

MIV

Vertical multistage centrifugal pumps

Installation and maintenance

MIV pumps

1 - GENERAL

The MIV series of vertical, multistage, centrifugal electro-pump units should be installed in accordance with the instructions in this manual. They must not be used in duty conditions other than those indicated in this document.

Should these instructions not be adhered to, or the equipment be modified in any way without LEROY-SOMER's approval, the guarantee is immediately rendered null and void.

LEROY-SOMER cannot be held responsible if the instructions contained in this document have not been followed.

This manual does not take account of existing safety recommendations and regulations which may be in force where the equipment is installed. It is the responsibility of the user to ensure that these are applied and adhered to.

2 - USE

The MIV series of vertical, multistage, centrifugal electro-pump units are designed to carry water and any other clear liquid which is non-contaminated, non-abrasive, non-explosive and compatible with the material of which the pump is made.

For any other pumped liquid : please consult LEROY-SOMER.

- maximum content of solid particles in suspension : 50 g/m³ ;
- maximum temperature of pumped liquid : 120 °C ;
- minimum temperature of pumped liquid : - 15 °C ;
- maximum ambient temperature : 40 °C ;
- maximum duty pressure of the pump (on lift) :
- 16 bar for pump bodies with oval flanges,
- 25 bar for pump bodies with round flanges.
- maximum suction pressure : 10 bar ;
- density of pumped liquid : 1 ;
- viscosity of pumped liquid : 1 mm²/s.

3 - CHARACTERISTICS

The MIV series of electro-pumps have been designed with "in line" suction and discharge ports on the lower body.

This makes installation easier and, if necessary, the hydraulic unit can be removed without dismantling the pipes.

3.1 - Flanges

- PN 16 oval bodies.

The pump is supplied with cast-iron oval flange adapters for screw-on tubes, joints and bolts.


- Round PN 25 bodies.

The pump is supplied with joints and bolts without flange adapters (optional).

Each electro-pump unit has two identification plates, one which defines the hydraulics, the other the motor.

3.2 - Hydraulic characteristics

The hydraulic characteristics are guaranteed to conform to international standard ISO 2548 class C for mass-produced pumps.



TYP	MIV 3,7
N°	A 970371
H max	82 m.


MOTEURS LEROY-SOMER

Total maximum manometric lift in metres _____

Electro-pump serial number _____

Type of electro-pump _____

3.3 - Electrical characteristics

		Mot 3 ~ LS 80		CE		— Type of motor
		N° 343566DG001		kg		— Motor serial number
IP 55	cl F	°C 40	S	S 1		
V	Hz	min ⁻¹	kW	cos φ	A	
Δ 220	50	2810	1,1	0,86	4,50	Rated current
Y 380		2810	1,1	0,86	2,60	
Δ 230	50	2825	1,1	0,82	4,50	Power factor
Y 400		2825	1,1	0,82	2,60	
Δ 240	50	2845	1,1	0,78	4,60	Rated power
Y 415		2845	1,1	0,78	2,70	

Speed of rotation _____

Frequency _____

Supply voltage _____

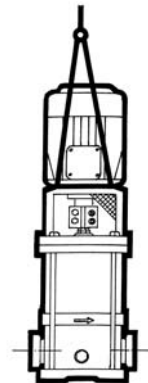
Connection _____

4 - HANDLING

On receipt of the equipment, ensure that it has not been damaged in transit. If any damage is apparent, make the necessary representations to the haulier.

Electro-pump units should be handled and unpacked with care.

We recommend the unit is handled as shown in the sketch below.



MIV pumps

5 - STORAGE

In good storage conditions, our electro-pumps are not at risk of deterioration.

They should be stored in dry, enclosed areas, away from inclement weather conditions, dust, vibration, and shocks.

If there is a risk of freezing temperatures in the storage area, ensure that the pump has been drained.

Do not place units leaning against the motor fan cover.

Before commissioning or re-commissioning an electro-pump unit, always read the instructions contained in this manual and follow them carefully.

6 - INSTALLATION

Electro-pump units must be installed by personnel suitably qualified to undertake this type of work.

