



Installation, Operation & Maintenance Manual



PULSA[®] Series 6270 HYDRAULIC DIAPHRAGM METERING PUMP

Bulletin: IOM-PUL-6270-1008-Rev.A

PULSAFEEDER FACTORY SERVICE POLICY

Should you experience a problem with your PULSA Series® 6270 pump, first consult the troubleshooting guide in this installation, operation and maintenance manual. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Distributor or email our Technical Services Department, proepo_service@idexcorp.com, for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective, which test good, will be sent back freight collect. No credit will be issued on any replacement electronic parts. Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

Pulsafeeder's Factory Service Policy is maintained online. Please source this document at this URL: www.pulsa.com/pulsa-docs/Pulsafeeder-EPO-Limited-Warranty-Statement.pdf

All Pulsafeeder PULSA Series 6270 manufactured products are guaranteed against defects in materials and workmanship under normal use for 12 months from the date of shipment from the factory. Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

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Conventions

The following Conventions are used in this document.



A WARNING DEFINES A CONDITION THAT COULD CAUSE DAMAGE TO BOTH THE EQUIPMENT AND THE PERSONNEL OPERATING IT. PAY CLOSE ATTENTION TO ANY WARNING.



NOTES ARE GENERAL INFORMATION MEANT TO MAKE OPERATING THE EQUIPMENT EASIER.

Revision History

Rev A Release Date July 2015, first revision

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1 INTRODUCTION

The pump covered by the following instructions is intended for operation in industrial areas and therefore cannot be treated as a product for retail (consumer).

This document therefore contains information to be used by qualified personnel only. They must also be integrated by laws and technical regulations in force and do not replace any plant regulation provisions or any additional requirements, either legislative or not, which have been issued for safety purposes.

1.1 RECEIVING INSPECTION

All material relative to supply is delivered to the shipper in perfect condition after thorough final testing and packaging (where applicable). Inspect goods immediately upon receipt and check that:

- the goods received correspond to the order made
- packaging (where applicable) has not undergone damage due to transport or has not been tampered with

If the packaging is damaged or tampered with, immediately check (quantity, quality and form):

- actual conditions of goods
- presence of all accessories or spare parts

ATTENTION: If anomalies or damage are found IMMEDIATELY ISSUE A COMPLAINT WITH THE COURIER and inform Pulsafeeder, Inc. as well. We suggest contacting Pulsafeeder, Inc. customer support before commissioning.

1.2 SUPPLY CONDITIONS

All PULSA Series 6270 series pumps are supplied as follows:

- ready to be installed as specified in the job order
- pre-tested in accordance with internal specifications
- pre-painted (where applicable)
- completed with lubricant oil and hydraulic oil (where applicable)

1.3 NOTES ON ELECTROMAGNETIC COMPATIBILITY

The PULSA 6270 pumps, if installed properly and **with direct power supply from the mains**, comply with emission limits set by regulations relating to electromagnetic compatibility (EMC - General requirements for industrial environments).

PUMPS FOR POWERING BY MEANS OF INVERTERS OR OTHER ELECTRONIC EQUIPMENT MUST BE ESPECIALLY ORDERED FOR SAID USE. ALL CHECKS AND ANY NECESSARY MEASURES TO COMPLY WITH EMISSION LIMITS SET BY REGULATIONS SHALL BE AT CHARGE AND RESPONSIBILITY OF THE END USER.

1.4 USE IN POTENTIALLY EXPLOSIVE AREAS

STANDARD operating Pulsa Series 6270 pumps are not suitable for use in potentially explosive areas!



WARNING: PULSA Series 6270 FOR HAZARDOUS AREAS MUST BE ESPECIALLY ORDERED FOR SAID USE! IN POTENTIALLY EXPLOSIVE ATMOSPHERES MUST BE USED ONLY ATEX EXECUTION PUMPS WITH A FLAMEPROOF MOTOR!

All pumps in ATEX execution differ from NON ATEX (or standard execution) pumps in that they are fitted with a second identification plate with specific indication of the data required by the directive.

2 GENERAL INFORMATION

The purpose of these instructions is to refer information deemed necessary for understanding as much as possible about and facilitating the installation, commissioning, use and maintenance of PULSA Series 6270 hydraulic diaphragm metering pumps, hereafter called, for short, 6270 pumps.

Although the 6270 pumps include different and widely different models (see "Identifying code" and "Technical data"), the technical information contained in this instructions manual are equally appropriate and applicable (except where expressly stated) for any pump containing "PULSA 6270" in its code.

Pulsafeeder, Inc. reserves the right to modify the characteristics of its products at any time to apply the latest technological innovations. The information contained in this document is therefore subject to change without notice.

2.1 PERSONNEL RESPONSIBLE FOR MACHINE OPERATION

Personnel, before operating the machine, must be trained, and have read and understood the instructions contained in this manual.

The employer must instruct all staff on the risks of accidents and on devices and clothing to be used for individual safety, on the risks arising from noise emission and on general provisions laid down by European Directives and legislation in the country of machine installation.

2.1.1 "Operator" personnel

The term "Operator" is intended as personnel that carry out the following tasks on the machine:

- Performs the functions needed for operation
- Uses the adjustment and operating commands
- Performs simple actions related to operation
- Performs any cleaning and daily inspection operations
- Reports defects or machine malfunctioning



WARNING: THE OPERATOR MUST WORK ON THE MACHINE WHILE PROTECTIVE GUARDS ARE MOUNTED AND SAFETY DEVICES ACTIVE

2.1.2 "Mechanical Maintenance" personnel

Intended as personnel that operates on the machine in all operating conditions and at all protection levels. Performs all types of repairs or mechanical adjustments but does not work on electrical installations.

2.1.3 "Electrical Maintenance" personnel

Intended as personnel that operates on the machine in all operating conditions and at all protection levels, performing all types of repairs or electrical installations adjustments, even in the presence of voltage.

2.2 TESTING AND GUARANTEE

2.2.1 Testing

Each PULSAFEEDER ENGINEERED PRODUCTS metering pump is a reliable quality product, subject to careful final inspection to ensure their proper functioning and found compliance with the specified performance. The final test results, if specifically requested by contract, are registered in special forms and made available to the Customer.

2.2.2 Guarantee

Metering pumps, as with all other PULSAFEEDER products, are guaranteed for a period of 12 months of operation but in any case no longer than 18 months from the date of delivery.

The guarantee covers the replacement, free of charge in Rochester, New York (USA), of any component found to be defective in material or processing by the Pulsafeeder, Inc. technical office.

The guarantee IS NOT VALID in the following cases:

- Components subject to normal wear (e.g. gaskets, seals, O-rings);
- If installation and/or use do not meet the technical conditions of sale and instructions;
- If the pump has been tampered with or disassembled;
- If the pump has been sold to third parties.



WARNING: ALWAYS AVOID DISASSEMBLY OR ATTEMPT REPAIRS OF PRODUCTS STILL UNDER GUARANTEE, AS DOING SO WILL VOID THE GUARANTEE. ALWAYS CONTACT PULSAFEEDER, INC. TECHNICAL SERVICE FOR INFORMATION.

In the case of a guarantee claim, the pump must be sent postage paid to the Pulsafeeder, Inc. factory in Rochester, New York (USA), accompanied by a description of the anomaly complained.

For safety reasons BEFORE shipping, the sender MUST ALWAYS contact Pulsafeeder technical service (Tel. +1 585-292-8000, proepo_service@idexcorp.com) and operate as indicated in point "Mandatory Instructions for returning goods to Pulsafeeder, Inc.". ALL pumps must be emptied and flushed clean.

2.3 INSTRUCTIONS FOR REQUESTING SPARE PARTS

Find and study the sectional drawing of the pump in use, if necessary contact Pulsafeeder, Inc to obtain a copy. Analyze the conditions and identify the damaged components. Using the nomenclature of the sectional drawing, make a list of the parts those components (mention the sectional drawing number and the component position code) and send to the the Pulsafeeder, Inc. Sales Office **always** specifying:

- Type of metering pump (complete model number)
- Metering pump serial number
- PULSAFEEDER ENGINEERED PRODUCTS job number (as an alternative to the serial number)



NOTE: THIS INFORMATION CAN BE FOUND ON METERING PUMP NAMEPLATE.

2.3.1 Spare parts

Standard components (screws, nuts, ball bearings, etc...) are also available directly from specialized dealers. **Replace any other components with original Pulsafeeder spare parts.**

2.3.2 Changes and manufacturing of spare parts without approval



NOTE: MODIFICATIONS ARE NOT ALLOWED. ORIGINAL PULSAFEEDER, INC. SPARES AND ACCESSORIES ARE TO BE USED IN ORDER TO ASSURE THE CONFORMITY WITH SAFETY RULES. PULSAFEEDER, INC. DECLINES ANY RESPONSIBILITY IN CASE OF USE OF NON-ORIGINAL PARTS AND WARRANTY WILL BE NO LONGER VALID.

2.4 LIABILITY EXCLUSION

Pulsafeeder, Inc. is unable to monitor the observance of the instructions given in this manual, nor verify the actual working conditions and installation of the equipment, the correct operation, the using and maintenance of the machines and accessories. An incorrect installation, or misuse of the machine, may cause serious damage and may pose a danger to persons or property. Any anomalies must be reported to the maintenance supervisor. The user is not authorized to tamper with the machine for any reason.



NOTE: ATTEMPTS TO DISASSEMBLE, MODIFY OR TAMPER IN GENERAL BY UNAUTHORIZED PERSONNEL WILL VOID THE GUARANTEE AND WILL RELEASE PULSAFEEDER, INC. FROM ANY LIABILITY FOR DAMAGE CAUSED TO PERSONS OR PROPERTY RESULTING FROM SUCH ACTIONS.

Pulsafeeder, Inc. is considered released from any liability in the following cases:

- Improper installation;
- Improper use of the machine by non-professional or inadequately trained operators;
- Use not in compliance with regulations in the Country of use;
- Lack of maintenance or improperly performed;
- Use of non-original spare parts or incorrect parts for the model in question;
- Total or partial failure to observe the instructions;
- Exceptional environmental events.

2.5 RESTRICTIONS REGARDING THIS DOCUMENT

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3 SAFETY WARNINGS



WARNING: METERING PUMPS ARE INDUSTRIAL MACHINERY, NOT INTENDED FOR USE BY NON-PROFESSIONAL OPERATORS. THESE INSTRUCTIONS ARE INTENDED FOR QUALIFIED PERSONNEL.

Study these instructions completely before installing and starting the pump. Failure to respect safety recommendations can damage the machine or compromise its operation.

For correct handling and maintenance, strictly follow all information within. It is critical that this IOM is read by the installer and the maintenance supervisor. This document should be stored near the machine in a safe, dry place, and in any case always made easily and readily available for future reference.

Keep always the instructions and warnings presents directly on the equipment in good and readable condition (replace if necessary):

- Equipment nameplate
- Arrow indicating the motor direction of rotation
- Warning and service information stickers

3.1 DANGER

Metering pumps are machines with dangerous parts. Therefore:

- Improper use or tampering,
- Removal of guards or disconnection of protective devices,
- Inadequate inspection or maintenance can cause serious damage to persons or property.

In particular, personnel must be informed of danger due to:

- Live parts
- Rotating or moving parts
- Handled fluid under pressure and/or corrosive
- Hot surfaces

The safety supervisory must ensure and guarantee that:

- The machine is handled, installed, commissioned, inspected, maintained and repaired by qualified personnel only, that must have:
 - Specific technical training and experience
 - Knowledge of technical regulations and applicable laws
 - Knowledge of general, national, local and plant safety requirements
 - Ability to recognize and avoid all possible danger.

Failure to follow these instructions, negligence or an incorrect or improper use of the machine by unauthorized and unqualified personnel may cause risk to persons or property, resulting in cancellation of the guarantee by Pulsafeeder, Inc..



WARNING: THE SAFETY OF THESE MACHINES CAN BE COMPROMISED IF THEY ARE USED IMPROPERLY OR TAMPERED WITH.

Metering pumps must be used only if they are in perfect technical condition, also considering safety aspects and danger. The smooth operation of these machines, their durability and operating efficiency depend on the observance of these details. We decline any responsibility for bodily injury or property damage caused by improper use of our equipment.

3.2 INDIVIDUAL PROTECTIVE EQUIPMENT

Any operation on the machine must be undertaken in compliance with safety regulations and safety warnings.

The safety supervisor must ensure compliance with applicable laws and safety regulations enacted for safety, and monitor that all personnel are equipped and always use appropriate individual protective equipment.



WARNING: APPROPRIATE INDIVIDUAL SAFETY DEVICES MUST ALWAYS BE USED TO ENSURE AND SAFEGUARD THE PERSONAL SAFETY OF PERSONNEL, WHO MUST ALSO BE PROPERLY TRAINED AND QUALIFIED.

3.3 ADDITIONAL NOTE FOR ATEX PUMPS

6270 pumps in ATEX version comply with the rules concerning equipment and protective systems for use in potentially explosive atmospheres in accordance with European Directive 94/9/CE dated 23/03/94, known as ATEX directives.

- They meet the requirements of Group II Category 2, making them suitable for use in Zone 1/21 (No danger as a result of predictable failure)
- Consequently they are suitable for use in Zone 2/22, resulting classified in Group II Category 3 (No danger during normal operation)



WARNING: THE PULSA 6270 PUMPS IN ATEX EXECUTION ARE NOT SUITABLE FOR USE IN ZONE 0/20!



NOTE: IN CASE OF PULSA 6270 PUMPS IN ATEX EXECUTION, IN ADDITION TO THESE INSTRUCTIONS MUST BE FOLLOWED ALSO THE WARNINGS CONTAINED IN "METERING PUMP SAFETY INSTRUCTIONS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES" (ADDENDUM TO THIS OPERATING MANUAL)

3.4 SUITABILITY VERIFICATION FOR EFFECTIVE APPLICATION/USE

All pumps are supplied in compliance with requirements established under technical/sales negotiation and defined at time of order.



NOTE: THE CUSTOMER (END USER AND/OR INSTALLER) IS RESPONSIBLE FOR CHECKING WHETHER OR NOT THE PUMP IS REALLY SUITABLE FOR THE APPLICATION/USE ON THE PLANT, THIS BEFORE THE INSTALLATION AND SUBSEQUENT MACHINE START-UP.

For ATEX pumps the customer/end user is responsible to determine the effectiveness of the pump to be used in a given plant, after having analyzed the characteristics of danger existing in the installation location and in compliance with current laws and those issued for safety purposes.

4 TRANSPORT, HANDLING AND STORAGE

4.1 TRANSPORT, LIFTING AND HANDLING

Unless otherwise agreed, the pumps are fixed and packaged in horizontal containers. Make sure that they cannot accidentally tip over during transport or handling and they are always placed on a flat surface.

Verify that the device used (traspallets, forklift, hoist, etc...) is appropriate for the size and weight of the package/equipment and that any lifting lugs on the machine are screwed down. In environments with temperatures below -20 °C, lifting rings must be used with caution because they could break in low temperatures, causing damage to persons or equipment.



WARNING: LIFTING RINGS ON THE PUMP ARE SIZED TO BEAR ONE-HEADED PUMP WEIGHT, THEREFORE DO NOT USE THEM TO LIFT MULTI-HEADED PUMPS. FOR THOSE OPERATIONS SLING BASE-PLATE AND USE LIFTING ROPES. BEFORE REMOVING ROPES FIX PUMPS SAFELY TO THE BASE. PAY ATTENTION, TILTING DANGER!

