

Instruction Manual

Gear pumps and pump units

Version : 2.0
Edit : 2011
Font : Calibri (10, 15, 20, 40)

TABLE OF CONTENTS

1 GENERAL

- 1.1 Introduction
- 1.2 Rules for manual
- 1.3 Rules for pump
- 1.4 Warranty
- 1.5 Addendum ATEX
- 1.6 Exception

2 SAFETY

- 2.1 General
- 2.2 Basic safety information
- 2.3 Additional information for work on electrical equipment
- 2.4 Additional information for lubrication
- 2.5 Noise

3 INSTALLATION

- 3.1 Gear pumps
- 3.2 Product information
- 3.3 Transport & storage
- 3.4 Recommendations
- 3.5 Standard installation scheme
- 3.6 Pump installation
- 3.7 Drive motor and coupling installation
- 3.8 Start up
- 3.9 Shut down

4 MAINTENANCE

- 4.1 Service plan and records
- 4.2 Anomaly-cause-remedy
- 4.3 Cleaning
- 4.4 Taking out of service
- 4.5 Mechanical seal maintenance
- 4.6 Lip seal maintenance
- 4.7 Relief valve maintenance
- 4.8 Heating system maintenance

5 WARRANTY

- 5.1 General
- 5.2 Residual risk
- 5.3 Disposal
- 5.4 "Warranty & Assistance" declaration

Chapetr 1 – General

1.1 INTRODUCTION

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

1.2 RULES FOR MANUAL

1. Read every page of this manual and don't hesitate to contact us if something doesn'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 unit. The operating and maintenance instructions and the notes on safe operation for these components must also be observed.

1.3 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 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. 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.

1.4 WARRANTY

The function of each pump is thoroughly tested before the pump leaves the factory. Faults caused by the non-observance of the before mentioned guidelines and notes can only be repaired at the cost of the customer.

1.5 ADDENDUM ATEX (only if used)

FOLLOW ANY OTHER INFORMATION CONTAINED IN THE "ATEX INFORMATION PAGE" STICKED ON INSTRUCTION MANUALS OF ANY ATEX PUMPS. CONTACT OUR OFFICE FOR MORE INFORMATION!

This document describes the specific criteria to be adopted for the installation, operation and maintenance of the above-mentioned pump types, when installed in presence of potentially explosive atmospheres. These pumps are manufactured and certified in compliance with directive 94/9/EC (ATEX) II 2G c T4 and are ATEX certified for the conditions of service and the operating range specified in the purchase order and/or in the order confirmation.

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.

The pump must be correctly earthed, using the earthing boss provided and marked on the pump, in order to avoid any ignition risk connected with electrostatic charges. Components and accessories such as electric motor, coupling, mechanical seal etc. must be used in accordance to their instruction manuals.

When required and specified on the purchase order and documentations, a flushing line may be installed to flush the seal and/or the pump may be fitted with a cooling or heating jacket, connected through an external line to a source of cooling or heating medium. It is the user's responsibility to ensure that the system 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 SEAL AND/OR ON THE COOLING/HEATING JACKET.

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.

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.

ROTATION OF THE PUMP MUST BE CHECKED AT PUMP START-UP. DURING THIS OPERATION PUMP RUNNING TIME SHALL BE LIMITED TO 2 ÷ 3 SECONDS.

1.6 EXCEPTION

Is impossible to create an instruction manual that include all possible configuration of a pump. Usually our products are built using particular solution, sealing systems or configurations that are not included in this manual. Sometimes manuals or suitable information are not given to maintenance personnel.

ALWAYS CONTACT OUR OFFICE TO CHECK IF THIS MANUAL IS SUITABLE FOR YOUR PUMP'S MAINTENANCE. JUST IN CASE WE WILL PROVIDE SPECIFIC INFORMATION OR MANUALS.

Chapetr 2 – Safety

2.1 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.

Severe damage to health and property can be caused by:

1. No permitted removal of covering material.
2. Not intended use of the pump.
3. Insufficient maintenance.

SAFETY DURING WORK TIME IS INTEREST AND RESPONSIBILITY OF THE CUSTOMER.