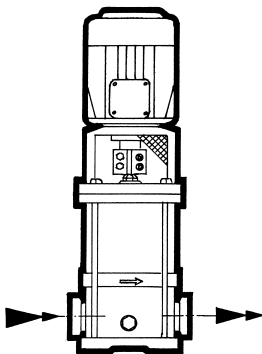
Install the unit as close as possible to the water supply in an easily accessible location.

The suction and delivery pipes must be fitted in such a way that they do not create any mechanical force on the body of the pump.

We recommend using sealing bolts to fix the unit onto a concrete pillar with a minimum thickness of 100 millimetres.

If necessary, wedge it in position so that the pump shaft is vertical.

Place some form of insulating material (cork, toughened rubber, etc.) under the concrete pillar to prevent transmission of noise and vibration.



Note : when installing the pump, bear in mind that its suction lift is linked to the temperature of the fluid being pumped and the altitude of the pumping location.

The unit should be installed in a well-ventilated location, sheltered from inclement weather conditions.

Pumps should be connected to pipes via :

- threaded tubes screwed directly into the tapped oval flange adapters (for pumps with PN 16 bodies) ;
- tubes soldered into the round flange adapters supplied as an option (for pumps with PN 25 bodies).

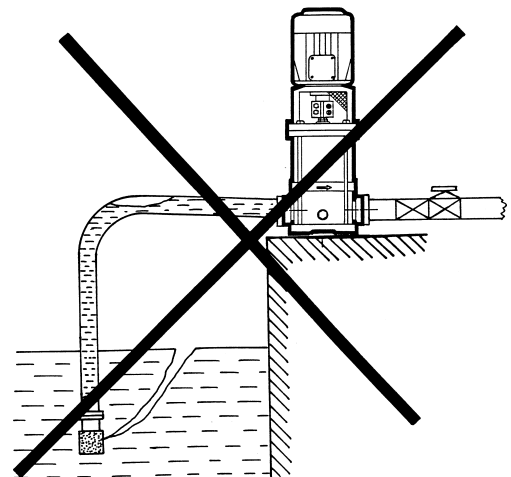
6.1 - Suction pipe

This pipe must be large enough in diameter to avoid significant loss of pressure. It must be absolutely watertight, capable of resisting depressurisation and should not have any high points.

A watertight inlet filter valve must be fitted at the bottom end.

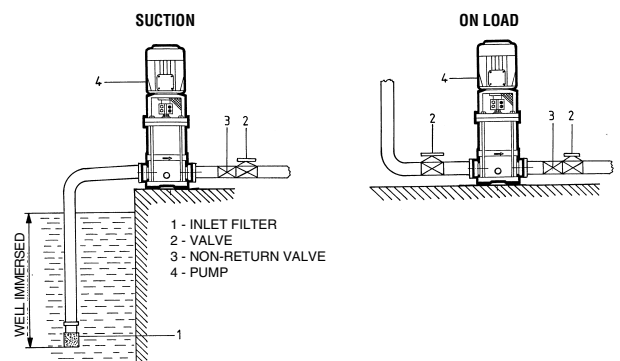
An incline of 2 % rising towards the pump is advisable to ensure that no liquid remains in the pipe.

The inlet filter should not allow the passage of particles larger than 2 mm. It should be placed at a depth below the lowest water level so that outside air cannot be siphoned in, and kept away from the walls and the bottom of the well.



If the pump is working on load, the bottom valve is replaced by an isolation valve on the pump.

The direction of fluid circulation is indicated by an arrow on the body of the pump.



6.2 - Delivery pipe

The diameter of this pipe should be chosen after first carefully calculating the installation pressure losses.

Place a flow-control valve on the pipe and a non-return valve upstream of this valve.

MIV pumps

6.3 - Before commissioning

- Make sure that the electro-pump rotates freely without sticking. To do this, remove the ventilation cover and rotate the fan a few times by hand.
- Fill the suction pipe and the pump with the liquid to be pumped, taking care not to let any air get in, by unscrewing the filler cap : part. no. 90. To do this, rotate the electro-pump shaft until water comes out with no air bubbles.
- Check that the bottom inlet filter valve is watertight and the water level has not dropped near to the opening : part. no. 90.
- Screw the filler cap back on : part. no. 90.