4.2 STORAGE CONDITIONS

If not used immediately, the pumps should be stored with suitable covers in a temperate, dry, clean, vibration-free and weatherproof environment. Protect from soil moisture by placing the unit on shelves or wooden pallets. If the temperature is below 0 °C, ensure that it does not go lower than -20 °C.

If not specifically highlighted on the package, do not stack packaging, to prevent damage to the machine and to avoid tipping over or falling that can create accidents. Ensure that access of unauthorized persons is not allowed in the storage location and that the floor or shelf can support the weight of the machinery or equipment stored.

Before being put pumps into operation, after being stored for a long period, bring them to a temperate environment in order to stabilize the temperature. In case of storage in extreme conditions, e.g. in sub-tropical or desert climates, take additional safety

measures. Particular storage conditions should be previously reported, in order to provide a suitable packaging.

4.3 DIMENSIONS AND WEIGHTS

Check the dimensions and overall gross weight of the package before handling or lifting. Unless otherwise agreed, the packaging bears such information.

5 DESCRIPTION

The PULSA 6270 version PULSA 6270 metering pumps are all with double diaphragm (sandwich) pump head with rupture detector on the head and fall into the family of controlled volume alternative displacement pumps.

The crank is driven by a constant speed electric motor (1,500 rpm) and the number of diaphragm cycles is determined by the endless screw – worm wheel internal reduction gear in an oil bath. The mechanically actuated replenishing hydraulic system ("intelligent" diaphragm) makes the diaphragm immune from accidents or mishandling in discharge or suction.

5.1 IDENTIFICATION NAMEPLATE

Each pump carries a nameplate for identification. Below is a representation of an example and its position:



Ensure that the machinery nameplate, the warning and service adhesives are always present and in good, legible conditions. Otherwise, provide to replace them.

Removal of the nameplate or alteration of data contained therein is NOT permitted for any reason.

5.2 IDENTIFICATION CODE

6270 pumps are identified by a unique serial number.

5.3 AMBIENT AND DESIGN TEMPERATURE

Unless differently agreed with the customer, the ambient design temperature range "Ta" of 6270 pumps can be:

-10°C Ta +40°C: Standard temperature range for all pump types

-10°C Ta +60°C: Standard temperature range for only some pump types

The table below illustrates the maximum allowed temperature of pumped fluid based on pump head material.

"STANDARD" PUMP HEAD CHARACTERISTICS					
	METALLIC pump head	PLASTIC pump head			
		PVC (P)	PVDF (S)	PTFE (T)	PP (PP)
Handled Fluid Max. Temperature	100°C (212°F)	40°C (104°F)	60°C (140°F)	30°C (86°F)	40°C (104°F)

Only on metallic pump heads can be used with heat jacketing. The table below illustrates the maximum allowed temperature of warming fluid.

THERMAL PUMP HEAD CHARACTERISTICS		
	HANDLED FLUID Max. Temperature	WARMING FLUID Max. Temperature
METALLIC material pumped	≤+100°C (212°F)	130°C (266°F)



NOTE: DURING PERIODIC INSPECTION ALWAYS CHECK THAT TEMPERATURES RESPECT LIMITS INDICATED!

The values contained in these tables are applicable equally for each of the allowable ambient temperatures "Ta".

5.4 WORKING PRINCIPLE

The 6270 pumps are all double hydraulic diaphragm type (sandwich) with diaphragm rupture detector. The "basic" detector is a pressure gauge placed directly on the head. During normal pump operation, it must indicate "zero (0) pressure", confirming that the diaphragms are intact.



NOTE: THE DETECTOR PRESSURE GAUGE DOES NOT INDICATE THE PUMP OPERATING PRESSURE!

6270 pumps consist of a pump head made of material (plastic or metallic) chemically compatible with the fluid to be handled and coupled to a mechanism body that incorporates the transmission reduction gear, the piston thrust system and the flow rate adjustment system.

The pump sectional drawing is usually attached to the present operating manual. In case it is not attached or missing, see the point "Hydraulic system oil filling" to consult pump head section drawing, visit www.pulsa.com, or at least contact PULSAFEEDER EPO customer service to receive an updated copy. They are normally powered by an electric motor through a reduction gear type "endless screw and worm wheel" joined to a reciprocating drive mechanism. The latter consists of a connecting rod system with variable eccentricity which determines the axial reciprocated movement of the piston; both the mechanisms are in oil bath.

When moving, the connecting rod generates both pump phases. During the discharge phase the connecting rod forces the piston to move forward, putting pressure on the oil chamber hydraulic circuit and determining the controlled deformation of the diaphragm, subsequently the fluid in the pump head moves to the discharge pipeline. During the suction phase the connecting rod pulls the piston back which, creating a vacuum on the oil chamber, deforms the diaphragm again and causes the entrance of fluid in the pump head.

The check valve on the pump head controls input and output of fluid from the pump head, determining flow direction.

A safety valve is installed on the oil chamber hydraulic circuit to safeguard the pump. If an excess of pressure exceeding its calibration is detected during operation, the valve opens, discharging a quantity of oil in the expansion tank equal to the displacement of the piston.

The flow rate adjustment system controls the volume of fluid pumped by varying the connecting rod eccentricity and, therefore, piston return stroke length. Standard adjustment is manual with graduated knob and linear vernier; alternatively (upon request), an automatic adjustment system can be applied (see "Flow rate adjustment system").

6270 pumps fall into the family of alternative volumetric pumps characterized by adjustable displacement.

The construction material of external components ensures high impact protection. With the exception of pump head, the external pump surfaces are treated to ensure high protection against corrosion. Metal parts are assembled to ensure correct and proper grounding.

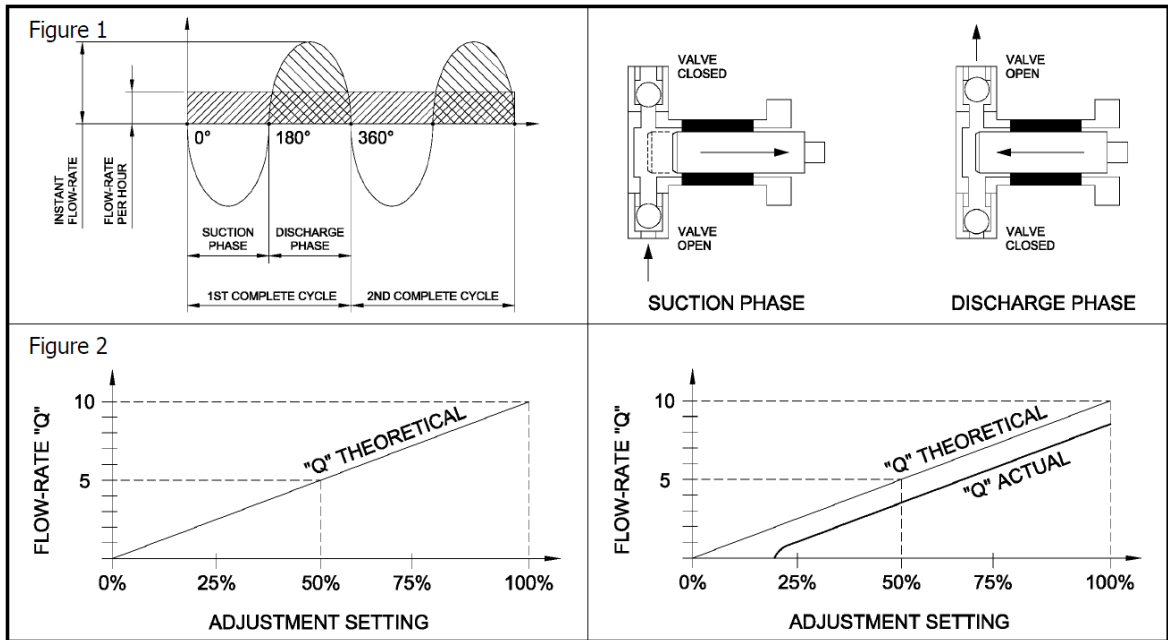
Multiple pumps are obtained by horizontal alignment of individual reduction gear, in which the endless screw shafts are fitted together by means of a flexible coupling. Each reduction gear has its own frequency of piston strokes per minute, depending on the own worm wheel transmission ratio.

5.5 THE FLOW RATE

6270 pumps flow rate is not continuous but pulsating, generated by the alternating movement of the piston (which deforms the diaphragm) and the action of the check valve on the pump head which determine flow direction (see figure 1). Pump flow rate is adjustable and increases or decreases in direct proportion to the variation of the piston stroke.

The theoretical flow rate corresponds exactly to the volume described by the movement of the diaphragm. The graphic representation of its behavior is a straight line whose course is proportional to the adjustment system setting.

The actual flow rate is inevitably lower than the theoretical flow rate, due to the volumetric efficiency of the pump. It varies depending on the type and size of the pump, the nature and viscosity of the liquid to be pumped, working pressure, etc. (see figure 2).



5.6 INTENDED USE

6270 pumps are destined for dosing liquid fluids (flammable, acids, alkaline, solvents, etc.) at ambient temperature or heated (see "Ambient and design temperature"), suitable for continuous service (24 hours/7 days per week of operation).

They can be used for the following applications:

- Oil and gas extraction plants;
- Chemical, petrochemical and power plants;
- Food and agribusiness industries;
- Pharmaceutical industries;
- Water and wastewater treatment;
- In paper mills, on paper production lines;
- Detergents production,
- Water treatment plants.

Any other use is considered "IMPROPER USE" and is not allowed. PULSAFEEDER EPO declines all responsibility for any damage to persons or property and any kind of machine guarantee shall be considered void.

5.7 REASONABLY EXPECTED IMPROPER USE

It is improper to use the 6270 pumps as follows:

- For dosing products differing from those established during technical/sales negotiation and defined at time of order
- In a corrosive and stagnant atmosphere and closed in a poorly-ventilated location

- Dosing in pressure without a pressure gauge installed on the discharge pipeline (see "Discharge pipeline - Pressure gauge")
- Powered by means of an inverter or other electronic equipment unless explicitly ordered for this use
- With a motor faster than the original one
- In potentially explosive areas unless explicitly ordered for this use



NOTE: IT IS THE RESPONSIBILITY OF THE CUSTOMER TO VERIFY THAT THE PUMP IS SUITABLE FOR APPLICATION/USE BEFORE INSTALLATION AND START-UP. IN CASE OF DOUBT, DO NOT IMPROVISE BUT CONTACT YOUR PULSAFEEDER EPO SALES REPRESENTATIVE.

5.8 PROHIBITED USE

It is prohibited to use the PULSA 6270 pumps as follows:

- In mining plants (underground);
- Immersed in water (as submersible pumps)

DO NOT use the pumps without protective covers, if safety devices have been tampered with, or are damaged. Standard PULSA 6270 pumps are not suitable for use in potentially explosive areas!



NOTE: 6270 PUMPS IN ATEX EXECUTION ARE NOT SUITABLE FOR USE IN ZONE 0/20!

5.9 NOISE

The table below shows the average noise level (lp noise pressure level) emitted by PULSA 6270 pumps, used within the limits of use and installed in accordance with the instructions contained in the present operating manual.

These average values were detected on the prototype at a distance of 1 meter from the surface of the machine, at a height of 1.5 meters from the working surface and weighted according to curve A.

METALLIC MATERIAL PUMP HEAD		PLASTIC MATERIAL PUMP HEAD	
Pump Max Capacity (Qmax)	Noise Pressure Level (lp)	Pump Max Capacity (Qmax)	Noise Pressure Level (lp)
Qmax < 200 l/h	< 65 dB(A)	Qmax < 300 l/h	< 65 dB(A)
200 l/h < Qmax < 400 l/h	< 68 dB(A)	300 l/h < Qmax < 600 l/h	< 68 dB(A)
400 l/h < Qmax < 600 l/h	< 70 dB(A)	600 l/h < Qmax < 1000 l/h	< 70 dB(A)
600 l/h < Qmax < 1000 l/h	< 73 dB(A)	1000 l/h < Qmax < 1500 l/h	< 73 dB(A)
1000 l/h < Qmax < 1500 l/h	< 75 dB(A)	1500 l/h < Qmax < 2000 l/h	< 75 dB(A)
Qmax > 1500 l/h	< 78 dB(A)	Qmax > 2000 l/h	< 78 dB(A)

The employer must implement in the workplace, appropriate technical measures to minimize the risks arising from daily noise exposure and as much as is necessary to ensure and safeguard the health of personnel in the working environment.

5.10 VIBRATIONS

PULSA 6270 pumps do not fall into the category of direct human contact machines. Vibrations produced are not significant when pumps are installed in accordance with these instructions. They are therefore less than 2.5 m/s² of acceleration and are not such as to cause dangerous situations. If these situations should arise, stop the machine immediately and call the maintenance supervisor.

5.11 POWERING THE ELECTRIC MOTOR WITH INVERTER

The pumps must be especially ordered for powering by means of inverter. Otherwise the end user, before their installation, must contact PULSAFEEDER EPO to define new limits of use (Hz, pressure and flow rate) that will be guaranteed only after a new nameplate is fixed to the pump.

For a correct use of the pump, the user must comply with the power frequency range allowed by PULSAFEEDER EPO, defined and including from 30Hz to 80Hz. Moreover, IT MUST NOT EXCEED the max operating pressure indicated on the pump nameplate. This value is downgraded and takes into account the maximum operating regime at maximum allowable power frequency (80Hz).

The user must also comply with any additional instructions provided by the inverter manufacturer. Solutions for meeting system electromagnetic compatibility (EMC) requirements are the responsibility of the installer.

5.12 FLOW RATE ADJUSTMENT SYSTEM

Flow rate adjustment is continuous and regular and can be carried out either with the pump running or at rest. The action is easier when pump is running, especially in the case of large diameter piston pumps.

5.12.1 Manual adjustment via graduate knob and linear vernier

Manual adjustment is standard.

The graduated knob, turning a fixed Vernier scale, runs on a linear scale sub-divided from 0 to 10. The knob lower edge is a reference index for setting the adjustment system to a desired flow rate percentage value.

5.12.2 Manual adjustment via hand wheel with gravitational dial

A hand wheel with gravitational dial can be supplied on request.

The gravitational dial offers easy and quick manual adjustment combined with precise, clear and immediate reading. The dial has a percentage scale (from 0 to 100) and is equipped with two pointers. Each turn of the hand wheel corresponds to an adjustment change of 1%.

ATTENTION: Adjustment via hand wheel with the gravitational dial indicator can be decalibrated during transporter handling due to sudden accelerations, shock or capsizing.

Proceed as follows to reset decalibrated adjustment:

- Start up the pump and extract the gravitational dial from the hand wheel by means of a screwdriver;

- Turn the hand wheel counter-clockwise, stopping when the adjustment comes to a hard stop (despite the motor running);
- Turn the gravitational dial by hand bringing the pointers to 0%, then reposition the dial in the hand wheel.

5.12.3 Automatic adjustment by means of actuator

The adjustment system can be automated (upon request) via the application of an electric or pneumatic actuator. For information on actuator operation consult its specific operating manual.

5.13 INTERNAL SAFETY VALVE ON HYDRAULIC OIL CIRCUIT

All PULSA 6270 pumps are equipped with an internal safety valve in the hydraulic circuit, located in the expansion tank (see the figures in "Hydraulic system oil filling").

This valve protects the pump from excess pressure generated by the pump itself during operation (discharge closed or blocked).

The safety valve on the discharge pipeline is essential when system pressure can rise regardless of pump operation.

It is the responsibility of the user and/or installer to evaluate use or not of an external safety valve.

If during operation of the pump there is an excess of pressure higher than the setting of the internal safety valve, this valve opens and discharges into the expansion tank a quantity of oil equal to the piston displacement.