For your safety, pay attention to all safety symbols, especially:



CAUTION!

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 and cause pump crashes. This symbol indicates safety information which may result in risk to the machine and its function if the information is not observed.



DANGER OF ELECTRICITY!

Touching parts, which are connected to the electric power supply, can cause immediate loss life. Before any operation on electric components assumes that it can be energised even if main supply is shut down.

2.2 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.

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. 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. The function of cooling facilities, such as ventilation slots, must never be interrupted.

ALWAYS ASSUME THE EQUIPMENT IS HOT.

2.3 ADDITIONAL INFORMATION FOR WORK ON ELECTRICAL EQUIPMENT

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

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. CHECK INSULATION PROTECTION LEVEL OF EACH PART BEFORE USING THEM OUTDOOR.

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.

2.4 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.

2.5 NOISE

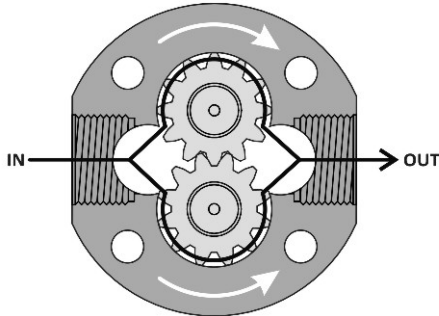
The noise level in a room with several pumps may be very high. Depending on the sound pressure level, the following measures should be applied:

1. Below 70 dB (A): No special measures required
2. Above 70 dB (A): Persons who have to be permanently in the room must wear ear defenders.
3. 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.

Chapetr 3 – Installation

3.1 GEAR PUMPS

THE INSTALLATION MUST BE CARRIED OUT ONLY BY TRAINED AND SPECIALIZED PERSONNEL, AND THE SAFETY INSTRUCTIONS (SEE CHAPTER 2) MUST BE DILIGENTLY OBSERVED.



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.)

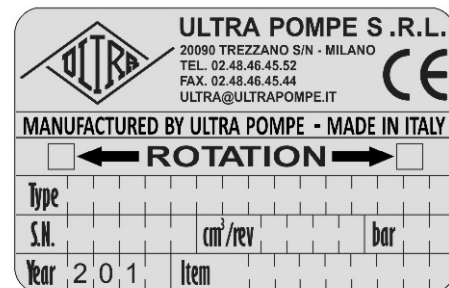
Into a gear pumps the two rotors, that are respectively called **driving** and **driven** rotor, are seated in a body that round them from all side. On the both sides of the mesh zone of the teeth there is a hole in the **body** of the pump. These holes are respectively called **suction** and **discharge**. Spinning the rotors the

fluid is moved, through the **chambers between the teeth** 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**. 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.

3.2 PRODUCT INFORMATION

The full type designation is specified in the technical data sheet or in the order confirmation. Inquiries concerning after sales service, spare parts and repairs should be sent complete of following information that can be found on the nameplate.

1. (Type) Pump code
2. (Year) Assembly year
3. (Cm³/rev) Capacity revolution
4. (Bar) Max operating pressure
5. (S.N.) Serial number
6. (ITEM) Item identification.