7 - ELECTRICAL CONNECTION

Electrical connection must be performed by a qualified electrician taking any existing regulations into account.

If the electro-pump unit has been stored in damp conditions, check the motor insulation resistance before commencing any electrical connection. This should be a minimum of 10 megohms in cold state at 500 volts for a period of 60 seconds.

7.1 - Power supply

Make sure that the power supply indicated on the motor identification plate corresponds to the actual electricity supply.

Check that the diameter of the meter incoming and outgoing conductors is adequate to supply the unit with the correct power.

7.2 - Connections

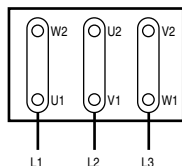
The motors are supplied with the following connections :

3-phase :

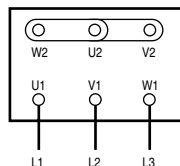
- Δ 230/Y 400 V up to 4 kW inclusive at 50 Hz.
- Δ 400 V 5.5 kW and above at 50 Hz.

Make absolutely sure that the type of connection corresponds to the mains supply voltage.

It should be connected as shown in the diagram below, which appears on the terminal box lid :



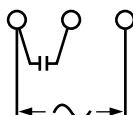
Δ connection



Y connection

Single phase :

- 230 V single phase 50 Hz.



7.3 - Protection

Connect to earth as required by existing regulations.

In order to benefit from the guarantee, it is essential to protect the motor electrically by placing a thermal magnetic circuit-breaker between the isolator and the motor. This circuit-breaker may also be fused.

Before starting up the unit, the circuit-breaker should be set provisionally to the correct current (shown on the identification plate) for the corresponding mains supply voltage.

Definitive setting should be performed as instructed in paragraph 8.

So as not to subject the unit to excessive temperature rises, a maximum number of 20 starts per hour should not be exceeded.

The number of starts should be spread over the hour.

8 - STARTING THE PUMP UNIT

An electro-pump unit must never be run dry. This is very important to ensure the mechanical seal remains watertight.

- Open the intake valve (for an on-load pump).
- Fill the pump and suction pipe with the liquid to be pumped.
- Close the outlet flow-control valve.
- For electro-pumps with 3-phase motors, make sure that the direction of rotation is that indicated by the arrow on the pump mounting, by running the motor for a couple of turns.
- If the direction of rotation is reversed, modify the connection to the motor terminal block by reversing 2 power supply wires.
- After starting, once the motor has reached its operating speed, make sure that the back pressure is normal, and not subject to significant fluctuations. If this is not the case, stop the pump and re-fill it. If the problem persists, look for air getting into the suction pipe.
- If the motor is not running fast enough, check the connection.
- Gradually open the pressure valve until the desired flow or pressure is achieved.
- Take care not to leave the pressure valve closed for more than 5 minutes.
- With the unit operating normally, measure the maximum current drawn on each phase. Set the circuit-breaker for a slightly higher current than the maximum measured. The latter must never exceed the current indicated on the motor identification plate.
- Check that the voltage between phases at the motor terminals is correct.
- Any disruption to operation indicates abnormal pump operating conditions (voltage drop, loss of phase, incorrect setting, foreign body in the pump, sludge, etc.).
- The unit should turn smoothly without vibrating.
- Never run the unit with a closed valve (whether the intake or the pressure valve).

Running the pump unit dry is absolutely prohibited.

Warning : when pumping hot water, watch out for splashes and risks of scalding.

Motor - Drain holes :

There are holes at the lowest points in the motor shields to drain condensates formed during cooling of the machines.

From time to time, the plastic plugs covering these holes should be removed and then replaced.

9 - STOPPING THE PUMP UNIT

- If the unit is not fitted with a non-return valve, close the pressure control valve to avoid water hammer.
 - Switch off the electrical supply to the motor.
 - In the event of prolonged stoppage and / or risk of freezing, drain the suction and delivery pipes as well as the pump itself, or take precautions against freezing by appropriate methods.
- To drain the pump, unscrew the special cap, part. no. 89.

10 - SERVICING

Practically no servicing is required.