The internal safety valve opening is recognized and evident by means of:

- No pump flow (or at least greatly reduced)
- Change of oil level in the tank
- Increased noise of the pump (synchronized to the piston strokes per minute)

6 INSTALLATION AND COMMISSIONING

6.1 INSTRUCTIONS FOR PROPER INSTALLATION

Because of the pump head check valves work by gravity, it is essential that the housing valve axis must be perfectly vertical for proper pump operation (also to prevent abnormal wear of the valves).

Provide also for installation of the following equipment:

- A pressure gauge next to the pump. It must be installed before any other accessory installed on the discharge pipeline. Controlling the actual pump operating pressure (see "Discharge pipeline - Pressure gauge")
- An external safety valve immediately after the discharge connection and, in any case, before the ON-OFF valve. Protects the pump and the plant from any accidents caused by excessive pressure (see "Discharge pipeline - External safety valve")
- A suitable thermal overload device. To protect the motor from overloads and/or short circuits

Protect the pump from product leaks from the plant and/or corrosion. Avoid arranging pipeline or installing accessories directly above the pump. Avoid installation in a closed, corrosive or stagnant location.

For outdoor installations provide proper protection for the pump from direct weathering actions (rain, wind, dust, humidity). Consider the benefits of using a shelter and/or sliding panels. These devices significantly raise the level of efficiency and safety of the whole pump.

Provide adequate free space around the whole pump to allow inspections and/or dismantling. In particular from the pump head side, in correspondence with the adjustment system and from the motor side (see figure 3).

If the pump is installed outdoors, a shelter is recommended, especially when the pump is equipped with electric actuators or other delicate devices.

Moreover, for pumps with PLASTIC material pump head also provide:

- Appropriate shelter from direct sunlight, to avoid thermal deformation of the pump head
- Periodic controls and/or adjustments of pump head locking bolt tightening torque
- Periodic checks of the handled fluid temperature
- Periodic checks of absence of chemical leakages from pumps connections or plant pipelines

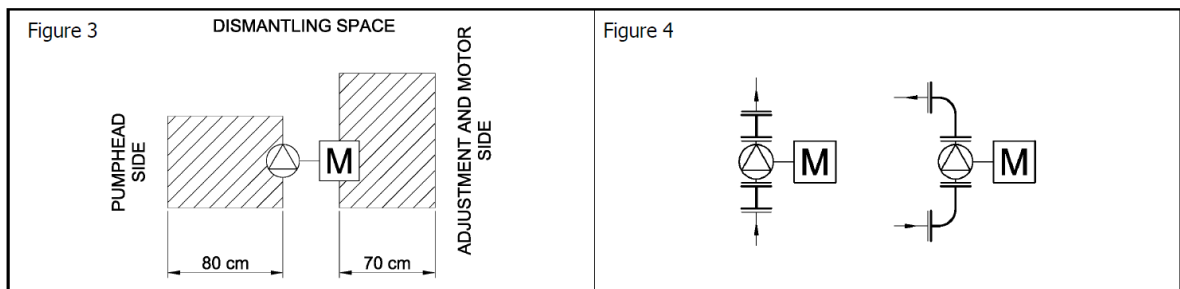
6.1.1 Pump and pipeline fixing

Do not install the pump directly on a concrete foundation base. Use a steel baseplate to make sure that it is stable and well leveled. Securely fix the pump to the baseplate using bolts and washers to ensure a proper load distribution.

The pipelines must be supported independently and their weight must not burden or create tension on the pump head. Therefore, besides the baseplate, the pump needs a supporting framework for both its suction and discharge pipelines.

6.1.2 Connecting to plant pipelines

On the discharge pipeline, to remove easily the pump from the plant, provide proper draining pipes near the pump head. We suggest using short fittings to easily disassemble the flanged connections (see figure 4).



After the pump discharge connection we recommend the use of a cross connection, both to facilitate pump dismantling from the plant and to allow (at a later time if necessary) the installation of a pressure gauge, safety valve, pulsation dampener.

Always verify complete sealing of fittings and pipe flanges, particularly on the suction side pipeline. The entry of suctioned air prevents pump priming.

Before connecting the plant pipelines to the pump connections, it is absolutely necessary to flush the pipelines with water, especially the suction pipeline and relevant feed tank. This preliminary flushing is often underestimated by the installer and/or the end user. If this operation is not properly carried out, the pump will become a collector of all foreign matters contained in the suction pipeline and tank, such as weld drops, gasket scraps, soil and other contaminants.

6.1.3 Connecting the motor to the mains

The metering pumps are always supplied with the use and maintenance instructions of the installed electric motor. In addition, ATEX pumps are also supplied the safety instructions, certification and an ATEX conformity declaration.

Before carrying out electrical connections ensure that the mains supply voltage corresponds to that indicated in the nameplate of the motor. Refer to the motor instructions manual and observe relevant provisions.

When the mains cable connections uses a cable-gland, always choose it correctly according to the type of environment and for the type of cable used.

The cable gland should be tightened so that the seal rings keep the necessary pressure:

- To prevent transmission of mechanical stress on the motor terminals
- To ensure mechanical protection (IP degree) of the terminal box



NOTE: ALWAYS MAKE THE GROUND CONNECTION USING THE APPROPRIATE TERMINAL IN THE TERMINAL BOX.

6.2 SUCTION PIPELINE

To ensure a proper and smooth operation of the pump it is essential design correctly the suction pipeline.

Especially when the pump is installed higher than the liquid surface, above tank (good suction lift required), the factors to consider are:

- The internal diameter of the pipeline
- The overall length of the pipeline
- The arrangement or path of the pipeline

The internal diameter of the suction pipeline must be chosen according to the pump flow rate (see following table A). Pump connections are sized/designed in excess to cover all applications.

Table A


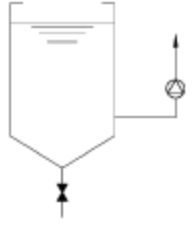
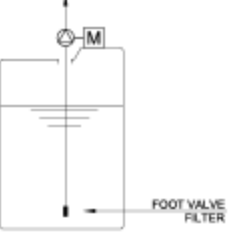
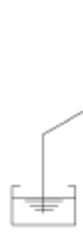

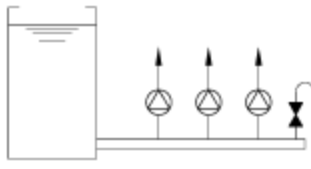
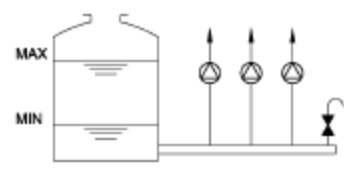
SUCTION PIPELINE SIZE ACCORDING TO MAXIMUM PUMP FLOW RATE					
Max Pump Flow Rate (Q_{max})	Quick Fittings	Connections		Flanged Connections	
		Threaded	Glued	UNI	ANSI
Q _{max} < 15 l/h	4x6 mm	-	-	-	-
15 l/h < Q _{max} < 30 l/h	6x10 mm	1/4"	-	-	-
30 l/h < Q _{max} < 125 l/h	-	3/8"	Ø 16 mm	DN 10	1/2" ANSI
125 l/h < Q _{max} < 200 l/h	-	1/2"	Ø 20 mm	DN 15	1/2" ANSI
200 l/h < Q _{max} < 300 l/h	-	3/4"	Ø 25 mm	DN 20	3/4" ANSI
300 l/h < Q _{max} < 500 l/h	-	1"	Ø 32 mm	DN 25	1" ANSI
500 l/h < Q _{max} < 2000 l/h	-	1-1/2"	Ø 40 mm	DN 40	1-1/2" ANSI
Q _{max} > 2000 l/h	-	2"	Ø 50 mm	DN 50	2" ANSI

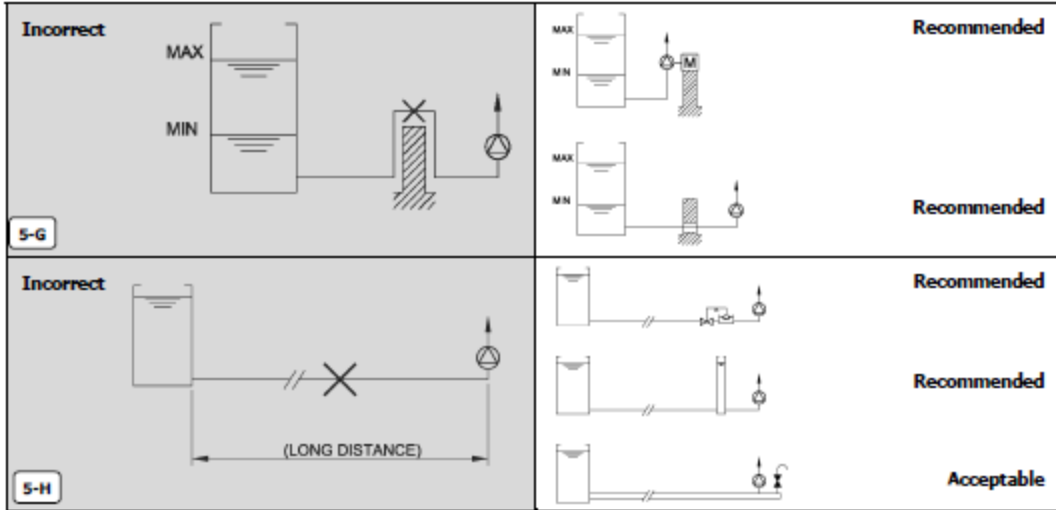
6.2.1 Suction pipeline path

The length of the suction pipe must be as short as possible, respecting the dimensions contained in the previous table A.

- For above tank installation (good suction lift required), do not exceed a maximum height of 3 meters
- Do not exceed a maximum length of 4 meters (sum of vertical and horizontal sections).

Please refer to figure 5 below for suction pipeline correct arrangement or path.

Figure 5	INCORRECT INSTALLATION	CORRECT INSTALLATION
<p>Incorrect Danger of pump valves clogging</p> <p>5-A</p>		<p>Correct</p> 
<p>Incorrect The fluid vein breaks and air remains trapped in the highest section of the pipeline</p> <p>5-B</p>	<p>Correct</p>  <p>FOOT VALVE FILTER</p>	
<p>Incorrect The fluid vein breaks and air remains trapped in the horizontal section of the pipeline</p> <p>5-C</p>	<p>Correct</p> <p>Suction pipeline always uphill</p> 	
<p>Incorrect Internal diameter of suction pipeline inadequate (see previous table A)</p> <p>5-D</p>	<p>Correct</p> <p>Internal diameter of suction pipeline proportioned (see previous table A)</p> 	
<p>Incorrect</p> <p>5-E</p>	<p>Correct</p> 	
<p>Incorrect</p> <p>5-F</p>	<p>Correct</p> 	



6.2.2 Suction pipeline for viscous liquids

Pumps for dosing viscous liquid must be specifically ordered for that use. Where possible, we recommend:

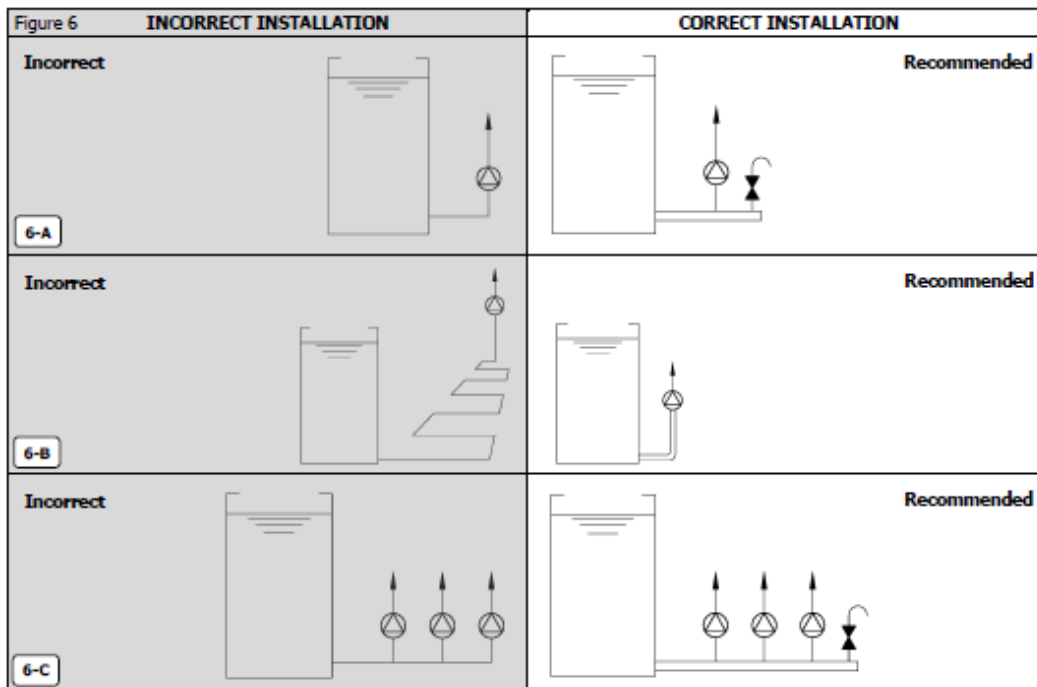
- Use stainless steel pump heads, otherwise with metallic valves or special material
- Maintain the diameter corresponding to pump connections as the minimum diameter of the suction pipe

As a general rule, always install the pump with suction connection flooded and pay particular attention to the design, arrangement and path of the suction pipeline.



NOTE: TO SELECT A SUITABLE PUMP THE CUSTOMER MUST INFORM US ON THE PLANT NPSH AVAILABLE!

Figure 6 shows some installation examples for viscous liquids.



6.2.3 Filter on suction pipeline

To ensure proper pump operation it is important that the product dosed is liquid, homogeneous and clean.

The use of the filter should not affect the suction capacity of the pump. Carefully evaluate the real benefit of using the filter according to the nature and characteristics of the handled fluid. If it is best to use it, properly choose the filter mesh size.

The pump can also convey solids in suspension (non-soluble particles) but these are always considered as “disturbing source” elements as they can cause:

- Check valves obstruction
- Accumulations and/or solidification inside the pump head
- In case of diaphragm pumps, cutting or rupture of it
- As a general rule, we do not recommend filter installation in the following case:
 - Viscous liquid (e.g. polyelectrolyte)
 - Liquid that coagulates, solidifies or crystallizes easily (e.g. caustic soda, ferric chloride)



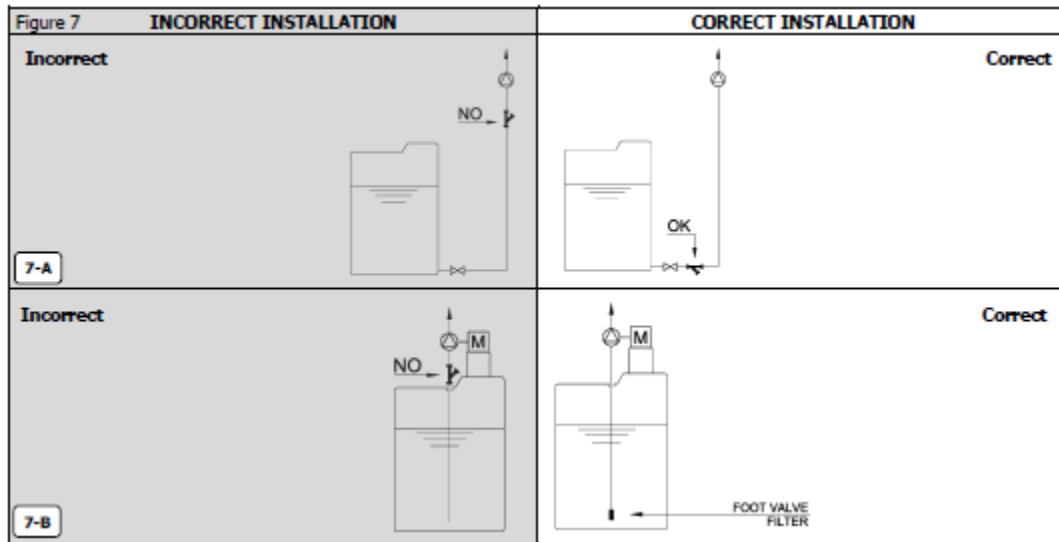
NOTE: A SMALL SIZE FILTER MAY IMPEDE THE SUCTION INLET FLOW, CLOGGING UP THE PIPELINE. USE Y FILTERS (A.K.A. Y STRAINERS) WITH SIZES LARGER THAN THE DIAMETER OF PUMPS SUCTION SIDE CONNECTION.