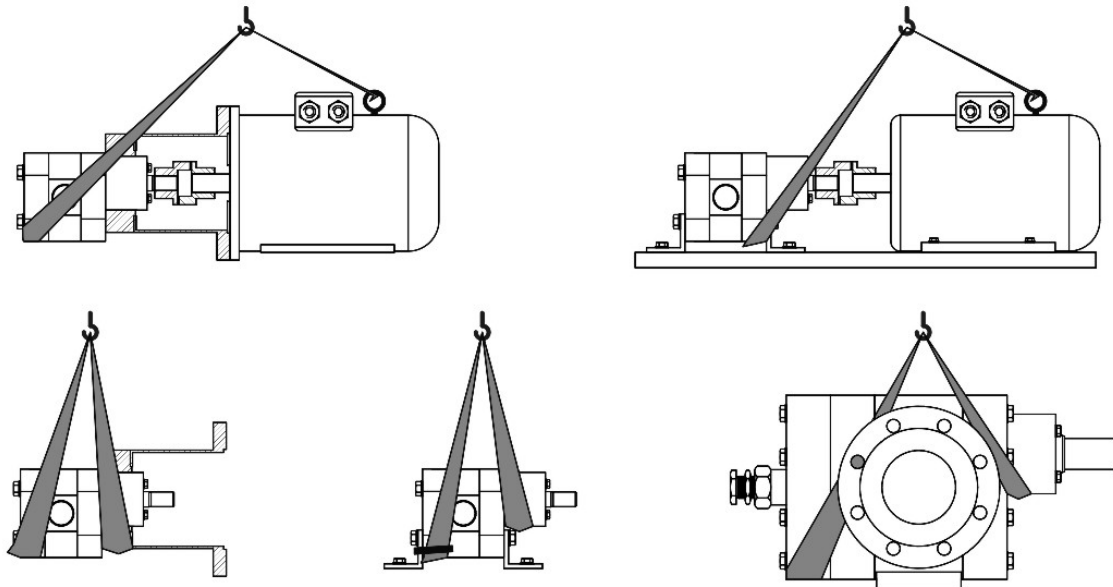
GEAR PUMPS ARE ABLE TO PUMP CW AND CCW, BUT IF ON NAMEPLATE THERE IS INDICATED A ROTATION SENSE (MARKED WITH A "X" SIGN), THIS SENSE IS OBLIGATORY. UNCORRECT ROTATION CAN CAUSE LEAKAGE OR THE UNCORRECTED OPERATION OF CERTAIN PARTS (AS SAFETY RELIEF VALVE).

3.1 TRANSPORT & STORAGE

1. Check the delivered goods against the delivery note for completeness and correctness.
2. Check the packaging material for any signs of transport damage.
3. Take the pump carefully out of the packaging material.
4. 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.

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

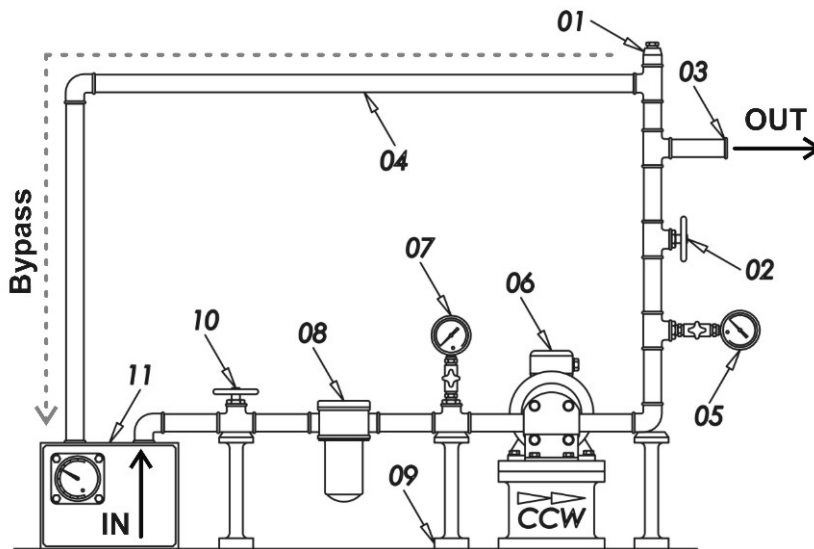
ATTACH THE LIFTING TACKLE IN SUCH A WAY, THAT THE PUMP (OR PUMP WITH DRIVE UNIT) CAN BE LIFTED SAFELY. TO AVOID SLIPPING OF THE LOOP, THE ROPE MUST BE CROSSED OVER ON THE HOOK.



3.4 RECOMMENDATIONS

1. 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) and must be permanently monitored and periodically cleaned.
2. 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).
3. 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.
4. Since 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.
5. 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.
6. 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.