The bearings are permanently greased, and do not therefore require any attention.

The mechanical seal must be changed if noticeably worn or leaking.

- Pump units installed as backup equipment should be run for a short time once a week, to ensure that they are working properly.

We recommend dismantling the electro-pump after 5 years or 10,000 hours of operation in order to examine parts subject to wear (mechanical seal, etc.) and to replace them if necessary.

If the unit has not been used for a long period, check that the pump has not seized (rotate it using the end of the shaft at the fan end).

11 - DISMANTLING - REASSEMBLY

Dismantling and reassembly of an electro-pump unit must be performed by personnel qualified to carry out this type of work.

Where one or more components of the electro-pump are being replaced (spare parts), it is essential that only parts supplied by LEROY-SOMER are used. Failure to comply with this instruction invalidates the guarantee, and relieves the manufacturer of responsibility for any malfunction. Any person tampering with an electro-pump unit is responsible for the consequences.

Before commencing work on the unit :

- Disconnect the unit from the electrical supply.
- Close the intake and outlet valves.
- Check that the pump body is not under pressure.
- Drain the pump.
- Wait until the pump body has reached ambient temperature.

11.1 - Dismantling

After disconnecting the motor, remove the suction and delivery pipes, then proceed as indicated below :

11.1.1 - Removing the motor

- Unscrew the tie rod of the protective grille, part. no. 69, and remove it.
- Unscrew the 4 motor fixing screws, part. no. 2.15.
- Remove the motor, part. no. 101.

11.1.2 - Removing the mechanical seal

The mechanical seal can be changed without removing the hydraulic sub-assembly.

- Unscrew the shaft end screw, part. no. 84/1, which fixes the coupling sleeve, part. no. 88.
- Remove the shaft end washer, part. no. 3.84/1.
- Unscrew the 4 coupling sleeve locking screws, part. no. 2.88.
- Unscrew the 4 tie rod nuts, part. no. 2.64, and remove the washers, part. no. 3.64.
- Remove the mount, part. no. 15, with the base, part. no. 11.

You can now access the mechanical seal.

- Remove the ring, part. no. 71, from the shaft after unscrewing its locking screw.
- Remove the spacer ring, part. no. 72, from the base, part. no. 11.

11.1.3 - Removing the coupling sleeve

- Remove the circlip, part. no. 106/2.
- Extract the coupling sleeve, part. no. 88, from the mount, part. no. 15.
- Remove the circlip, part. no. 106/1.
- Extract the bearing, part. no. 105, from the coupling sleeve, part. no. 88.

11.1.4 - Removing the hydraulic unit

After removing the motor and the mechanical seal as indicated above, you can access the hydraulic sub-assembly which consists of stages stacked on the shaft.

- Remove the stage body, part. no. 13/1.
- Remove the impeller locking screw, part. no. 84, and remove the washers, part. nos. 3.84 and 85.
- Remove the first impeller, part. no. 28.
- Remove the stage body, part. no. 13/1, which holds the first diffuser.
- Remove the other hydraulic stages in the same way.

MIV pumps

11.2 - Reassembly

Before reassembly ensure that the parts are clean and unworn. Replace if necessary.

We recommend fitting a new mechanical seal and new sealing rings on reassembly.

Reassemble the parts by carrying out the dismantling procedure in reverse.

- Grease the sealing rings and the tube with silicon grease before reassembly.
- Ensure the lower bearing is correctly positioned :
 - above the second stage (except for models with 2 and 3 stages) ;
 - above the first stage (only for models with 2 and 3 stages).
- Ensure the intermediate bearing is correctly positioned.

11.2.1 - Refitting the mechanical seal

The housing for the spacer ring must be clean.

- Mount the spacer ring, part. no. 72, in its housing in the base, part. no. 11, after immersing it in a soap-based product.

To ensure correct assembly, use a suitable implement to push the joint into place.

- Check that the spacer ring is correctly positioned on the base of its housing. The friction surface must be smooth, dry and clean.
- Refit the ring, part. no. 71, on the shaft using a propulsion tube which has been previously lubricated with the same solution as the spacer ring.
- Tighten the locking screw to hold the ring on the shaft.
- Take care not to damage the friction surfaces of the mechanical seal during these operations.