The filter mesh size and characteristics are linked to the nature of the handled fluid and the pump flow rate. For liquids having viscosity not exceeding 200 cps see the table below.

MAX. PUMP FLOW RATE (Q _{MAX})	FILTER MESH (US STANDARD)	MESH OPENING (MM)
Q _{max} < 15 l/h	100	0.152
15 l/h < Q _{max} < 50 l/h	60	0.251
50 l/h < Q _{max} < 100 l/h	50	0.353
100 l/h < Q _{max} < 300 l/h	40	0.422
300 l/h < Q _{max} < 1000 l/h	30	0.599
Q _{max} > 1000 l/h	30	0.599

To avoid suctioning of impurities, especially in dosing liquids with suspensions, do not suction from the bottom of the tank but lift the suction point 10 cm from the bottom (see previous figure 5-A).

Figure 7 shows some examples of filter installation in suction pipeline.



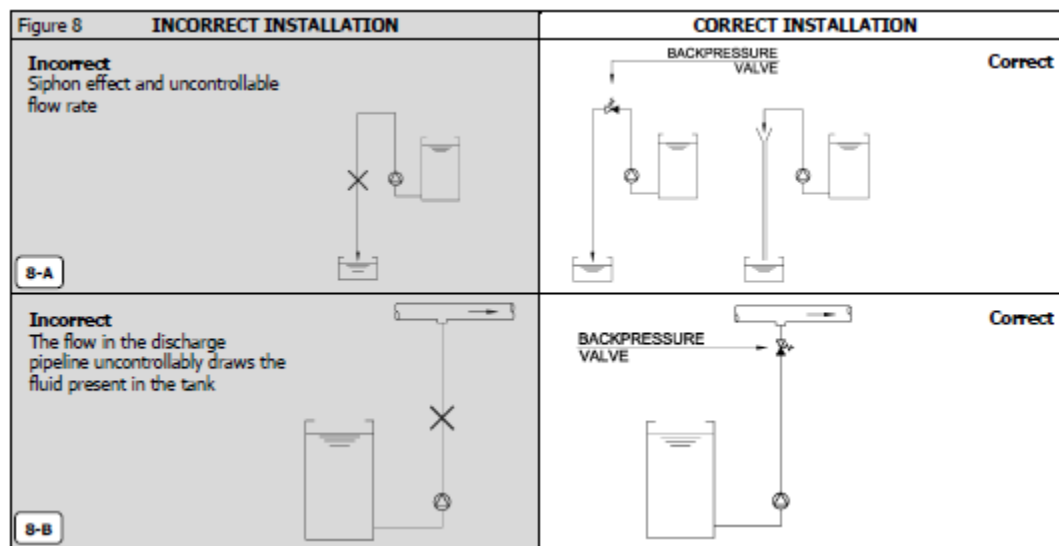
6.3 DISCHARGE PIPELINE

Avoid routing the discharge pipeline, or worse to installing other equipment, directly above the pump.

If the handled fluid free surface of the suction tank is higher than the delivery reservoir this may trigger the siphoning phenomenon (see Figure 8). The fluid moves in a spontaneous and uncontrolled manner from the suction tank to the discharge tank, going through the pump without it being able to control the flow rate in any way.

To avoid and prevent this phenomenon we suggest installing a backpressure valve on the discharge pipeline, or else raise the pipeline so to break the fluid siphon. Discharge pressure must be greater than suction pressure by at least 0.3 bar (0.5 bar for small flow rates).

See indications shown in figure 8 for discharge pipeline arrangements.



6.3.1 External safety valve

As a general rule, it is always suggested to install an external safety valve on the discharge pipeline, near the pump and before any accessories. This allows to increase the "intrinsic" safety level of the plant.

The EXTERNAL safety valve on the discharge pipeline is essential when plant pressure can rise quickly, unexpectedly and uncontrollably, regardless of pump operation.

The external safety valve must be installed immediately after pump discharge connection and, in any case, before the ON-OFF valve (see figure 9). The discharge of safety valve must be visible, inspectable and directed back to the suction tank or into drainage. Avoid connecting the discharge to the pump suction pipeline (recirculation), especially on small flow rate pumps. Consider the use of an external safety valve also when dosing in a "free discharge / open flow" plant.

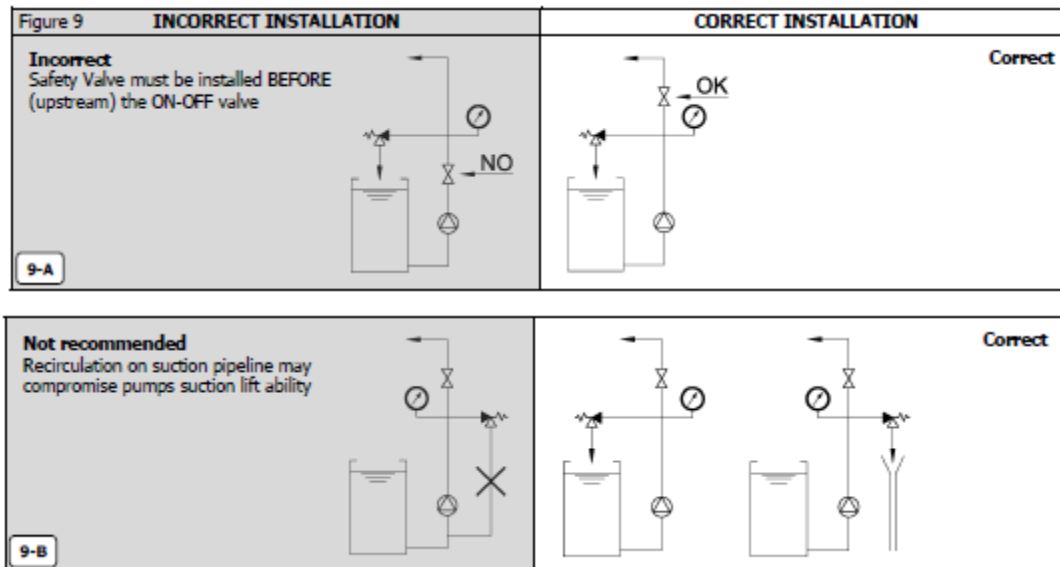
Doing so prevents accident caused by the following risks:

- Freezing or solidification of fluid in the pipeline
- Obstruction or accidental crushing or kinking of the discharge pipeline (flexible pipes)
- Variation of fluid viscosity in relation to the temperature
- When dosing the fluid through injection nozzles
- Other unforeseen risks that may cause quick, uncontrolled rise in pressure



NOTE: 6270 PUMPS ARE PROTECTED FROM GENERATING EXCESSIVE PRESSURE BY AN INTERNAL SAFETY VALVE. TO PROTECT THE PLANT WE RECOMMEND INSTALLING AN EXTERNAL SAFETY VALVE ON THE DISCHARGE PIPELINE.

The external safety valve receiving pressure setting must be lower than the pumps internal safety valve setting. The pumps safe operating pressure can be found on the nameplate.



6.3.2 Pulsation dampener

The pulsation dampener is particularly important to improve the dosing process and the pump operation. There are various benefits obtained with its installation:

- Protects the pump from high pressure peaks (fluid hammer) increasing lifespan of pump

- Flow rate becomes continuous with a linear flow, increasing the reliability of the dosing process
- Significant reduction of vibrations transmitted along the discharge pipeline
- Help in reducing noise emitted by the pump



NOTE: IF THE PROCESS REQUIRE A CONTINUOUS TYPE FLOW RATE, IT IS ESSENTIAL TO INSTALL A PULSATION DAMPENER.

There are two types of pulsation dampeners on the market:

BOTTLE DAMPENER:

Fluids enter in the dampener and directly compresses the air inside it (without any means of separation). Dampener volume is approximately 35 times the pump displacement.

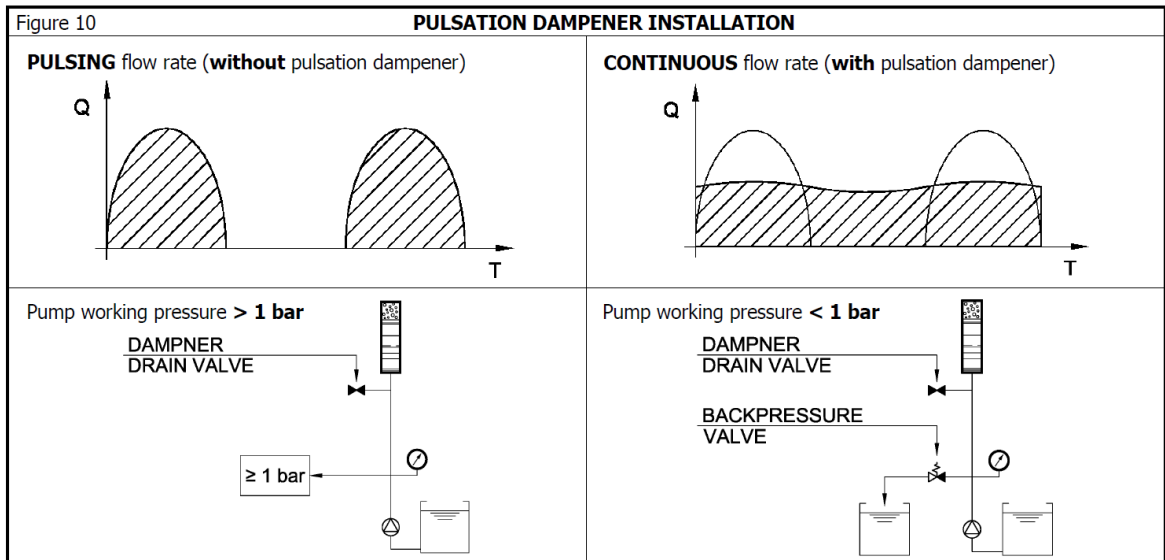
Advantages: Less expensive than bladder type dampener. No need for precharge pressure as it self-adjusts. Disadvantages: Bulkier than the bladder type dampener. Must be installed “vertically” only. Requires periodic maintenance. Must be regenerated periodically by discharging fluid and restoring the air inside.

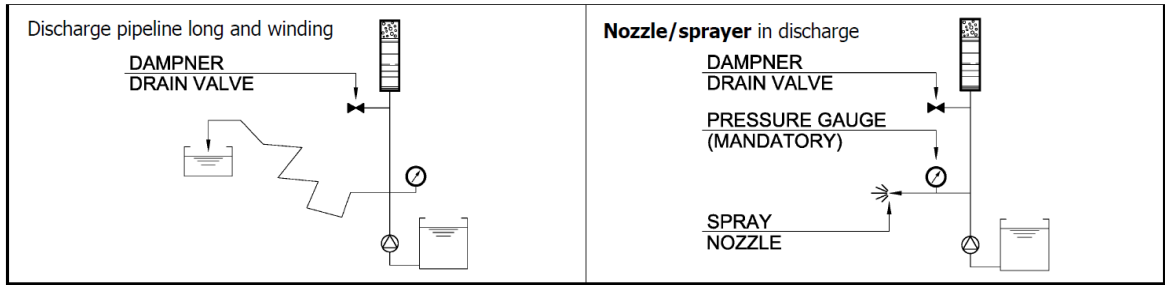
BLADDER DAMPENER (precharged):

Fluids enters in the dampener and compresses a precharged separation bladder or diaphragm (distension chamber). Dampener volume is approximately 8 times the pump displacement.

Advantages: More compact than bottle type dampener. Can be installed vertically or horizontally. No need periodic maintenance and not requires to be regenerated as the precharge gas always remains enclosed in the bladder. Disadvantages: More expensive than the bottle type dampener. It is necessary to know the pump actual operating pressure beforehand to determine the correct bladder precharge pressure. The pump working pressure must always be higher than the precharge pressure.

Figure 10 shows some pulsation dampener examples of installation.





6.3.3 Pressure gauge

Always install a pressure gauge on the discharge pipeline, near the pump, and upstream of any other accessories that may cause pressure increase (see previous figure 10). Allows control of plant conditions and checking the pump actual working pressure.

ATTENTION: KNOWING THE PUMP ACTUAL WORKING CONDITIONS IN THE PLANT CAN AVOID EQUIPMENT DAMAGE AND, ESPECIALLY, CAN PREVENT SERIOUS RISK TO PERSONS OR PROPERTY PRESENT IN THE PLANT!

Consider the use of a pressure gauge also when dosing in a "free discharge / open flow" plant. Doing so prevents accidents caused by the following risks:

- Freezing or solidification of fluid in the pipeline
- Obstruction or accidentally collapsing or kinking of the discharge pipeline (flexible pipes)
- Variation of fluid viscosity in relation to the temperature
- When dosing the fluid through the injection nozzles
- Other unforeseen risks that may cause quick, uncontrolled rise in pressure

The actual working pressure must NEVER exceed the maximum value indicated on the nameplate.

6.3.4 Calibration column

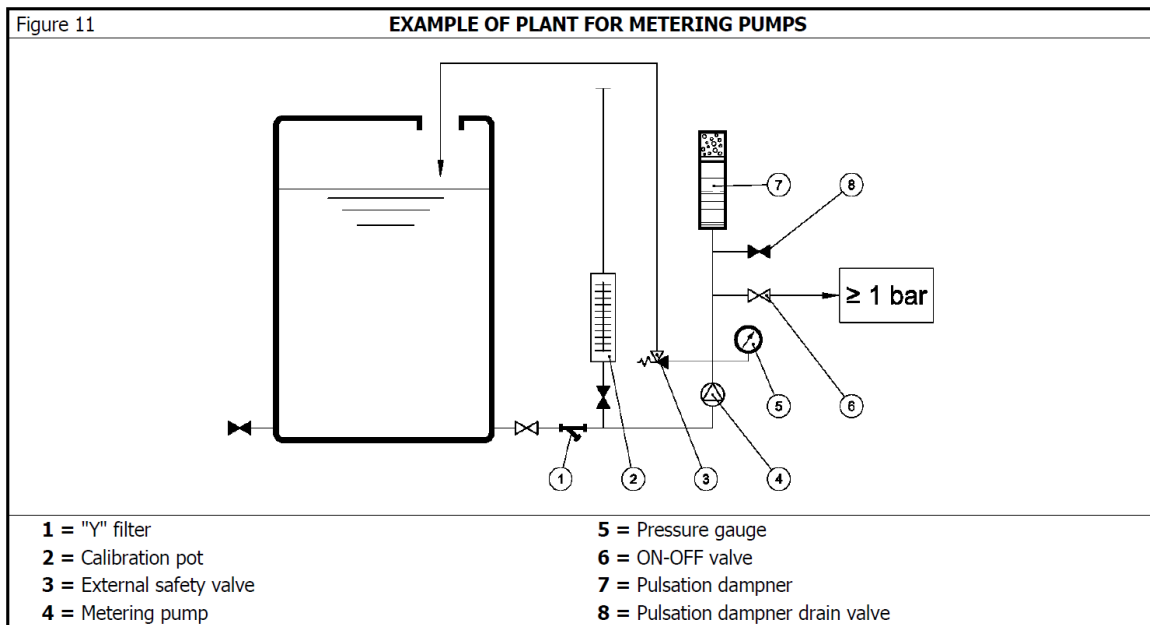
Helps to detect the operating flow rate of the pump under actual working conditions and especially during normal operation, without interrupting the dosing process.

