

CE



IRIONDO
Soluciones en bombeo

**Instructions manual
Stainless steel gear pumps**



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1. General information

1.1. User information

This operating manual includes important instructions on how to use the gear pump correctly and safely. It is therefore essential that the technician in charge of installing it reads and understands these instructions before commissioning. These instructions must be kept safe and available for consultation in the place of operation at all times.

The manual does not include legislation, rules and regulations in the country where the pump is sold. The installing technician is in charge of ensuring compliance with these regulations.

If you have any questions, please let us know the following details for each pump: model, type of seal (mechanical or packing) and, if coupled to a motor or geared motor, its power and revolutions, along with any particular specification.

1.2. Instructions

This gear pump should only be used in accordance with the original specifications of the pump and the instructions manual.

The manufacturer is not liable for any injury or damage caused by improper use.

1.3. Warranty

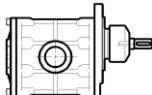
See the general sale terms and conditions to apply the pump's warranty.

The warranty includes the replacement or repair, free of charge, of all defective parts acknowledged by the manufacturer. This would be cancelled in the following cases:

- If use does not comply with the instructions described in this manual (see 2.2.).
- In the event of any modification or manipulation of the pump or its parts without the manufacturer's authorisation.
- In the event of lack of maintenance.

2. Description of the gear pump

Type AL



Stainless steel gear pump for pumping and decanting liquids with some viscosity.
Suitable for the food, chemical, pharmaceutical industries, etc.
Can be coupled to a 4, 6 or 8 pole electric motor, forming a compact monoblock unit.
Flow rates between 1,5 - 200 l/min.
Working pressure between 0 - 100 metres.
Watertight integrity by means of packing or mechanical seal.
Made from stainless steel AISI 316 and stainless steel AISI 420
Approvable according to ATEX regulations.

2.1. General description

Gear pumps are rotary volumetric pumps consisting of two gearwheels driven via a shaft which, once engaged, rotate in a chamber to produce a pressure difference between the pump inlet and outlet.

We offer a wide range of pumps, in accordance with their field of use. All C.M.I. gear pumps are described in the table above.

2.2. Proper use of the gear pump

C.M.I. gear pumps are designed to work with clean liquids, without any abrasive parts that will attack their materials. The revolutions the pump turns at, must be in accordance with the viscosity of the liquid to be decanted, as shown in the data sheet.

It is very important that the liquid to be pumped is within the following values;

| | |
|---------------------|---|
| Liquid | Cooling emulsion, cutting oil or cooling oil. |
| Kinematic viscosity | 1 – 2500 mm ² /s |
| Temperature | 0 – 180 °C |

Please ask us if the liquid conditions are different to those in the table.

2.3. Misuse of the gear pump

Any use other than that described in point 2.2. or that exceeds the mentioned limits will be considered non-compliant and will not be covered by the warranty.

3. Safety instructions

3.1. General information

All safety regulations and laws in the country and/or company where the pumps will be used must be followed.

The following symbols will be used in this manual to draw your attention to hazards.



CAUTION! Danger of injury.

Hazard warning.



CAUTION! Danger of injury.

Electrical hazard warning.



INFORMATION

Indications and warnings for correct handling.

- It is essential that the technician in charge of installing the pump reads and understands these instructions before commissioning. These instructions must also be kept safe and available

for consultation in the place of operation at all times.

- Electrical equipment must only be installed and maintained by a qualified electrician.
- The pump is designed to work in ventilated places protected from the weather, remembering that the maximum ambient temperature without loss of power in the electric motor is 40 °C.

4. Transport, storage and installation

The pumps are packed in specially made boxes to ensure optimal shipment. For ease of transport, the heaviest, bulkiest motor pumps (pump coupled to motor or geared motor) are usually placed on a pallet.



Check that the packaging has not been damaged during transport.
Loading other goods on top is not allowed.

3

4.1. Transport

The motor eyebolts are designed to lift only the weight of the motor. Only lift the gear pump or motor pump with lifting and loading equipment that is in a perfect condition and can withstand the load.



Risk of crushing during pump assembly and disassembly.

4.2. Storage

The gear pump must be stored in an environment which is dry, with constant temperature, is well ventilated and free of vibrations, even during short storage periods.

If the pump is fitted with feet, these should be used for support when storing; in the case of flange pumps, store so the end of the shaft is not subjected to any load.

The protective plugs in the inlet and outlet must not be removed before starting up the pump at the envisaged location.

Whenever possible, greasing the inside of the pump with oil compatible with the liquid to be decanted is recommended before assembling after long periods of storage.