11.2.2 - Reassembling the motor

The design of the electro-pump removes the need to adjust the axis of the hydraulic unit.

To connect the motor to the pump, simply :

- position the motor on the mount, part. no. 15, placing the shaft end correctly in the coupling sleeve. Remember to replace the drive system key in its housing.
- Tighten the 4 screws, part. no. 2.15, used to fix the motor on its mount.
- Check that the moving parts rotate freely without sticking by rotating the coupling sleeve manually.
- Fit the two protective grilles, part. no. 69, using the tie rod.

12 - SPARE PARTS

To order spare parts, please specify :

- the type of electro-pump ;
- the serial number of the motor ;
- the description of the part with its part number, as shown on the diagram and on the parts list in this document.

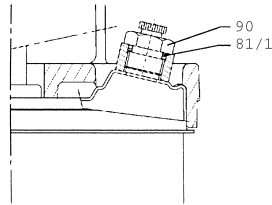
MIV pumps

Fault	Cause	Remedy
The motor will not start.	<ul style="list-style-type: none"> - Circuit-breaker faulty or incorrectly set. - The supply voltage is correct but the voltage at the motor terminals is too low. - The motor is not properly connected. 	<ul style="list-style-type: none"> - Check the circuit-breaker. - Replace the unit power supply cable, increasing the diameter of the wires. - Comply with the wiring diagram (connection to the motor).
The pump will not start.	<ul style="list-style-type: none"> - Pump body not filled sufficiently. - The inlet filter valve is not sufficiently immersed. - Direction of rotation reversed (3-phase motor). - Manometric suction lift too great. - The suction pipe is not watertight or has a counter-slope where an air pocket forms. - The valve is stuck. 	<ul style="list-style-type: none"> - Fill up the pump. - Check the depth of immersion. - Reverse 2 cables on the motor terminal block. - Reduce the lift (minimize pressure losses). - Check the suction pipe. - Check the valve.
Inadequate performance.	<ul style="list-style-type: none"> - Direction of rotation reversed (3-phase motor). - Total manometric lift is greater than expected. - Manometric suction lift too high. - The pump, suction pipe or inlet filter valve are partially obstructed. - Counter-slope on intake where an air pocket forms. - Air entering on intake. 	<ul style="list-style-type: none"> - Reverse 2 cables on the motor terminal block. - Use a more sophisticated pump or minimize the pressure losses. - Reduce the geometric suction lift. - Minimize the pressure losses on the suction pipe. - Clean them and remedy the problem. - Make sure the suction pipe has a minimum upward slope of 2 cm per metre. - Check that the suction pipe is airtight. - Check the depth of immersion of the inlet filter valve.
The circuit-breaker trips.	<ul style="list-style-type: none"> - Permanent overload due to inadequate TML, resulting in too high a flow. - Permanent overload due to excessive viscosity or density of the liquid being pumped. - Operation with 2 phases (3-phase motor) 	<ul style="list-style-type: none"> - Fit a control valve on the pump delivery pipe to slow down the flow. - Please consult LEROY-SOMER. - Inspect the supply cables and connection terminals
Leaking mechanical seal.	<ul style="list-style-type: none"> - Faulty mechanical seal. 	<ul style="list-style-type: none"> - Check and replace all the components of the mechanical seal (never run dry).
Unit vibration.	<ul style="list-style-type: none"> - Conformity of the various points indicated above. - Abnormal restriction on the flanges. - Faulty motor or mounting bearings. - Unit incorrectly fixed on pillar. 	<ul style="list-style-type: none"> - Check the connection of the pipes to the pump flanges and remove any restrictions (reposition pipes or fit flexible collars). - Check and change the bearings (with same size and type). - Check and retighten the fixing bolts. - Check and retighten the fixing bolts.

