



IRIONDO
Soluciones en bombeo

Instructions manual
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

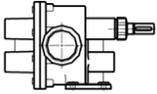
See the general sale terms and conditions to apply the pump's warranty.

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.

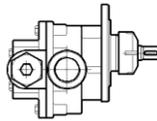
2. Description of the gear pump

Type A



Gear pump for pumping and decanting non-oxidising liquids with some viscosity.
 Can be coupled to an 8 pole electric motor or a geared motor.
 Flow rates between 1,5 - 500 l/min.
 Working pressure between 0 - 10 bar.
 Watertight integrity by means of packing seal. *See mechanical seal.*
 Made from Iron, Iron - Stainless and Bronze.
 Approvable according to ATEX regulations.

Type F



Gear pump for pumping and decanting low viscosity non-oxidising liquids.
 Can be coupled to a 4, 6 or 8 pole electric motor, forming a compact monoblock unit.
 Flow rates between 1,5 - 400 l/min.
 Working pressure between 0 - 25 bar.
 Watertight integrity by means of packing or mechanical seal.
 Safety by-pass valve built into the cover.
 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, non-corrosive, 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 a general rule, the maximum revolutions are 1500 rpm in Type F and 600 rpm in Type A. See the characteristics sheet for further details.

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

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

Gear pumps suitable for working up to 250 °C can be supplied on request.

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.

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4. Transport, storage and installation

The pumps are packed in specially made boxes to ensure optimal shipment. The heaviest, bulkiest electropumps (pump coupled to motor or to geared motor) are mounted on a pallet for easier transport.



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

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 SAE 30 or SAE 40 lubricating oil 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.

Type F pumps already have a bypass valve built in as standard.

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 Installation in 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.

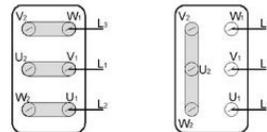
Good electrical installation is vital to pump assembly, making it essential to check that the line section from the electrical equipment through to the motor is enough to maintain the required voltage without any oscillations.

The motor or geared motor must also be installed with suitable thermal protection and a magnetothermic switch to ensure the electropump 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

The motor's turning direction must match the arrow direction on the pump. 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 freely.

Pay special attention to the following points:

- The temperature of the liquid never exceeds the maximum specified (see point 2.2.) or is so low that it alters the viscosity characteristics of the product, meaning it cannot be decanted.
- 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, except for agricultural pumps or special requests. 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 Type pumps can work in both directions, conditioned only by the nut, while in the case of F Type pumps, which normally have a built-in safety valve, the liquid inlet will be on the side where this is located.

Proceed as follows if the opening pressure of the safety valve in F Type pumps needs to be regulated:

- a) Unscrew the valve plug (17).
- b) Pressure can be increased by turning the tensioner stud (16) which is now accessible clockwise (tightening).
- c) Pressure can be reduced by turning the tensioner stud (16) anti-clockwise (loosening).
- d) When the pressure adjustment is complete, fix the position of the regulation screw using the locknut and screw the valve cap back on.

Indicative value for pressure adjustment: around 10% above the system's service or working pressure.

Note on Type F pump valves: the maximum allowable pressure for these valves is closely related to the working speed and the type of spring installed. Pressure can be regulated between 1,5 and 12 bar for a standard pump at 1500 rpm with SAE 30 diesel oil. A larger spring should be installed if working at a higher pressure.



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 values 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.
- For pumps fitted with a packing seal, regularly tighten 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 syphoning, 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.
Strange noise or vibration in the shaft.	Wear in the pump's internal parts.	Take down the pump and check the fitting of the worn parts, replacing them if necessary.
Pump leaks.	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.

The pump model is shown on its cover. This information makes it 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.

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:

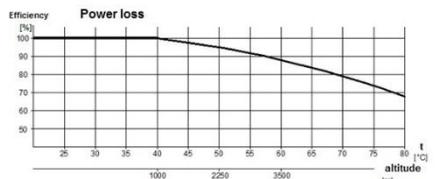
- Before disposing of the pump: collect the outgoing pump fluid and dispose of it separately according to local regulations.
- Separate the plastic and rubber parts, and deliver them to a specialist centre for treatment.
- Scrap the metal parts.

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 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 A and Type F 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	Council Directive on Non-Electrical Equipment Intended for Use in Potentially Explosive Atmospheres . <i>Only pumps with mechanical seal.</i>
EN 13463-5:2011	
EN 13463-8:2003	

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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 2019

Ignacio Iriondo Saint-Gerons
Technical Director
Construcciones Mecánicas Iriondo S.A.

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