Has to be installed on the suction pipeline, between the tank and the metering pump (see figure 11).

It is not a required accessory but, especially in process plants, it is considered a complementary element to monitor the correct flow rate of the pump.

6.4 EXAMPLE OF PLANT FOR METERING PUMPS

All instructions for proper installation of metering pumps are grouped in figure 11.



6.5 ELECTRIC MOTOR INSTALLATION

Unless otherwise agreed, the pumps are always supplied complete with an electric motor.

For pumps explicitly ordered without motor technical requirements to be met are defined during specification.

For NON ATEX pumps supplied without a motor, it is the end user's responsibility to install a motor with power, rotational speed and coupling type that meets the technical requirements.

For ATEX pumps supplied without a motor, in addition to the above, it is the end user's responsibility to verify and install a suitable motor for the zone classification and characteristics of flammable substances present in the plant.

PULSAFEEDER EPO DISCLAIMS ALL RESPONSIBILITY FOR DAMAGES TO PERSONS OR PROPERTY CAUSED BY IMPROPER STRUCTION AND/OR INSTALLATION OF MOTORS.

6.5.1 Flexible joint coupling

The motor coupling on the pump is performed by means of a BoWex flexible joint. Clean the end of the shaft, lubricate it with oil and then carefully proceed to assemble the half-coupling without excessive force and with maximum caution.

6.5.2 Check and change the direction of rotation

At first start-up of the pump, the direction of rotation of the motor should be checked by authorized, experienced and qualified personnel. An arrow on the motor adaptor indicates the correct direction of rotation.

To reverse the direction of rotation of the motor, follow the manufacturer's instructions. Re-check the motor direction of rotation after this activity.

6.6 DESIGN DATA CHECK

Make sure that pump is suitable for working in the actual operating conditions by checking the following:

6.6.1 Environmental conditions

- a. Ambient temperature: check that the actual ambient temperature is consistent with pump characteristics
- b. Altitude: pump suction performances could be influenced by atmospheric pressure. Check the real NPSH(a) available (of the plant) in relation to the NPSH(r) required of the pump.

6.6.2 Installation conditions

- a. Pump installation and operation should only be carried out under the conditions defined at time of order.
- b. For ATEX pumps: pump classification (group and category) and the temperature class must be suitable for the installation area classification.

Special operating conditions, differing from normal conditions, must always be defined at time of the order, to prevent the pump from working under conditions which may affect proper functioning and compromise safe operation.

6.7 START-UP

Carry out the first start-up with stroke adjustment at 20% and with the lowest discharge pressure possible; maintain these conditions for at least 5 minutes. Gradually increase the adjustment up to 100%, then place it in the condition required by the process.

During this initial phase, check with a pressure gauge (see "Discharge pipeline - Pressure gauge") the actual pump working pressure. Such value (pointer max. oscillation) must never exceed the maximum pressure value indicated on the pump nameplate.

6.7.1 Checks before start-up

Before starting up the pump check the following:

- a. That there are no product leakages from pump connections nor pipelines plant, especially along the discharge side
- b. The gear box lubricating oil conditions by means of the oil level indicator, see "Lubricant oil check"
- c. The hydraulic oil condition by means of the reservoir cover and level indicator, see "Hydraulic system oil check"
- d. The direction of rotation of the motor and that it is protected as provided for by regulations, see "Electric motor installation"
- e. In case of power supply via inverter, that pump has been purchased for said use and that the actual power frequency range complies with the range of frequency from 30Hz to 80Hz allowed and defined by PULSAFEEDER EPO
- f. Correct installation of all possible accessories and their proper operation
- g. That ON-OFF valves along the discharge and suction pipelines are open or closed depending on their function

- h. The liquid to be dosed has not solidified or frozen in pipelines that is protected from agents such as: sand, corrosive substances, dust and/or fiber, water, mechanical stress and vibrations. That is, protected mechanically for indoor installations or outdoor installations considering the damaging effects of weathering, the combined influence of temperature, humidity and condensation.

6.7.2 Checks during operation

Once the pump has been started, make sure that operating conditions remain within prescribed limits, in particular check the following:

- a. Pump working pressure
- b. Motor current
- c. Handled fluid temperature, if different from ambient temperature
- d. Warming fluid temperature, for pumps with warming jacket
- e. Efficiency of the cooling system, for pumps with flushing
- f. the entire pump maximum surface temperature (max 40°C for pump reduction gear unit and max 80°C for motor. Check that pump suitability is maintained whenever changes in operating conditions occur, such as:
 - Modification of one or more process variables (e.g. working pressure and/or pump flow rate adjustment)
 - Movement of the pump to a different environment (e.g. from indoors to outdoors)
 - Dosing of a different fluid from the initial (change of the pump use)
 - Movement of the pump from a low temperature ambient to another with higher temperature
 - Change of season or significant climatic variations
 - Malfunction of possible external safety valve installed on discharge pipeline

6.7.3 Abnormal conditions

Pump must be used exclusively for operating conditions determined at time of order. In case of abnormal operating conditions (high motor current, excessive surface temperature, high noise and/or vibrations) promptly inform the maintenance staff/manager.

NO RESPONSABILITY IS ACCEPTED FOR DAMAGE OR INJURIES CAUSED BY MALFUNCTIONS NOT IMMEDIATELY RESOLVED OR REPORTED TO PULSAFEEDER EPO.

6.7.4 Prolonged stops

If a prolonged period of pump stop is foreseen, take the following measures to preserve pump integrity: Cleaning of chemicals, protection from weathering, etc. (see also "General and surface cleaning").

7 ROUTINE MAINTENANCE

Accurate records in the early stages of pump operation will reveal the type and amount of maintenance that will be required. A preventative maintenance program based on these records will insure trouble free operation. It is not possible in these instructions to forecast the life of such parts as the diaphragm, check valves and other parts in contact with the product you are handling. Corrosion rates and conditions of operation affect the useful life of these materials so an individual metering pump must be gauged according to particular service conditions. These maintenance suggestions are not intended as "do-it-yourself" repairs. To perform such works, specialized technical knowledge is required and operations are to be performed by qualified personnel.

Interventions on electrical circuits or equipment must only be performed by qualified electricians or, under supervision, by appropriately trained personnel and in accordance with applicable electrical codes.

In case of ATEX pumps, it is necessary pay particular attention not compromise the pumps suitability characteristics to the plant classified area where it is installed.

7.1 OPERATING PRECAUTIONS

All operations must be performed by qualified personnel and abide by all safety regulations. To keep operators safe when performing maintenance on the pump, follow these guidelines:

- a. The power line is disconnected and no parts are energized, including any auxiliaries
- b. Risk of accidental restart has been excluded
- c. Any fluid present in the pump head and pipelines, is not pressurized or chemically dangerous
- d. Confirm the ON-OFF valves on the suction and discharge pipelines are closed
- e. The pump has been adequately and properly cleaned. Cleared of hazardous chemical, avoiding exposure to the environment.

All maintenance work must be carried out on the pump only when the machine is stopped and disconnected from mains supply (including auxiliary circuits). Maintaining original characteristics over time must be ensured by an efficient maintenance and inspection plan, developed and managed by qualified technicians, taking into account the service and the actual environmental conditions in which it operates.

7.2 BE PREPARED

Before starting work, you should read and understand this IOM, identify the correct sectional drawing of the pump and have all the tools and equipment necessary to perform the maintenance or repair works.



NOTE: WHEN THE PUMP HAS BEEN DISASSEMBLED, WAITING TO BE REASSEMBLED, IT IS NECESSARY TO PROTECT THE VARIOUS COMPONENTS (PARTICULARLY THOSE INSIDE THE MECHANISM, PAYING SPECIAL ATTENTION TO THE WORKING SURFACES OF THE SEALS) TO PREVENT DAMAGE CAUSED BY OXIDATION OR ACCIDENTAL IMPACT.

Improper assembly of the sealing components or ball bearings can result in wear, accelerated malfunction, and/or overheating.

7.3 PERIODIC OPERATIONS

As a general rule, after the first start-up, close initial monitoring of the machine is recommended to practically define the maintenance plan and also determine the frequency of general inspections and planned maintenance.

Should anomalies or malfunctions occur it is user's responsibility to consider whether maintenance work should be anticipated or not.

7.3.1 Checks of normal operation

During periodic inspections, verify that:

- There is no leakage of process fluid, lubricating or hydraulic oil
- The pump operates properly, without abnormal noises or vibrations
- CE protections (accident prevention) are in place

Any defects or irregularities detected during inspection must be promptly solved !

7.3.2 Checks of electrical connections

Power cables, control and grounding cables must not have signs of deterioration and connections must be tight.

7.3.3 Checks of pump connection to plant pipeline

Verify that the connection elements (screws, nuts and bolts, flanges, etc.) are firmly tightened and that relative sealing components are efficient and in perfect condition. During normal operation, pumps can transmit vibrations to pipelines, loosening component connections and causing product leakages. In this case, install a pulsation dampener to reduce pressure peaks, making flow linear and reducing these vibrations.

7.3.4 General and surface cleaning

It is suggested periodically perform the following operations:

- a. If the pump works in a batch dosing system, and the process fluid tends to coagulate, solidify or crystallize easily, wash the pump head immediately after each working cycle
- b. Prevent/eliminate surface deposits of material that can generate scale and encrustations
- c. Remove any accidental presence of corrosive product from the external surface of the pump
- d. Verify and be sure that motor ventilation is not impeded. Remove any possible deposits of dust or fibers from the fins and fan cover of the motor.

7.3.5 Protection against corrosion

Metering of aggressive chemicals or operating in exposed environments (acid atmosphere) may expose the pump to corrosion and the risk of premature wear of sealing components. Periodically check:

- a. That protection covers are always mounted
- b. That operating windows are always properly closed
- c. That there is no oil contamination in the reduction gear that could endanger proper lubrication.

7.3.6 Verification of thermal protections

Make sure that motor thermal overload protection is not excluded and is correctly set. Proper selection and setting of overload protection for ATEX pump motors is essential to ensure the temperature class and safety against explosion dangers.

7.3.7 Painting check

In a corrosive environment, and every time it is needed, it is necessary check periodically that painting does not show deterioration signs which can jeopardize the equipment protection degree.

Repaint the pump to protect the external surface from corrosion.

7.3.8 Lubricant oil check

PULSA 6270 pumps are always supplied with lubricant oil in the gearbox.

Check daily that oil level is at the halfway of the oil level indicator and that there are no leaks from dynamic seals or from plugs on the mechanism. Verify there is no oil contamination which may compromise the correct lubrication. Replace if necessary (see "Lubricant oil change").

7.3.9 Hydraulic oil system check

All hydraulic diaphragm pumps are always supplied with the hydraulic circuit filled with oil and ready for operation. Make sure the oil cover is mounted and is always tightly closed.

Check weekly that oil level is at the halfway of the oil level indicator located on the tank making sure there is no sludge or contamination. Replace if necessary (see "Hydraulic oil system change").

7.4 RECOMMENDED SPARE PARTS

The most common faults can be solved by having the recommended spare parts in stock, saving both time and effort.

7.4.1 Pumps with PLASTIC material pump head

This list is indicative; we suggest proceeding as detailed in "Instructions for requesting spare parts".

COMPONENT DESCRIPTION	SV*	DV*
Piston Seal	2	2
Valve Seat (Single Valve "SV")	2	2
Valve Guide	2	4
Valve Seat O-ring	2	4
Valve Housing O-ring	2	2
Valve (sphere)	2	4
Diaphragm	1	1

Note: Suggested quantity: SV= single valve pump head (standard Pulsafeeder EPO); DV= double valve pump head

7.4.2 Pumps with METALLIC material pump head

This list is indicative; we suggest proceeding as detailed in "Instructions for requesting spare parts".

COMPONENT DESCRIPTION	SV*	DV*
Piston Seal	2	2
Valve Seat (Single Valve "SV")	2	2
Valve Guide	2	4
Valve Seal	6	10
Valve Seat O-ring	2	4
Valve Housing O-ring	2	2
Valve Seat (Double Valve "DV")	0	2
Valve (sphere)	2	4
Diaphragm	1	1
Valve Guide O-ring	0	4

Note: Suggested quantity: SV= single valve pump head (standard Pulsafeeder EPO); DV= double valve pump head

7.5 DISMANTLING, REPLACEMENT AND REASSEMBLY

Operating experience on thousands of installations has indicated the many metering pump troubles have to do with check valves. Problems usually stem from (a) an accumulation of trash between the valve and seat, (b) corrosion which damages seating surfaces, (c) erosion from high velocity flow, or (d) normal physical damage after extended service.



NOTE

NOTE: IN THE CASE OF DOSING ANOMALIES, BEFORE DISMANTLING THE HYDRAULIC SYSTEM (PUMP HEAD), VERIFY THE ACTUAL CONDITIONS OF PUMP HEAD DIRECTIONAL VALVES (SEE "VALVE VERIFY AND/OR REPLACEMENT").

7.5.1 Personnel qualifications

Entrust the maintenance, repairs and overhauls to experienced and qualified personnel who will restore the original equipment conditions.

7.5.2 Disconnecting electrical connections

Before disassembling the pump always disconnect all the electrical connections. Make sure that any risk of accidental restart of the machine has been excluded.

7.6 CHECK VALVE VERIFY AND/OR REPLACEMENT

When reassembling after cleaning or replacement be sure to use new seals. Separate the valve assembly and examine the components for wear, damage or accumulation of solids. A ball valve seat should have a sharp 90° edge, free of any nicks or dents. Hold the ball firmly on the seat and examine against a light. If light is visible between the two then replace the seat and/or ball.



NOTE

NOTE: BEFORE START TO DISASSEMBLY, MAKE SURE THERE IS NO PRESSURE OR HIGH TEMPERATURE IN THE PIPELINE!

