information

DECLARE THAT:

- I have taken charge of the instruction and maintenance manual of the a.m. machining
- I have thoroughly taken notice of the content of the a.m. manual.
- I have learn the safety rules concerning the a.m. machinery in order to make use of it protecting my own and other's safety
- I accept the conditions indicated on chapter 11.0 (that must be signed and send to Ultra with this page)

SIGNATURE:_____

Moreover, in no event shall ULTRA POMPE liability exceed the cost of the ULTRA POMPE product purchased by purchaser.

- **NON ACCEPTANCE IN WRITING OF THE "WARRANTY & ASSISTANCE" DECLARATION WON'T RELIEVE THE CLIENT/USER OF THE MENTIONED RESPONSABILITIES**

- **DISCLAIMER: The information, specifications and technical data contained in manuals and schedules are subject to change without notice. The user should verify all technical data and specifications (according to bought pump type) prior use. ULTRA POMPE does not warrant that the material and information contained are current or correct and assumes not responsibility for use or misuse of any such material and information by the user.**