4.3. Installation

The customer must ensure that the pump installation site is suitable. The environment where it is installed must comply with the requirements set out in section 3.1. General information.

If the gear pump is coupled to an electric motor or geared motor, the assembly space must be duly sized to ensure sufficient cooling of the motor.

Installing and commissioning in areas with a potentially explosive atmosphere is strictly forbidden unless the motor pump is ATEX certified.

4.3.1 Installing pipes

Perfect operation of the pump depends directly and largely on proper assembly, both in terms of suction and delivery.

It is essential to ensure the pump's suction inlet is completely clean and free.

- Suction pipe

The suction pipe must have a diameter at least equal the diameter of the pump inlet mouth. A larger diameter can be used below suction level.

The maximum flow speed indicative value for the suction pipe is 1,5 m/s.

All bends that must be included in the pipe should have the largest radius possible, avoiding sharp turns. The suction pipe must slope up to the pump. Fit air bleed screws at the highest points if ascending and descending pipes are to be installed.

Installing a filter at the pump suction connection point is recommended in order to prevent foreign bodies from entering the pump and causing it to seize up, become blocked or wear prematurely. This filter should be sufficiently sized, as the internal resistance it implies reduces the pump's suction capacity. If suction height of 4 metres (the standard value guaranteed by the factory) is exceeded, installing a foot valve in the intake pipe is recommended in order to ensure correct suction.

- Delivery pipe

It is important for the delivery pipe's diameter to match at least the diameter of the pump's outlet. If it were lower, there would be an increase in liquid flow speed and pressure, causing an unforeseen increase in consumption.

Beyond this, fitting a safety device such as an external safety valve would be essential were the pump to work in the event of closure or a dramatic pipe reduction, in order to ensure any excess fluid returns to the suction side and the motor is protected from excessive overpressure.

The maximum flow speed indicative value for the delivery pipe is 3,0 m/s.

A pressure gauge and a shut-off valve must also be installed in order to regulate flow and pressure.

4.3.2 Installing the tank



Always respect the maximum and minimum liquid levels.

It is very important to leave a minimum distance of 20 mm between the bottom of the tank and the suction pipe.

A proportional filtering system should be fitted if the liquid to be pumped contains a lot of solid particles or these particles are large in size.

In a closed system, care must be taken to ensure the total volume of transported liquid is not too small, in order to prevent inadmissible heating caused by frequent circulation.

4.3.3 Electrical installation

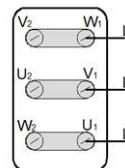
The electrical connection must be made by a qualified company or individual, always in accordance with local rules, whenever the pump is coupled to an electric motor or a geared motor.

Good electrical installation is vital to pump assembly, making it essential to check that the line section from the electrical equipment through to the motor is enough to maintain the required voltage without any oscillations.

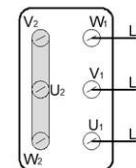
A motor protection relay or magnetothermic switch must also be installed to ensure the pump stops in the event of overload or phase failure.

There must be no foreign bodies, dirt or moisture in the junction box. Hermetically seal the junction box to prevent the ingress of water and dust, but without blocking the unused cable inputs.

If the gear pump is supplied with a single-phase motor, the electrical connection must be carried out in accordance with the diagram on the terminal box cover. The connection must comply with the following layout if the supplied motor is three-phase, depending on whether it is a triangle or star configuration:



Three phase connection Δ
(low voltage)



Three phase connection Y
(high voltage)

- Checking turning direction

If the pump's turning direction is determined by the seal installed, this direction must match the motor's turning direction. To check, turn on and off quickly (not exceeding 10 seconds).

If turning direction is incorrect, change either of the two phases L1, L2 or L3 in the motor's terminal box.

5. Commissioning

5.1. Observations before commissioning

Make sure the requirements below are met before starting up the pump for the first time.

1. The motor's electrical connection is correct and meets all safety requirements.
2. There is sufficient liquid level in the tank.
3. The suction mouth is clean and all sealing devices are open in the suction part.
4. The pump shaft turns without any problems.
5. It is worthwhile charging the pump with the liquid to be decanted.

Pay special attention to the following points:

- The temperature of the liquid must never exceed that specified in section 2.2.
- To avoid a large temperature increase in the motor and excessive stress on the pump, the

motor starting frequency should not exceed the following reference figures.

| Motor power [kW] | Maximum starting frequency per hour |
|--------------------|-------------------------------------|
| Up to 3,00 | 20 |
| From 4,00 to 11,00 | 15 |

- The density of the liquid must match the data shown in the specifications in order to prevent the motor from overheating (see point 2.2.).