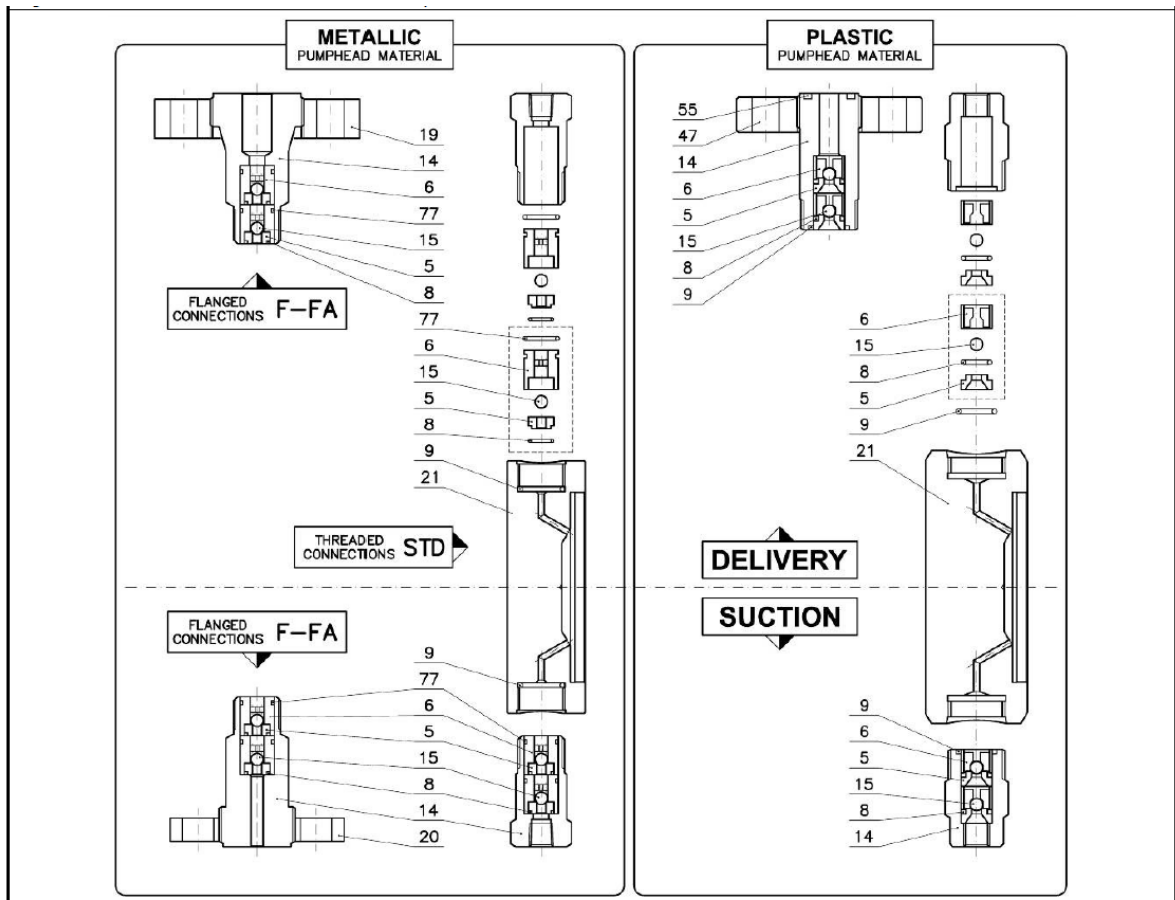
Operate with pump OFF. To verify conditions and/or replace the valves proceed as follows (see figure 12):

- Release the pump from suction and discharge pipeline, and clean adequately
- Remove the valve housing one at a time (pos.14)

- Delicately extract the internal components without damaging them (use a plastic tool)
- Carefully observe and check the direction of assembly of each components
- Check the cleaning, wear and proper direction of assembly of components
- The ball valve (pos.15) MUST be SMOOTH, and not have dents or corrosion signs
- The valve seat (pos.5) must have smooth beveled surfaces with no dents or signs of wear
- Verify the integrity of the O-rings (sealing components) (pos.8; 9; or 77)
- If necessary, replace the damaged components
- Reassemble everything exactly as shown in figure 12

ATTENTION: THE VALVE (POSITION 15) MUST SIT ON VALVE SEAT (POSITION 5) ON THE OPPOSITE SIDE OF LARGE BEVELLED SURFACE.

Figure 12



7.7 LUBRICANT OIL CHANGE

PULSA 6270 pumps are always supplied with lubricant oil in the gearbox.

In multiplex pumps each pump body has its own lubrication, and should be maintained individually.

FIRST lubricant oil change after 1,000 hours of operation. For standard pump version replace oil after every 15,000 operating hours and every 10,000 hours for ATEX pumps. At a minimum, replace the oil every 5 years.

NOTE: CHEMICALLY CONTAMINATED LUBRICANTS CAN CAUSE WEAR, CORROSION AND LEAKING SEALS.

The oil filling plug (pos.119), the oil level plug (pos.120) and the oil drain plug (pos.121) are all placed on the reduction gear body.

The following images allow easy identification of the different plugs.



8 SPECIAL MAINTENANCE

The following guidelines cover the most common “special maintenance” operations that only an expert and trained technician can perform. Avoid impromptu operations or attempts, contact PULSAFEEDER EPO customer service for specific information.

These maintenance suggestions are not intended as "do-it-yourself" repairs. To perform such works, specialized technical knowledge is required and operations are to be performed by qualified personnel.



NOTE: IN THE CASE OF DOSING ANOMALIES, BEFORE START TO DISMANTLING THE HYDRAULIC SYSTEM (PUMP HEAD), VERIFY THE ACTUAL CONDITIONS OF PUMP HEAD DIRECTIONAL VALVES (SEE "VALVE VERIFY AND/OR REPLACEMENT").

Appropriate individual safety devices must always be used to ensure and safeguard the personal safety of personnel, who must also be properly trained and professionally qualified.

8.1 TECHNICAL DOCUMENTATION

For "special maintenance" not expected, contact PULSAFEEDER EPO customer care (Tel. +1 (585) 292-8000, proepo_service@idexcorp.com) to receive:

- Detailed and focused information
- Specific instructions copy (if available)
- Sectional drawing updated copy

8.2 HYDRAULIC SYSTEM MAINTENANCE

PULSA 6270 pump hydraulic system is equipped with an air-bleed valve, a mechanically actuated oil replenishing valve and a safety valve. The three valves ensure that the pump has:

- Perfect hydraulic balance, allowing operation without any air bubbles (air-bleed);

- Impossibility of oil overloading due to clogging or shut-off of the suction pipeline, preventing the danger of impact of the diaphragm against the front wall of the pump head (mechanical replenishing);
- Displacement recirculation in the event of overpressure or shut-off of the discharge pipeline (safety).

Diaphragm working life exceeds 40.000 operating hours. The most likely cause of rupture is usually linked to the nature of the handled fluid (abrasive, solid parts in suspension, etc.).

8.2.1 Hydraulic oil system change

If hydraulic oil system contains sludge or is contaminated, replace as follows:

- Remove the tank cover (pos.94) and suction all oil with by means of a large syringe
- Remove and clean the oil filter (pos.49) without disassemble it in its components, then reassemble it
- Clean and dry the inside of the tank. Then pour the new hydraulic oil up to the level indicator (pos.64) GB
- Clean and reassemble the tank cover (pos.94)

Change oil also in relation to pump use and as illustrated in the following table.

FREQUENCY OF CHANGES IN HOURS	HANDLED FLUID MAXIMUM TEMPERATURE				(*) OPERATION
	$\leq +70\text{ }^{\circ}\text{C}$	$+70\text{ }^{\circ}\text{C} \div +80\text{ }^{\circ}\text{C}$	$+80\text{ }^{\circ}\text{C} \div +90\text{ }^{\circ}\text{C}$	$+90\text{ }^{\circ}\text{C} \div +100\text{ }^{\circ}\text{C}$	
	20.000	10.000	2.000	1.000	
20.000	10.000	1.000	500	24h / 24h	

(*) Consider as part of pump "OPERATION" a waiting period with warmed fluid temperature in the pump head.

8.2.2 Diaphragm rupture signaling

The diaphragm rupture detector, located directly on the pump head, allows the user to know diaphragm conditions. The "standard" version is a pressure gauge which, during normal pump operation, must indicate "zero (0) pressure", confirming that the diaphragms are intact.

Depending on the version, signaling is carried out by means of:

- A pressure variation (standard detector with pressure gauge)
- Electrical contact (detector supplied upon request with microswitch, pressure-switch or pressure transmitter) Signaling can be caused by:
 - A presence of air between the two diaphragms
 - Rupture in one of the two diaphragms

The rupture of one diaphragm does not always prevent the pump to continue to supply flowrate correctly. Within a short time, the maintenance supervisor must however provide a check/replace the diaphragm.

8.2.3 Diaphragm condition check

Proceed as follows to verify if the diaphragm is broken:

- Find the sectional drawing of the diaphragm rupture detector installed on the pump
- Release the pump from suction and discharge pipeline, and clean adequately

- Hermetically seal the discharge valve unit and introduce compressed air (6-8 bar) in the pump head by means of the suction connection. The pressure will compress the two diaphragms together
- "SLOWLY" unscrew and remove the rupture detector locking screws to vent any internal pressure

ATTENTION DANGER! PROTECT PROPERLY FROM EJECTIONS OF PRODUCT UNDER PRESSURE!

- Check for any possible liquid leakage from the detector, checking whether said leakage is OIL or else HANDLED PRODUCT
- If nothing comes out, the diaphragm can be considered intact. See "Diaphragm rupture detector resetting"
- If comes out OIL or HANDLED PRODUCT, replace the diaphragm. See "Diaphragm replacement"

8.2.4 Diaphragm replacement

Since this requires pump head disassembling (hydraulic system) BEFORE operating see "Diaphragm condition check".



NOTE

NOTE: THE REMOVAL OF THE PUMP HEAD CAUSES A LOSS OF HYDRAULIC OIL AND FAILURE OF THE WHOLE SYSTEM! CAREFULLY ASSESS THE ACTUAL NEED FOR SUCH OPERATION AND PREPARE FOR OIL COLLECTION.

Pump head disassembling operations for diaphragm replacement are the same for all types of pumps. We suggest, however, reference to the following figures during operation:

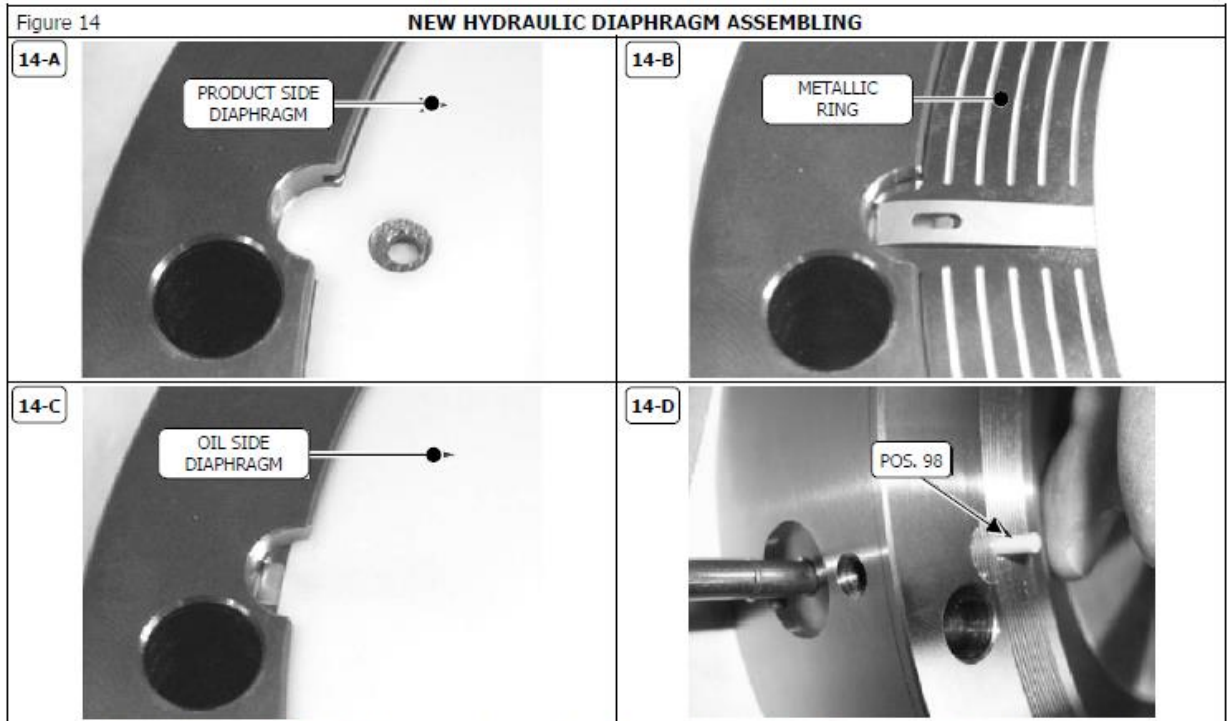
- Pump types LY, LYH: See figure 15
- Pump type LK: See figure 16
- Pump types LN, LP: See figure 17

Proceed as follows:

- Release the pump from suction and discharge pipeline, and clean adequately
- Dismantle both valve units from the pump head, then the diaphragm rupture detector

ATTENTION DANGER! PROTECT PROPERLY FROM EJECTIONS OF PRODUCT UNDER PRESSURE!

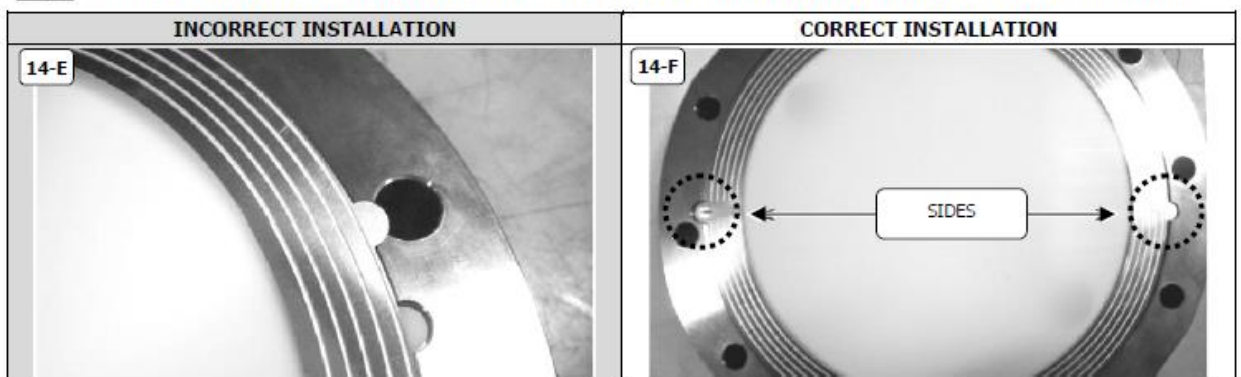
- Unscrew all locking nuts (pos.100) and remove the pump head body (pos.21) and the whole sandwich diaphragm (pos.48)
- Clean and check the conditions of the inside of the oil chamber (pos.33) and of the replenishing disk (pos.38) which must be whole and free to move
- Assemble the new diaphragm (pos.48) (see figure 14), taking SPECIAL ATTENTION to position the sandwich diaphragm ring with the hole toward the pump head and to correctly insert the oil side diaphragm in the relative groove
- Verify the free movement of the rupture detector shutter (pos.98), introducing compressed air in the related hole in the pump head (see figure 14-D)
- Clean and reassemble the pump head (pos.21) following the instructions in reverse order and figures relative the type of pump
- Fasten the pump head with locking nuts (pos.100), see "Pump head tightening torque"
- Reassemble the diaphragm rupture detector on the pump head, see "Diaphragm rupture detector resetting"



In order, first insert the product side holed diaphragm (14-A), then the metallic ring (14-B), then the oil side diaphragm (14-C).