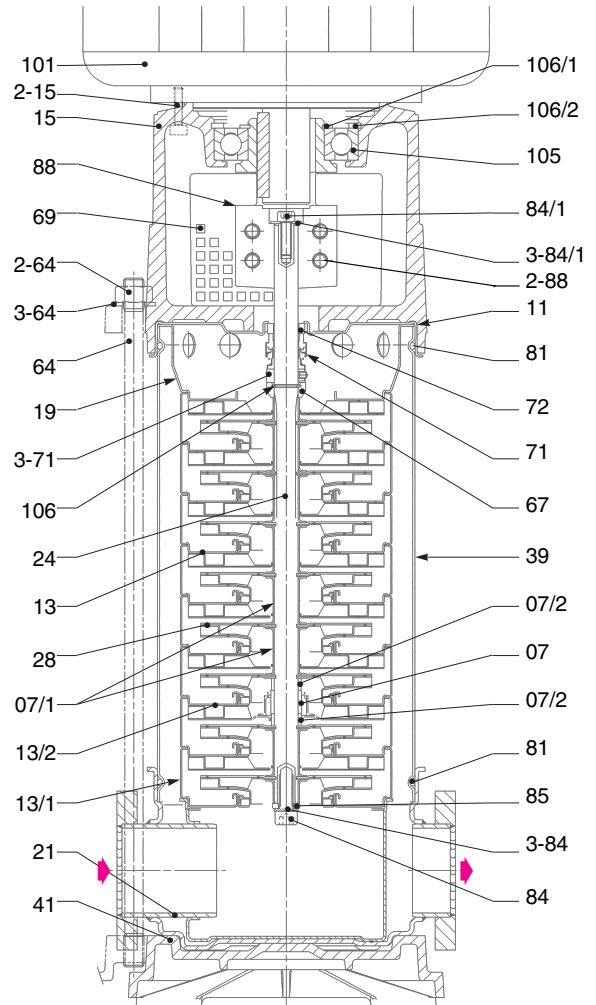
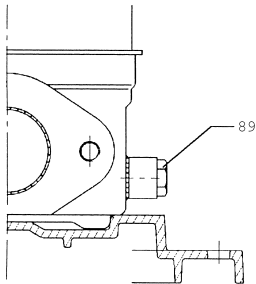
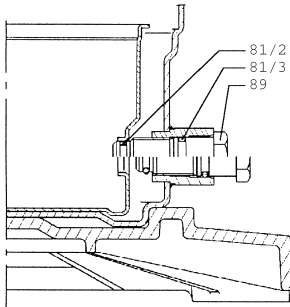
MIV pumps

CUTAWAY OUTLINE DIAGRAM – PN 16 BODY WITH OVAL FLANGES

AIR PURGING & FILLER PLUG



PRIMING AND DRAIN PLUG



Parts list			
07	Shaft casing	3-71	Lock ring for mechanical seal
07/1	Impeller spacer	72	Fixed part of mechanical seal
07/2	Shaft casing spacer shim	81	Sealing ring (external tube casing)
11	Base of priming unit	81/1	Sealing ring (filler plug)
13	Stage body with return channel	81/2	Sealing ring } drain and
13/1	Stage body without return channel	81/3	Sealing ring } priming plug
13-2	Stage body with intermediate bearing	84	Lower screw, shaft end
15	Motor mounting	84/1	Upper screw, shaft end
2-15	Motor fixing screw	3-84	Tooth washer 84
19	Cell centring pin	3-84/1	Washer 84/1
21-A	PN 16 pump body with oval flanges	85	Lower washer, shaft end
21-B	PN 25 pump body with round flanges	88	Coupling
24	Pump shaft	2-88	Coupling fixing screw
28	Impeller	3-88	Washer under screw 2-88
39	External watertight tube casing	89	Drain and priming plug
41	Pump fixing plate	90	Filler - purging plug
64	Assembly tie-rods	101	Electric motor with flange
2-64	Assembly tie-rod nut	105	Ball bearing for mount
3-64	Washer 2-64	106	Stopper half-ring (bush ring)
67	Bush ring	106/1	Circlip (mount bearing)
69	Coupling guard	106/2	Circlip (mount bearing)
71	Rotating part of mechanical seal		

**MIV
pumps**



MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE

338 567 258 RCS ANGOULÊME
S.A. au capital de 62 779 000 €
www.leroy-somer.com