3.5 STANDARD INSTALLATION SCHEME



1. Overflow valve (by-pass control)
2. Discharge isolation valve
3. Discharge line
4. Back-flow line
5. Discharge pressure gauge
6. Pump unit
7. Suction pressure gauge
8. Filter
9. Pipe support
10. Suction isolation valve
11. Tank

3.6 PUMP 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.

ALL THE INTERSTED PIPES MUST BE CORRECTLY ALIGNED, INDEPENDENTLY SUPPORTED AND THEIR WEIGHT MUST NOT REST ON THE PUMP. ALL PIPE LINE MUST BE ABSOLUTELY TIGHT! IN CASE, INSTALL ADEGUATED PIPE EXPANSION JOINT AND ANTI-VIBRATIONS SUPPORT.

3. Check that all connections and joints are tight and leak-free. Where possible check the system with a compatible non-hazardous liquid.
4. Check that the pump rotation is correct (see chapter 3.1 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.
5. 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.

3.7 DRIVE MOTOR AND COUPLING INSTALLATION

1. 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.
2. Check the lubrication of the driver unit. Check that all guards are installed and secured.
3. Make sure that the distance dimension between the two hubs is kept to ensure that the spider can be moved axially. Disregarding this hint may cause damage on the coupling. Both coupling halves must be the same distance from each other at all points on the circumference. Checks periodically the wear of spider, if necessary replace it.
4. Before commissioning care should be taken that pump and drive unit are correctly aligned and fastened without distortion to avoid a premature wear.
5. The pump may be operated only with a coupling guard installed. If this coupling guard is not supplied, the operator must provide such a guard.

3.8 START UP

1. Check the mobility of the internal components of the pump when placing back into operation in case of media which could set, by spinning the drive shaft manually.
2. 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.
3. Start the pump for a moment and check that sense of rotation is corrected.

ON NO ACCOUNT MAY A COLD PUMP BE STARTED UP WITH A TOO HOT MEDIUM. THE TEMPERATURE OF THE PUMP MUST BE INCREASED SLOWLY IN ORDER TO AVOID SEIZING OF THE PUMP AS RESULT OF THERMAL SHOCK.

4. Start the pump and check that liquid is being pumped. 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.
5. 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.

3.9 SHUT DOWN

1. Close the shut-off element in the supply line if the pump has been out of operation for a long period. Close off additional connections.
2. The shaft seal must be supplied with sealing fluid even when at standstill on pumps in which the pumped fluid is supplied under vacuum.
3. Media which set should be drained off. The pump can be used at most only briefly and at low purging pressure in order to clean the pipe system.

Chapetr 4 – Maintenance

4.1 SERVICE PLAN AND RECORDS

THE MAINTENANCE SHOULD ONLY BE CARRIED OUT BY TRAINED AND SPECIALIZED PERSONNEL, AND THE SAFETY INSTRUCTIONS (SEE CHAPTER 2) MUST BE DILIGENTLY OBSERVED.

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.

In general, ULTRA gear pumps do not require preventive maintenance. However a regular inspection is recommended.

Maintenance operations are distinguished in external maintenance (no pump disassembly required) and in internal maintenance (pump disassembly required).

EXTERNAL MAINTENANCE:

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

INTERNAL MAINTENANCE:

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

4.2 ANOMALY-CAUSE-REMEDY

ANOMALY	CAUSE	REMEDY
<ul style="list-style-type: none"> Pump doesn't pump. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Fill the pump. Open valves. Reverse sense of rotation. Remove the blockage. Find leakage and seal properly. Check connection.
<ul style="list-style-type: none"> Pump with irregular delivery capacity or with air bubbles (loud noise). 	<ul style="list-style-type: none"> Shaft seal or pipelines are not watertight. Pressure in suction lower than vapor tension of the pumped liquid. 	<ul style="list-style-type: none"> Check the seal and change if necessary. Make the pipe watertight. Increase pressure in suction.
<ul style="list-style-type: none"> Delivery capacity or pressure is too low. 	<ul style="list-style-type: none"> Viscosity or speed are too low Due to over load or dirt in bearings, the shaft and the teeth sides are used up. 	<ul style="list-style-type: none"> Increase viscosity or speed. According to the wear change the bearings or the gears or both of them. Filter better in suction.
<ul style="list-style-type: none"> Loud noise in starting with high differential pressure (cavitation). 	<ul style="list-style-type: none"> The pump doesn't fill itself completely. 	<ul style="list-style-type: none"> Increase pressure in suction. Check the filter.
<ul style="list-style-type: none"> Delivery capacity humbles itself in case of emptiness in suction. 	<ul style="list-style-type: none"> In suction head too low or hydraulic resistance too high (the pump doesn't fill itself properly). 	<ul style="list-style-type: none"> Increase the head in suction. If necessary reduce speed. Increase pipe section in suction.
<ul style="list-style-type: none"> Pump with emptiness in suction lets air in. 	<ul style="list-style-type: none"> Free batch outflow in discharge line (without opposite pressure) without slope of pipe. 	<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Pump has blocked. 	<ul style="list-style-type: none"> Due to overload or thermal shock the gears are seized. 	<ul style="list-style-type: none"> Let it cool and try to turn its shaft by hand. If necessary dismantle the damage pieces. In case increase radial and floats clearance.
<ul style="list-style-type: none"> The seal doesn't hold anymore. 	<ul style="list-style-type: none"> Seal spoiled by wire product. 	<ul style="list-style-type: none"> 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.

4.3 CLEANING

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.

BEFORE OPENING THE PUMP, THIS SHOULD BE CAREFULLY FLUSH WITH A CLEANING NEUTRAL AGENT IF IT HAS BEEN USED WITH AGGRESSIVE, CAUSTIC OR TOXIC PRODUCT.

High purging pressures and long operating times should be avoided in the case of purging or cleaning fluids with poor lubrication properties owing to the risk of jamming or seizing on the sliding surfaces of the pump.

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.

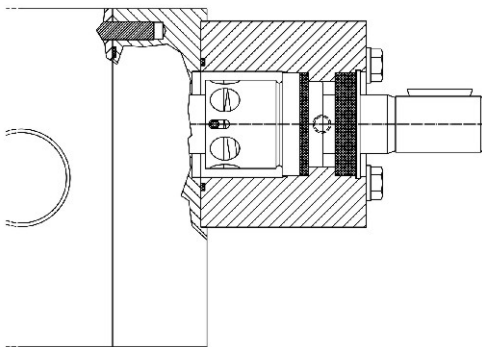
4.4 TAKING OUT OF SERVICE

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.

4. Disconnect suction and pressure lines from the pump and remove the flushing line (if installed).
5. Remove the pump from coupling and the base plate or the lantern.

4.5 MECHANICAL SEAL MAINTENANCE



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

1. Rotary face member, fixed to drive shaft
2. 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.

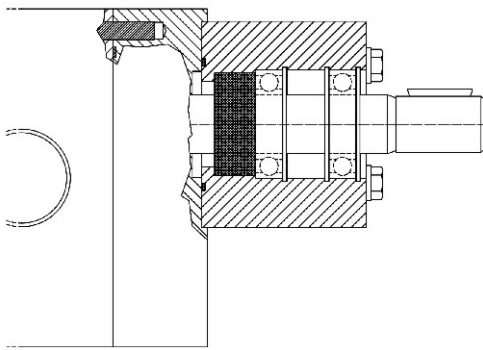
Among the factors having influence on a bigger or lower leakage the flatness of the seal faces plays an important role. Other factors are the face finishing and the machine vibration (due for example to misalignments or forced piping). Mechanical seals can leak initially more than foreseen. This is due to a phase of run-in during which the mating faces are "bedding-in" together.

In some application, not even small leakage is 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.

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 sealing seat must be clean and free of any foreign particles. The shaft should not show any signs of wear.

General maintenance instructions:

1. According to pump type, unscrew the seal cover bolts or turn the 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 Teflon-lubricant and slide it carefully over the shaft.
6. Lubricate the stationary face member surface with Teflon-lubricant and slide it carefully into the cover.
7. Assemble and secure the mechanical seal cover on the front cover.