ATTENTION: Correct assembly of the diaphragms and metallic ring is guided by the sides on the pumphead



8.2.5 Hydraulic system oil filling

Operations for new hydraulic system oil filling are the same for all types of pumps. We suggest, however, reference to the following figures during operation:

- Pump types LY, LYH: See figure 15
- Pump type LK: See figure 16
- Pump types LN, LP: See figure 17

Proceed as follows:

- Remove the tank cover (pos.94), remove the oil filter (pos.49) and clean it without disassembling its components
- Unscrew the safety valve locking screws (pos.66) and extract the whole safety valve (pos.85) complete with the locking flange

- (pos.50) without breaking the seal. In this way it will be easier to expel air from inside the oil chamber (pos.33)



NOTE: THE INTERNAL SAFETY VALVE IS SETTED AND SEALED BY PULSAFEEDER EPO AT THE END OF FINAL TESTING. DO NOT REMOVE THE SEAL, DO NOT DISMANTLE THE PSV, DO NOT TAMPER WITH OR, WORSE, OPERATE DIRECTLY ON THE INTERNAL COMPONENTS. THESE ACTIONS COULD COMPROMISE THE SAFETY OF THE PLANT AND OF PERSONNEL AND WILL ALSO VOID THE GUARANTEE.

- Start up the pump with adjustment at 20%. Pour the hydraulic oil in the tank (low viscosity oil 2÷3 °E; see "Hydraulic system oil replacement") up to the level indicator (pos.64). Passing through the safety valve duct, the oil will fill the oil chamber (pos.33) and the various ducts, expelling air
- Wait in this condition for at least 5 minutes, and in any case until the release of air bubbles stops
- Reassemble the oil filter (pos.49), then clean the safety valve (pos.85) tightening the fastening screws (pos.66)
- Set the adjustment to 100%, refill oil halfway up the level indicator (pos.64). Reassemble the tank cover (pos.94)



NOTE: BEFORE THE PUMP REACHES ITS OPTIMAL FUNCTIONING, WAIT UNTIL THE HYDRAULIC OIL (JUST Poured INTO THE OIL CHAMBER) BLEEDS AIR FROM THE BLEED VALVE AND BECOMES HOMOGENEOUS. DEPENDING ON THE DIAMETER OF PISTON, PUMPS MAY REQUIRE FROM 2 HOURS (DIAM. 25÷30) TO 8 HOURS (DIAM. 10) OF OPERATION.

Figure 15

LY, LYH PUMPS: PUMPHEAD

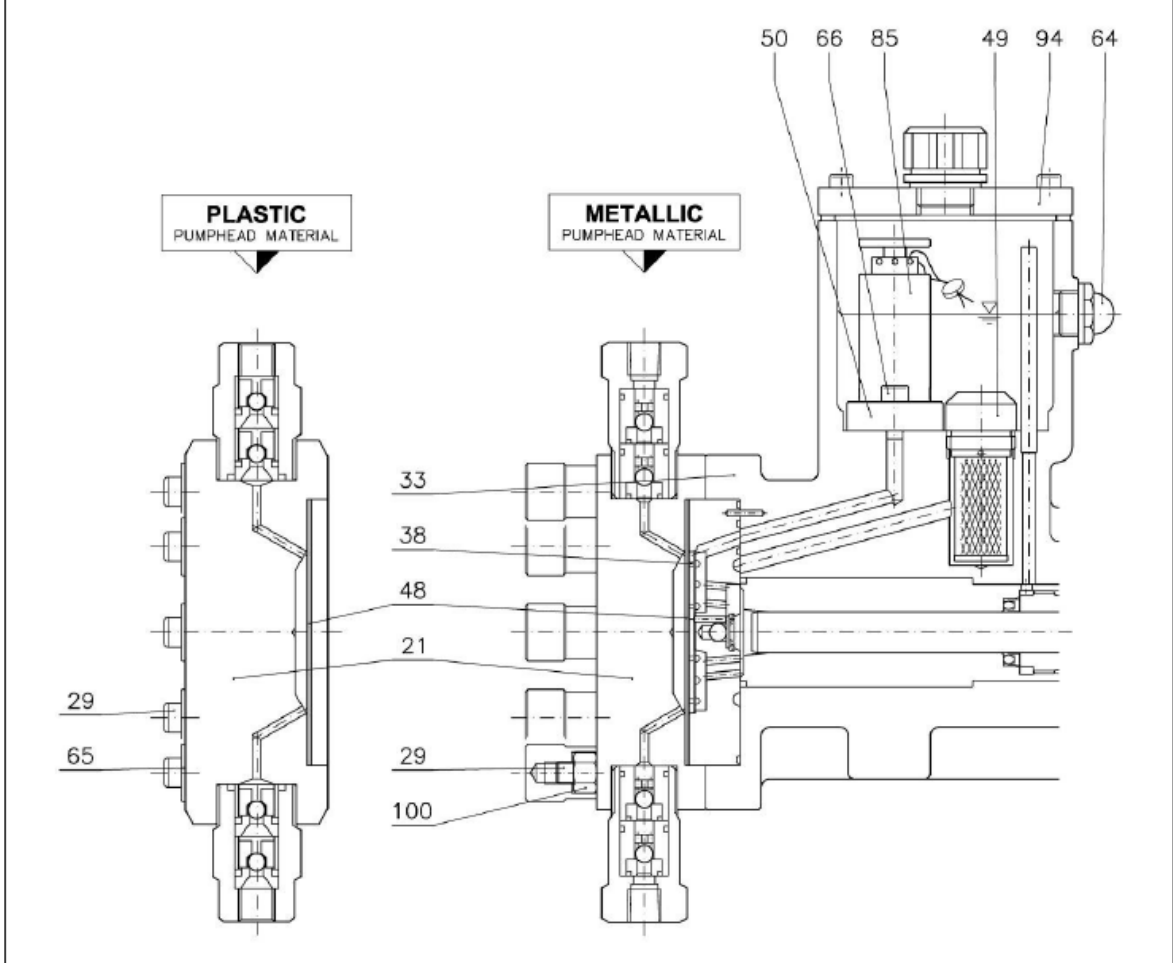


Figure 16

LK PUMPS: PUMPHEAD

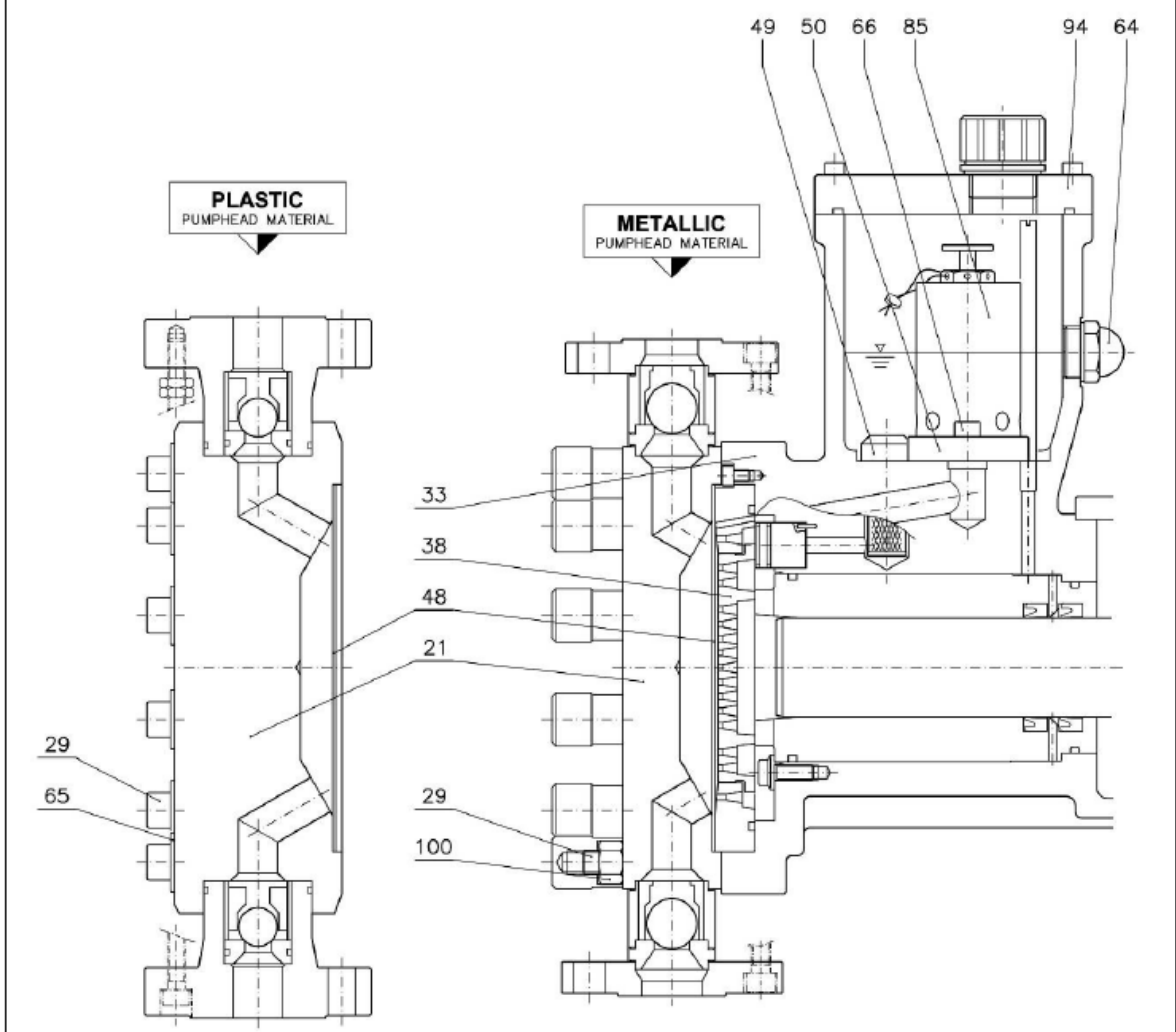
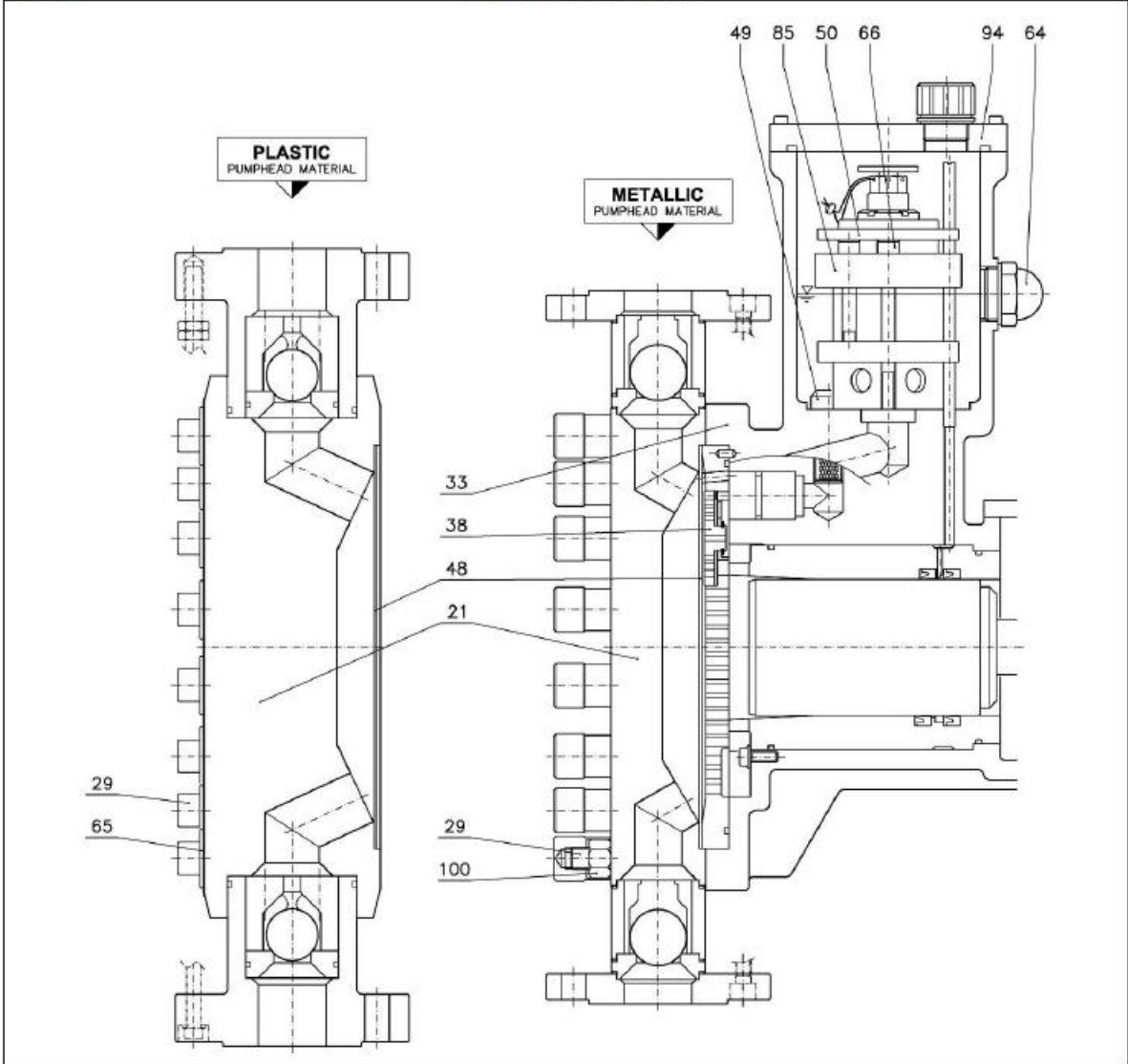


Figure 17

LN, LP PUMPS: PUMPHEAD



8.2.6 Pump head tightening torque values

The table below shows the tightening torque for correct pinching the diaphragm and locking the pump head.

The values are purely indicative and refer to temperatures indicated in "Ambient and design temperature".

Nut (pos.100) Screw (pos.29) *	METALLIC pumphead material	PLASTIC pumphead material			
		PVC (P)	PVDF (S)	PTFE (T)	PP (PP)
M 8	25 Nm	12 Nm	12 Nm	10 Nm	12 Nm
M 10	45 Nm	25 Nm	30 Nm	20 Nm	25 Nm
M 12	75 Nm	60 Nm	60 Nm	50 Nm	60 Nm
M 16	180 Nm	100 Nm	100 Nm	90 Nm	100 Nm

* (pos.29): For metallic pump heads material is a 8.8 stud bolt, for plastic pump heads material is a screw type TCCE in AISI-304.



NOTE: FOR PUMPS WITH PLASTIC MATERIAL PUMP HEAD (WHERE APPLICABLE) ALWAYS USE THE WASHER (POS.65) TO ENSURE APPROPRIATE LOAD DISTRIBUTION, IN ORDER TO AVOID DEFORMATIONS OR DAMAGE TO THE PUMP HEAD.

8.2.7 Pumps with plastic material pump head: Recommendations



NOTE: THE CUSTOMER (USER AND/OR INSTALLER) MUST IMPLEMENT THESE RECOMMENDATIONS.

Pumps with plastic material pump head, compared to the metallic material, require a higher level of attention because of the mechanical characteristics of the material and the nature and/or danger of the chemical being pumped.

Define the most appropriate pump head tightening torque value, considering also the following factors:

- If the pump is directly exposed to sunlight, or to extreme changes in temperature or if installed near heat sources
- If the handled fluid temperature can cause deformations or the pump head
- At what actual pressure the pump works and if there is a pulsation dampener installed on the discharge
- Also according to the importance and danger of the process, define an appropriate frequency for following checks:
- In case of piston pumps, verify the piston packing tightness (check and if necessary adjust the gland nut tightening)
- In case of diaphragm pumps, verify the pump head leak-tight (check and if necessary adjust the tightening torque)
- Verify the presence of any pump head deformation due to the combined action of temperature and pressure

Any defect or irregularity detected during inspections should be promptly solved !

