

# TRI CMV



## Instructions for use and installation

## 1. Product description

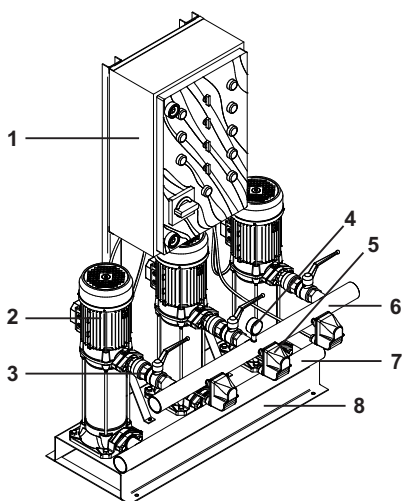
The TRI CMV pressurization system was designed to pressurize clean water.

Examples:

- building blocks
- hotels
- schools

The TRI CMV consists of three identical pumps connected in parallel and mounted on a common base, collector compression, isolating valves, check valves, pressure gauge, pressure switches and a control cabinet.

See Pic. 1.



**Pic.1**

- 1 - Control panel
- 2 - Pumps (CMV)
- 3 - Check Valves
- 4 - Pressure gauge
- 5 - Pressure switches
- 6 - Discharge Manifold
- 7 - Inlet manifold (not included in the standard version)
- 8 - Base



**You must be always install a membrane tank in the discharge side of the pressurization system.**

## 2. Operating conditions

Max. flow:	up to 66 m <sup>3</sup> /h
Max. Operat. Pressure:	10 bar
Liquid temperature:	+5 a +40°C
Ambient temperature:	+5 a +55°C
Power range:	até 4 Kw
Boot method:	Direct
Power supply:	1x220V +/-10% 50Hz 3x400V +/-10% 50Hz

## 3. Installation

- Before the installation confirm that the system corresponds to the request and if any part is damaged.

- The system should be in place that allow a good cooling system, as well as the cooling fans should be kept clean.

**- The central TRI is not suitable for outdoor installation, and should be protected from frost, direct sunlight and rain.**

- The system should be placed on a flat solid surface and must be fixed to the ground.

## 4. Tubing

- The pipes connected to the pressurization system must have the appropriate size.

- Connect the pipes to the collectors of the pressurization system.

- Can be used either end.

- For optimum operation and reduce noise and vibration, may need to install vibration dampers.

- If the pressurization system is installed in a block of apartments or the first consumer line is near the pressurization system, we recommend the installation of compensation joints in suction and discharge pipes to prevent the vibration is transmitted through pipes.

**NOTE: The deposit of the membrane, gaskets and shims to compensate the machine are not provided with the system.**

- All bolts must be tightened before first start of system.

- The pipes must be fixed to the building structure to ensure that they can not move or be twisted.

- In the case of the pump operate with a suction head, it is mandatory to install a foot valve (cone) of adequate size.

- If the pressurization system is installed on a base with vibration dampers, joints compensation must always be installed in the collectors. This procedure is important to prevent the pressurization system becomes "hung" in the pipeline.

## 5. Compnsation joints

The compensation joints are used in order to:

- Absorb the expansions / contractions of the tubing caused by the temperature of the liquid constantly changing
- Reduce the strain with respect to pressure surges in pipes
- Isolate the noise produced by the mechanical structure of the pipe (just compensation joints of rubber bellows).

**NOTE: The joints of compensation can not be installed to compensate inaccuracies in the pipeline, such as the displacement of the central holes.**

- Install joints offset a minimum distance of 1 to 1 ½ times the nominal diameter of the orifice of the suction and discharge manifolds. This prevents the development of turbulence in compensation joints, resulting in better suction and a minimum loss of pressure on the discharge side.

- The pipes must be fixed so as not to press the compensation joints and pump. Follow the instructions of the supplier and to disclose them to the consultants or installers.

## 6. Electrical Installation

- Before making connections take in attention:

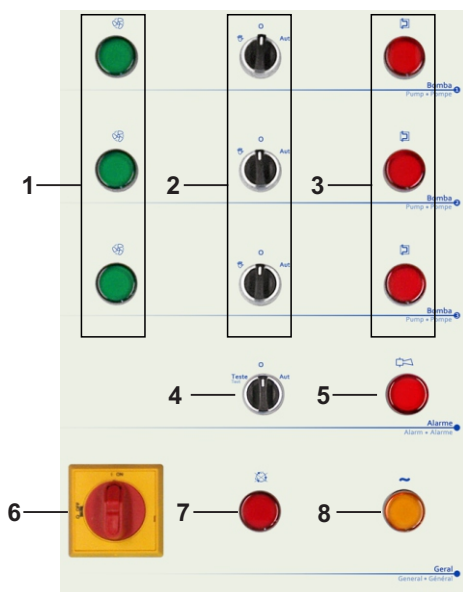
Wiring must be performed by a professional according to local regulations.

Make sure the power is turned off and locked

Make sure that the system is suitable for power supply which will be connected.