5.2. First start-up

Pay attention to turning direction when starting up the pump. In models with a packing nut, turning must be in accordance with the nut's tightening direction. Turning will be clockwise unless otherwise requested. The pump can turn independently in both directions when a locknut is fitted. In models with a mechanical seal, turning direction is determined by the direction of the spring. A mechanical seal can be supplied on request in order to work in both directions.

The same liquid as the liquid to be pumped should be included inside stainless steel gear pumps when assembling. This helps prevent dry start-up that could damage essential parts of the pump, which is even more important in smaller models (below GAS 1") where the pump's suction capacity is lower.



The pump must be turned off immediately if any shaft vibrations or noises are observed.

6. Maintenance and repair

The gear pump must be monitored carefully during operation, paying particular attention to the following points.

- The pump must turn without any vibrations, jerks or strange noises.
- The pump must always work with liquid; if there is a risk of a lack of liquid, a level probe must be

fitted in the tank to shut down the unit when the liquid drops below a preset level. Moreover, pumps fitted with a mechanical seal must always turn in the direction indicated by the arrow on the pump, in order to prevent damage to the spring.

- Regularly check that current consumption does not exceed the value shown on the nameplate.
- Check that the thermal relay is set to 125% of the consumption shown on the motor's nameplate.
- Regularly inspect and clean the filters and/or other dirt separators installed in the system, and regularly check the watertight integrity of the output shaft.
- It is worthwhile cleaning with water or another non-aggressive product whenever the pump has been shut down for a length of time. Cleaning duration and frequency should be decided on a case-by-case basis, in accordance with the liquid the pump has been decanting.
- Depending on the complexity of the pumped product, the pump may need to be taken down regularly for thorough cleaning. This should be done following its plane, respecting the assembly position for each part.
- For pumps fitted with a packing seal, regularly retighten the stuffing box nut until it drips slightly (4 - 6 drops per minute).

The nominal service life of the packing is estimated at 5000 working hours; however, this may be shortened due to temperature, characteristics of the liquid, etc., making it advisable to replace it sometime earlier.

All worn packing should be replaced, introducing the rings one by one with the cuts offset 90° to each other. The number of rings to be installed can vary between 3 and 5, depending on the model.

The most common causes of failure or malfunction are detailed below, as well as their solutions.

| Problem | Possible cause | Solution |
|---|--|---|
| The pump doesn't turn. | No power to the motor. | Check the condition of the electrical equipment that supplies the motor. |
| The pump works but does not deliver any flow. | Insufficient minimum liquid level. | Fill the tank with refrigerant liquid until the indicated minimum level is exceeded. |
| | Suction mouth and/or internal organs of the electropump blocked. | Make sure the suction inlet is clean. Take down the pump and clean the gears and other elements where there is dirt or solid particles. Prefiltration of around 200 microns is recommended in these cases. |
| | Excessive suction pressure height. | Lower the pump to a level closer to the liquid. Maximum suction height is 6 - 7 mWC, which is influenced by the temperature of the liquid and the height above sea level. |
| | Excessive total pressure height. | Review and check the geometric heights, pipe runs, bends and other accessories in the facility; a foot valve and initial charging may be required. |
| | The motor turns in the opposite direction to the arrow. | Interchange 2 of the 3 motor power phases. |
| | Formation of air pockets in the pipe. | Make sure the suction pipe is kept constant, without any siphoning, and ensure no air enters at any point (see 4.3.1). |
| | Motor speed too low or zero. | Check the motor's winding, replacing it with a new one if necessary. |

| Problem | Possible cause | Solution |
|------------------------------|--|--|
| | Liquids with characteristics (viscosity, etc.) different to oil. | Pre-filling the pump, occasional charging and even installing a foot valve may be required, depending on the liquid to be decanted and its characteristics. There are some products which, given their characteristics or because we wish to carry out exact dosing, require the pump to be installed below suction level. Check with our technical service if you have any questions. |
| Pump leaks. | Wear in the pump's internal parts. | Take down the pump and check the fitting of the worn parts, changing replacing them if necessary. |
| | Poor watertight integrity. | Meticulously check the watertight integrity of the pump's seals and the joints to other sleeves and accessories. Replace any seals in a poor condition. |
| | The pump leaks liquid from the shaft. | Monitor the degree of dirt in the refrigerant liquid. Liquids with solid particles in suspension can easily scratch and wear the faces of the mechanical seal. For pumps fitted with a packing seal, retighten the stuffing box nut with the pump running until it is almost hermetic. Leave a constant drip of 4 - 6 drops per minute for the packing gland to cool down. |
| Excessive motor consumption. | High liquid viscosity | The motor can become overloaded due to two main causes. Excessive pressure or an increase in the viscosity of the liquid, which may have been caused by a drop in temperature. In the first case motor power would have to be increased; the second case can be resolved by insulating the pipe to reduce viscosity or lowering the revolutions. |

7. Spare parts

7.1. Part order

The following information must be provided when ordering spare parts for the gear pump.