8.3 DIAPHRAGM RUPTURE DETECTOR RESETTING

Proceed as follows to reset the diaphragm rupture detector:

- Check and, if necessary, adjust the pump head tightening torque (see "Pump head tightening torque value")
- Hermetically seal the discharge valve unit and introduce in the pump head compressed air (6÷8 bar) by means of the suction connection. The pressure will compress the two diaphragms together, causing the expulsion of air
- Wait in this condition for at least 5 minutes
- Reassemble the detector (check the integrity of the pressure gauge if present and ensure that, when mounted, it indicates "zero (0) pressure")
- Restart the pump after having reconnected it to the plant and reopened the valves on the suction and discharge pipelines
- Monitor diaphragm rupture detector conditions after the restart of the pump
- If another signaling is given, it is reasonable to assume that one of the diaphragms is broken. It will therefore be necessary to disassemble the pump head to "physically" check the actual diaphragm conditions. See "Diaphragm replacement".

8.4 PUMPS TYPE LN, LP: KNOB ADJUSTMENT FRICTION SETTING

8.4.1 Increase the adjustment friction

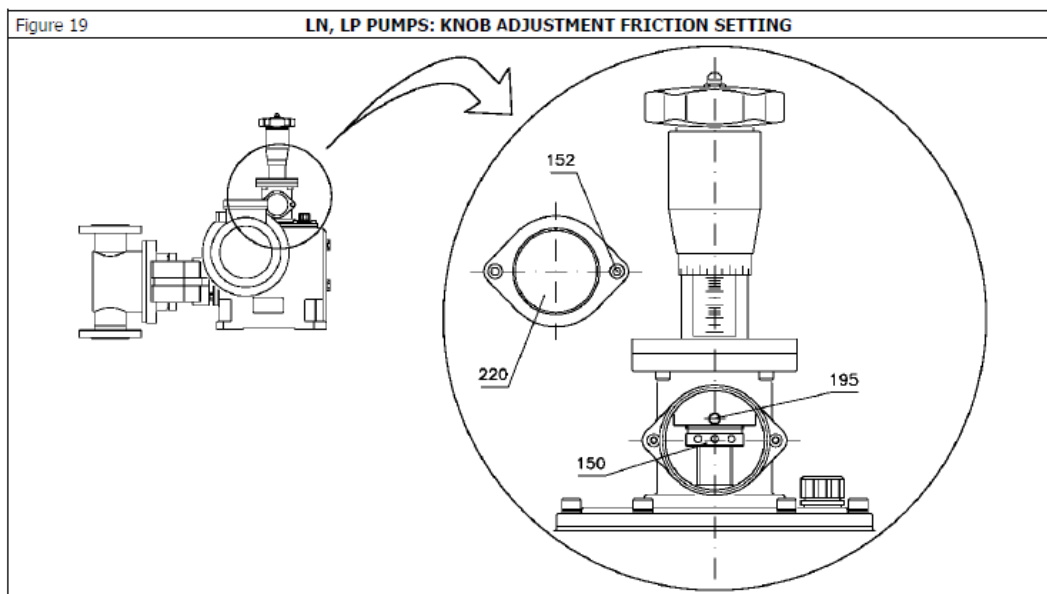
The knob, while pump is running, does not remain on the set position. Increase the friction as follows (see figure 19):

- Unscrew and keep the locking cap screws (pos.152)
- Remove and keep the window cap (pos.220), and single out the ring nut locking dowel (pos.195)
- Unscrew, almost completely, the ring nut locking dowel (pos.195)
- In order to increase the stiffness adjustment up to the required value, screw the ring nut (pos.150) by 5° max. at time checking each time the amounting friction by turning the knob
- As the required stiffness is reached, lock the ring nut (pos.150) by screwing, not tightly, the locking dowel (pos.195)
- Reassemble the cap (pos.220) and lock by the screws (pos.152).

8.4.2 Reduce the adjustment friction

Is difficult use the knob, the adjustment system is too stiff. Reduce the friction as follows (see figure 19):

- Unscrew and keep the locking cap screws (pos.152)
- Remove and keep the window cap (pos.220), and single out the ring nut locking dowel (pos.195)
- Unscrew, almost completely, the ring nut locking dowel (pos.195)
- In order to reduce the stiffness adjustment down to the required value, unscrew the ring nut (pos.150) by 3° max. at time checking each time the amounting friction by turning the knob
- As the required stiffness is reached, lock the ring nut (pos.150) by screwing, not tightly, the locking dowel (pos.195)
- Reassemble the cap (pos.220) by means of the screws (pos.152).



8.5 BEARINGS REPLACEMENT

Replace the bearings according to actual pump operating conditions:

- Every 20.000 operating hours, for continuous works at maximum performance
- Every 40.000 operating hours, for discontinuous works under less severe conditions

To mount the new bearings it is advisable to use a proper sleeve exerting pressure on the coupling ring. In case of shaft coupling, place and support the sleeve on the internal bearing ring. For coupling on the hole, put pressure instead on the outer ring. Make sure the surfaces of the relative seats are lightly oiled to help fitting.

8.5.1 Reassembling

Before reassembling, carefully clean internal parts and all components, ensuring above all that seals working surfaces have not been damaged. Pay particular attention while reassembling oil containment seals, especially taking care to preserve the integrity of the seal lips. Restore where needed the layer of grease on the contact surfaces, and then proceed with reassembly.

Before restarting the pump, turn the motor fan with a screwdriver, in order to verify the pump mechanism free movement to confirm the correct reassembling.

8.6 CHANGE OF INTERNAL SAFETY VALVE SET PRESSURE

The set pressure value of the internal safety valve (PSV) is indicated on the pump nameplate, see "Identification nameplate".

AVOID as much as possible his changing. When this operation is required, however, it must be performed only by expert, qualified maintenance engineers with highly specialized knowledge. Without said expertise avoid impromptu operations or attempts.



NOTE

NOTE: PULSAFEEDER EPO DECLINES ALL RESPONSIBILITY FOR ANY DAMAGE CAUSED BY MODIFICATIONS ON OR TAMPERING WITH THE PSV BY NON-AUTHORISED USERS. BEFORE OPERATING ON THE PSV, CONTACT PULSAFEEDER EPO CUSTOMER SERVICE TO DEFINE NEW LIMITS OF USE THAT WILL BE GUARANTEED ONLY AFTER A NEW NAMEPLATES FIXED TO THE PUMP.



NOTE

NOTE: THE INTERNAL SAFETY VALVE IS SETTED AND SEALED BY PULSAFEEDER EPO AT THE END OF FINAL TESTING. DO NOT REMOVE THE SEAL, DO NOT DISMANTLE THE PSV, DO NOT TAMPER WITH OR, WORSE, OPERATE DIRECTLY ON THE INTERNAL COMPONENTS. THESE ACTIONS COULD COMPROMISE THE SAFETY OF THE PLANT AND OF PERSONNEL AND WILL ALSO VOID THE GUARANTEE.

If modifying PSV set pressure is required and necessary, contact PULSAFEEDER EPO customer service (Tel +1 (585) 292-8028, proepo_service@idexcorp.com) stating the following:

- Type of metering pump (complete model number)
- Metering pump serial number or PULSAFEEDER EPO job number (as an alternative to the serial number)
- The actual PSV set pressure value (indicated on metering pump nameplate)
- The new set pressure value required

9 OTHER INFORMATION

9.1 FAULTS AND OPERATING PRPULSAFEEDER EPOEMS

The tables below are not exhaustive. They contain possible causes and suggested remedy for the most common and recurring faults.

9.1.1 Flowrate lower than expected

POSSIBLE CAUSE	REMEDY
Air enters from suction pipeline fittings	Check suction pipeline and tighten the fittings
Air trapped inside the pump	Set, and maintain for a short time, pump flowrate to 100% of the adjustment
Suction head (suction lift) too high	Reduce the suction head (suction lift)
Vapor tension too high	Increase the hydrostatic head on suction side
Pumping temperature too high	Increase the hydrostatic head on suction side
Handled fluid viscosity too high	Change suction pipeline with one of a larger diameter Increase the hydrostatic head on suction side
Suction tank sealed and/or without vent	Make a vent on top of suction tank
Filter on suction pipeline clogged	Check and clean filter, if necessary
Pumps valves dirty, worn or reassembled in wrong direction	Check the cleaning, wear and proper direction of assembly of pump valves
Safety valve pressure setting is too low	Check if the safety valve opens or not
Piston packing damaged	Check for any oil leaks
Wrong flowrate adjustment setting	Check and if necessary correct the adjustment setting

9.1.2 Flow rate irregular or higher than expected

POSSIBLE CAUSE	REMEDY
Suction pressure higher than discharge pressure	Increase the discharge pressure at least 0.3÷0.5 bar (3÷5 meters) respect the suction pressure
Backpressure valve stuck in open position because of dirty or set pressure is too low	Verify backpressure valve conditions
Pump valves jammed in open position	Verify pump valves, dismantle and clean them carefully

9.1.3 Overheating of pump body and/or motor

POSSIBLE CAUSE	REMEDY
Incorrect electrical connections	Check electrical connections and motor power consumption
Actual pump working pressure higher than the maximum allowed	Install a pressure gauge on the discharge pipeline to verify and reduce actual pump working pressure
Discharge pipeline may have reduced section causing a drastic increase of working pressure	Reduce the working pressure or install a pulsation damper to stabilize pressure (avoid the peaks)
Plant pipelines transmits stress to the pump connections	Verify and correct the pipeline connections to the pump, if necessary
Discharge pipeline clogged or valve closed	Check the discharge pipeline
Backpressure valve set pressure is higher than maximum allowed	Check the backpressure valve
Low level of lubricant oil or chemically contaminated	Check and if necessary change the lubricant oil

9.2 DISCONNECTION FROM THE PLANT AND SENDING TO PULSAFEEDER EPO FOR MAINTENANCE

BEFORE shipping, always contact PULSAFEEDER EPO customer service and operate as indicated in "Mandatory instruction for returning goods in PULSAFEEDER EPO".

9.3 STORAGE FOR LONG PERIODS

For long term storage (more than 6 months), in addition to those described in "Storage conditions" it is necessary to observe the following precautions:

- Before storage: protect unpainted surfaces with long-term anti-corrosion products
- Verify the conditions about every 6 months. At the first sign of corrosion clean and re-apply anti-corrosion products



NOTE: PARTICULAR STORAGE CONDITIONS SHOULD BE PREVIOUSLY REPORTED, IN ORDER TO PROVIDE A SUITABLE PACKAGING.

9.4 DISPOSAL AND DEMOLITION

The pumps are made of metal and plastic parts.

It is the end user's responsibility to respect the procedures and regulations in the country of operation, regarding disposing correctly of waste resulting from maintenance (consumption material) or the demolition of equipment.

"Waste" means any substance or object that the holder intends, or requires to discard. Waste is classified according to their origin in "urban waste" and "special waste" and also according to their harmfulness, in "dangerous waste" and "non-dangerous waste".



WARNING: WASTE DERIVING FROM PUMPS MAINTENANCE OR DEMOLITION, ONLY IF PROPERLY CLEANED, ARE CLASSIFIED AS "SPECIAL WASTE". OTHERWISE THEY ARE TO BE CONSIDERED AS "DANGEROUS SPECIAL WASTE".

Mixing "special waste" with "urban waste" is forbidden and especially mixing "dangerous waste" with "non-dangerous waste"

Briefly summarized:

- There is a Pulsafeeder Engineered Product signification not to dispose of "special waste" as "urban waste"
- "Special waste" must be subject of separate collection using public or private collection systems according to local laws (transferred to appropriate collection points approved)
- According to its use, the equipment may contain dangerous substances. Improper disposal may have adverse effects on human health and the environment
- Fines are provided in case of misuse or improper waste disposal

It is strictly forbidden to dispose of waste in the sewage system or leave waste in the environment. Contact your local waste disposal service to receive adequate and correct information.

10 MANDATORY INSTRUCTIONS FOR RETURNING GOODS TO PULSAFEEDER, INC.



NOTE: PULSAFEEDER, INC. WILL NOT RECEIVE ANY GOODS WITHOUT PREVIOUS AUTHORIZED RETURNED MATERIALS AUTHORIZATION (RMA)!

In the interest of the customer/user, please contact Pulsafeeder, Inc. technical service (Tel +1 585-292-8000, proepo_service@idexcorp.com) to acquire the RMA.

Following directions apply to ANY reasons for returning goods to Pulsafeeder, Inc., e.g.:

- Servicing, maintenance, upgrading, retrofitting;
- Functional/Performance check, checking of Warranty applicability;
- BRAND NEW goods return and application for credit note due to wrong ordering

Following directions apply to ANY reasons for returning goods to PULSAFEEDER ENGINEERED PRODUCTS, e.g.:

- Servicing, maintenance, upgrading, retrofitting;
- Functional/Performance check, checking of Warranty applicability;
- BRAND NEW goods return and application for credit note due to wrong ordering;

10.1 MANDATORY DIRECTIONS FOR SENDER

BEFORE shipping anything to PULSAFEEDER ENGINEERED PRODUCTS, ALWAYS contact PULSAFEEDER ENGINEERED PRODUCTS customer (+1 585-292-8000, proepo_service@idexcorp.com) to have **RMA number** (authorization number to return goods to Pulsafeeder, Inc.), returning information **and related forms**;



WARNING: PARTS CONSIDERED "HAZARDOUS" FOR IMPROPER CLEANING WILL BE REPLACED AND QUOTED AS A NEW SPARES

- Insert in the packing (courier often keep them): a copy of shipping documents and for each equipment, copy of duly fill-in declaration of conformity for shipping and of Material Safety Data Sheet of pumped/handled fluid;
- Pack the good in a proper manner to avoid damage during transit, and clearly indicate RMA number on packing;
- Ship goods as instructed on the RMA number to: Pulsafeeder, Inc., Inc. 2883 Brighton Henrietta TL Rd. Rochester, NY 14623 USA.



NOTE: THE SENDER IS AWARE OF THE PENALTIES PROVIDED FOR UNFAITHFUL STATEMENTS AND FALSITY IN ACTS. THE CUSTOMER IS ALSO RESPONSIBLE FOR DAMAGE TO PERSONS OR PROPERTY RESULTING FROM SUCH ACTIONS.

10.2 CLEANING OF EQUIPMENT

Take appropriate and adequate protection measures to ensure and guarantee safety at work for the operator.

In the case of machines working with chemicals product (e.g. acids) pay the greatest attention to the most appropriate choice of liquid to do this operation properly and safely, and also preserve the integrity of the machinery.

Present information does not replace any existing standard or requirement for safety. Pulsafeeder, Inc. declines any responsibility for damages to persons or property.

10.3 GOODS REJECTED TO SENDER

If PULSAFEEDER ENGINEERED PRODUCTS receives the goods:

- Not properly cleaned
- PUMPS: With pump head not properly dismantled and cleaned
- WITHOUT an RMA number (authorization number) on shipping documents and/or on the packing itself
- With chemicals in the packing

They WILL NOT be accepted (nor service will be done) and will be sent back at sender's expense!

11 OVERALL AND SECTIONAL DRAWINGS

Considering the importance of such documents (subject to changes or updates) we believe that they should not be an integral part of the present instructions manual. Unless agreed otherwise with the customer, they are therefore manually attached (latest edition).



PULSA[®] Series 6270

HYDRAULIC DIAPHRAGM METERING PUMP

Bulletin: IOM-PUL-6270-1008-Rev.A



A unit of IDEX Corporation
2883 Brighton Henrietta Town Line Road
Rochester NY 14623
+1 (585) 292-8000
www.pulsa.com
pulsa@idexcorp.com