4.6 LIP SEAL MAINTENANCE

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 should not show any signs of wear.

General maintenance instructions:

1. According to pump type, unscrew the seal cover bolts or turn the seal cover in counter clock wise rotation for take it off.
2. Remove the clip ring and the ball bearings (if installed).
3. Remove the lip seal (one or more) by the cover, clean and insert the new seal.
4. Position the clip and the ball bearings (if installed).
5. Lubricate the lip seal and the shaft surface, then assemble and

secure the mechanical seal cover on the front cover.

4.7 RELIEF VALVE MAINTENANCE

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.

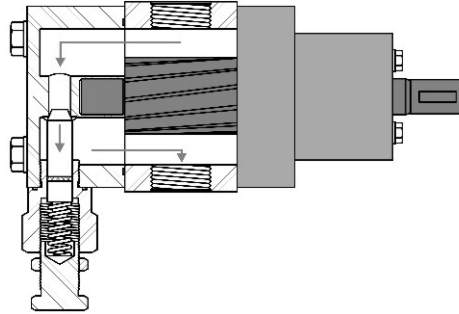
Adjusting the relief valve:

Adjust the load using setting screw and secure the nut, 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.

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

Valve pressure range:

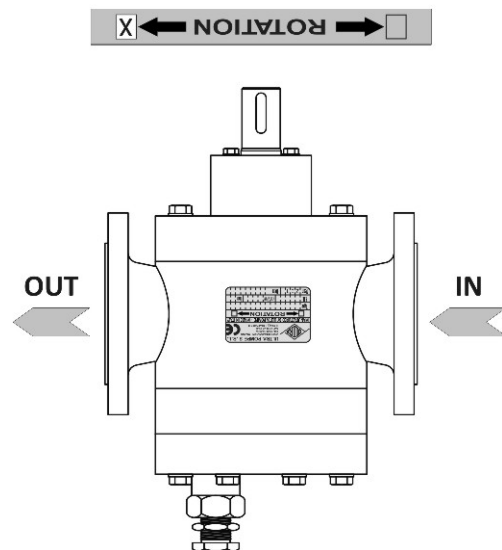
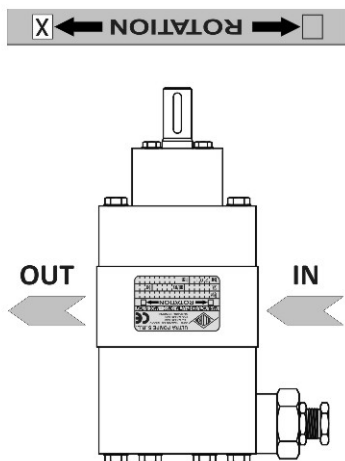
Is dependent on actual application and selection of the required spring strength: 1-10, 10-20, 20-30, 30-40 or 40-50 ate. If the maximum system pressure, pump speed or product viscosity are changed, the valve will require resetting and valve springs may have to be changed to suit the new duty. Contact our offices for any clarifications.

**General dismantling instruction:**

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

General assembly instruction:

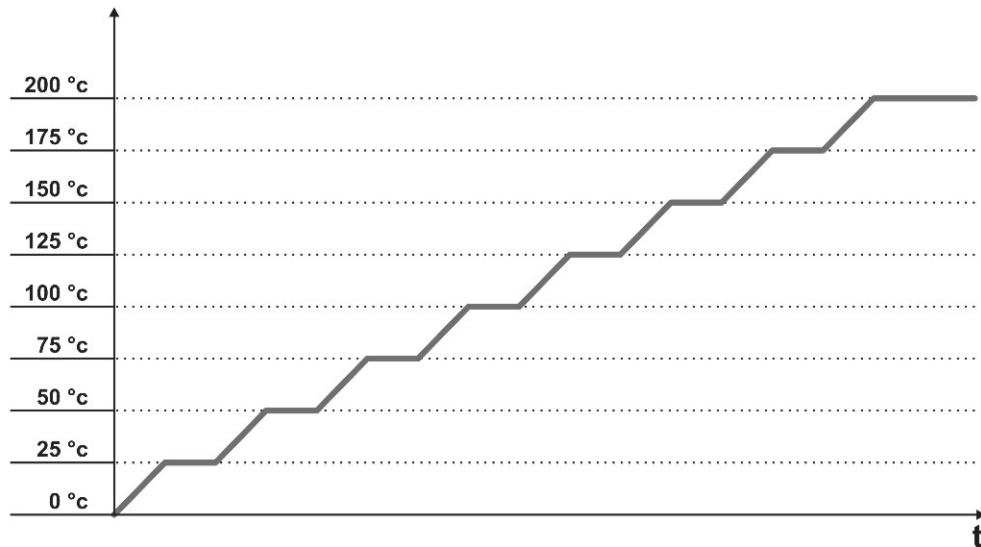
1. Position the "plug" o-ring in the seat of the plug.
2. Position the "bushing" o-ring in the seat of the bushing.
3. Insert the plug into the bushing.
4. Spread a small quantity of lubricating grease on the thread and screw the bushing onto the By-pass cover.
5. Fit the spring onto the plug.
6. Screw the nut on the setting screw.
7. Spread a small quantity of lubricating grease on the thread and screw the setting screw on the bushing.
8. Adjust the load using setting screw and secure the nut.



4.8 HEATING SYSTEM MAINTENANCE

Oil heating: Pumps have an internal grooving that creates a recirculation system which can be heated or cooled with a liquid or gaseous medium. This system doesn't need particular maintenance, just cleaning in case of dirt.

Electric heating: Pumps are heated with electrical heating cartridges. The temperature is controlled steplessly by means of a system regulator. If one electric components burn, replace it with new one.



ON NO ACCOUNT MAY ANY PART OF THE PUMP SHOULD EXCEED THE MAXIMUM TEMPERATURE LIMITS ALLOWED BY CONSTRUCTION MATERIALS OR STATED IN QUOTATION. CONTACT PUR OFFICE FOR MORE INFORMATION.

Chapetr 5 – Warranty & Assistance

5.1 GENERAL

1. 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.
2. 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.
3. 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.
4. 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.
5. Subject to the liability of the seller, indemnification of any damage may not exceed the amounts referred to under point A) above.
6. 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.
7. After test start-up, when client is sure that the system can operate, must be sent to vendor by return mail or fax the "Warranty & Assistance" Declaration (chapter 5.4), duly completed and signed; in doing so, the warranty procedure start will take place and go on until its contractual expiration.

5.2 RESIDUAL RISK

1. 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:
2. 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.
3. 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.
4. 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.
5. 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.

5.3 DISPOSAL

1. If the system is to be dismantled, the owner must comply with some basic rules aimed at protecting health and the environment.
2. Electric cables, sheathes, plastic parts must be disposed of separately from all the other materials.
3. The casing and all the structural metal parts must be separated by type of material and demolished.



5.4 “WARRANTY & ASSISTANCE” DECLARATION

READ, SIGN AND SEND TO ULTRA!

ULTRAPOMPE 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

Pumps description:

See chapter 3.1 for find all necessary information. Send a copy of inquiry attached.

Type : _____
 Year : _____
 Cm³/rev : _____
 Bar : _____
 S.N. : _____
 ITEM : _____

Customer identification:

I undersigned : _____
 Work level in factory : _____
 On behalf of : _____

Declare that:

1. I have taken charge of the instruction and maintenance manual of the a.m. machining and thoroughly taken notice of its content.
2. I have learn and read the safety rules concerning the a.m. machinery in order to make use of it protecting my own and other's safety
3. I accept the conditions indicated on chapter 5 by sign and end user factory's stamp.

NON ACCEPTANCE IN WRITING OF THE “WARRANTY & ASSISTANCE” DECLARATION WON'T RELIEVE THE CLIENT/USER FROM FULL AND TOTAL RESPONSABILITIES THAT OCCUR BY AN UNCORRECT USE OF THE PURCHASED PRODUCT.

Date : _____

Sign : _____

Stamp