- Pump model.
- Watertight integrity details (packing or mechanical seal).
- References of the parts to be replaced and their quantities.

This information makes it a lot easier for us to deliver the right spare parts for your pump.

7.2. Factory repair

Whenever the pump is returned to the factory for repair or modification, be sure to include precise information about all the faults observed and details of the fluid pumped.

7.3. Parts view

See the exploded view sheet. Ask your supplier if you don't have one.

8. Appendix

8.1. Disposing of the pump

The pump must be disposed of in accordance with local rules and regulations when it is so damaged or deteriorated that it cannot be repaired.

The procedure to be followed would be as follows:

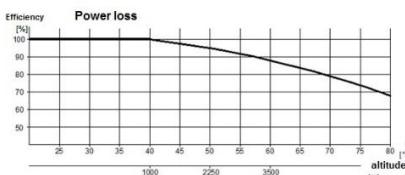
- Before disposing of the pump: collect the outgoing pump fluid and dispose of it separately according to local regulations.
- Separate the plastic and rubber parts, and deliver them to a specialist centre for treatment.
- Scrap the metal parts.

Pump components must not be disposed of into the environment.

8.2. Loss of motor power.

The motors we provide are suitable to work within the parameters described in the specifications table. If the aim is to work at a higher pressure, report this circumstance so we can include a bigger motor.

Motor power is calculated to work at sea level with an ambient temperature of 20°C. This may be reduced at temperatures above 40°C or at an altitude above 1000 m due to low air density.



8.3. Loss of pressure.

Flow resistance is calculated using the following table:

| Accessory | GAS | | | | | |
|----------------------------|-----|------|--------|-----|--------|-----|
| | 1" | 1/4" | 1 1/2" | 2" | 2 1/2" | 3" |
| Equivalent pipe length [m] | | | | | | |
| 45° bend | 0,2 | 0,2 | 0,4 | 0,4 | 0,6 | 0,6 |
| 90° bend | 0,4 | 0,6 | 0,9 | 1,1 | 1,3 | 1,5 |
| 90° gentle bend | 0,4 | 0,4 | 0,4 | 0,6 | 0,9 | 1,1 |
| Check valve | 1,1 | 1,5 | 1,9 | 2,4 | 3,0 | 3,4 |

The table is validated with Hazen-Williams coefficient C=100 (cast iron pipe). For steel pipes, multiply the values by 1.41. For stainless steel and copper, multiply the values by 1.8.



EC Declaration of Conformity

The company **Construcciones Mecánicas Iriondo S.A.**, holder of VAT number A-20076857, located in Mendarozabal, 15 - 20850 Mendaro (Gipuzkoa), declares that it is solely liable for the following elements manufactured by it:

Type AL STAINLESS GEAR PUMPS

Comply with the following directives:

| | |
|-----------------|---|
| 2006/42/EC | Council Directive on Machinery Safety. |
| 2006/95/EC | Council Directive on Low Voltage. <i>If coupled to an electric motor or geared motor.</i> |
| 2004/108/EC | On Electromagnetic Compatibility. <i>If coupled to an electric motor or geared motor</i> |
| 1994/9/EC | Council Directive on Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres. |
| EN 1127-1:2011 | Council Directive on Explosive Atmospheres. |
| EN 13463-1:2009 | |
| EN 13463-5:2011 | Council Directive on Non-Electrical Equipment Intended for Use in Potentially Explosive Atmospheres. <i>Only pumps with mechanical seal.</i> |
| EN 13463-8:2003 | |
| 1935/2004/EC | Complies with the European regulation on materials and articles intended to come into direct or indirect contact with food. <i>Made from AISI 316</i> |
| 10/2001/UE | Commission regulation for Materials and plastics intended to come into contact with food. |

The following standards were checked to ensure compliance with the safety requirements set out in EC directives.

ISO 12100:2010 EN 809/A1:2009 60204-1:2006/A1:2009 61000-6-3:2007/A1:2011

Starting up these machines before the machine they will be part of has been declared compliant with the provisions of the Machinery Safety Directive is forbidden.

Pay attention to the instructions and specifications in the pump's installation manual before and during commissioning and also in subsequent maintenance.

The EC Declaration of Conformity was issued in/on:

Mendaro, 22nd July 2018

A handwritten signature in black ink, appearing to read "Ignacio Iriondo".

Ignacio Iriondo
Technical Director
Construcciones Mecánicas Iriondo S.A.

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