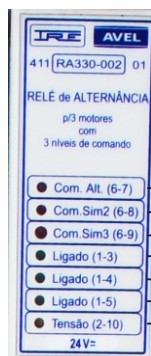
Follow the wiring diagram in Annex 1

## 7. Control panel



**Fig.2**

- 8 - Power indicator
- 1 - Indication of pump connected
- 2 - Mode button manual/0/auto pump
- 3 - Indication thermal intervention of pump
- 4 - Mode button teste/0/auto alarm
- 5 - Alarm Indication
- 6 - General cutoff switch
- 7 - Indication exchange or phase failure
- 8 - Indication of presence of phase on control circuit



**Pic.3**

## 8. First start



**Do not proceed to boot the system until the pumps and suction pipe being supplied with liquid.**

To the system boot, proceed as follows:

- 1 - Connect the power and water networks.
- 2 - Close the valve on the discharge side of all pumps.
- 3 - Purge all the bombs and make sure that the inlet manifold and the suction pipes are also purged.
- 4 - Make sure the preload pressure of the deposit is equal to 0.9 x boot pressure.
- 5 - Connect the power supply.
- 6 - Proceed to the start of the first pump positioning for a few moments the button manual operation (Pic. 2 - No. 2).
- 7 - Check the direction of rotation of the pump. If the rotation is incorrect, switch two phases of the power supply (only in the case of three-phase models).
- 8 - Proceed to purge the pump slowly opening its valve.
- 9 - Repeat the same procedure for others pumps.
- 10 - Prepare the pressurization system for automatic operation, positioning operation buttons for the automatic position (Pic. 2 - No. 2).

## 9. Operating Modes

The mode of operation of each pump can be selected through specific buttons for "Automatic operation (AUT)", "Stop (0)" and "Operation manual (☞)", as described in section "7. Control panel".

### Manual operation

Manual operation is typically used during the system boot, testing or for maintenance and service. To activate the manual operation position for a few moments the button manual operation. The button for manual operation does not have a fixed position, so you should keep the button positioned during the test cycle.

### Automatic operation

When selecting this mode of operation, the pumps operate automatically according to system requirements, eg. configured on the pressure switch.

- When you open a faucet, the water is removed from the membrane tank until the tank is empty.

- When the pressure down to the pressure of the first startup, there is the start of the first pump.

- If consumption continues to rise, more pumps will be triggered until the pump efficiency in operation meet the requirements.

- When the water consumption decreases, the discharge pressure increases until the pressure of the first stop, giving stop of pressure switch and a pump.

- If consumption continue to decrease more pumps will be stopped until the last pump finally fill the membrane tank and stop.

### Protection against running dry

The system includes option for protection against running dry to prevent dry running of pumps. Protection against dry running is activated by a pressure switch or level switch on the suction side and then the control framework (Annex 1 - security command). Not included in the standard system.

## 10. Features

The system provides the following functions:

- Automatic control of the effect of pumps in sequence through two pressure switches.
- Automatic switching the pump on any cycle start / stop.
- If a pump is in a state of breakdown, it is automatically removed from service.
- Manual reset state trip due to overload.

Pump protection and system:

- Protection against short circuit through the breaker.
- Motor protection by means of a thermal relay.
- Protection against dry running through a pressure switch or level switch added (not included in the standard system).
- Delay between two pumps at startup: It prevents starting simultaneously from more than one pump.

## 11. Pressure switches



**The pressure stop, can not under any circumstances, exceed the maximum operating pressure of the pump and tank membrane.**

During installation and first start of the system should be set off and the pressure differential of each switch in order to configure the system to be optimized.



Pic.4

### Setting the pressure stop

To set the pressure stop ( $p_{stop}$ ), proceed as follows:

1. Turn the screw P in the direction + to increase the pressure stop, and direction - to decrease the pressure stop, as indicated on the pressure switch. See Pic. 4.
2. Set the stop pressure with a difference from 0.3 to 0.5 bar, respectively, in each pressure switch.
3. Proceed to start the pump and check, by reading the gauge, if the pressures were obtained for each desired stop pressure switch.

### Setting the differential pressure

To set differential pressure ( $p_{dif}$ ), turn the screw  $\Delta P$  in the direction + to increase the pressure differential and in the direction - to decrease the pressure differential, as indicated on the pressure switch. The stop pressure remains unchanged. See Pic. 4.

The pressure differential must be set to the same value in all pressure switches.

**NOTE:** Reduce to a minimum differential pressure can reduce the pressure variations in the system.

### Start-up pressure

The pressure startup ( $p_{start}$ ) is configured automatically when you set the pressure differential.

$$p_{arranque} = p_{paragem} - p_{dif}$$

To verify that the boot pressure is desired, proceed as follows:

1. Proceed to start the pump and check, by reading the gauge, if the start and stop pressures taken it's what you want.
2. Repeat the above procedures for setting up the pressure to obtain the correct start and stop.

### Adjustments of pressure preload tank membrane

Once you determine the pump start pressure, the pressure required to pre-load tank membrane can be adjusted to approximately 90% of the pressure pump start.

Preload pressure =  $0.9 \times p_{start}$ .

The preload of the tank must be checked / adjusted when the discharge pipe is empty.

## 12. Maintenance



**Before starting any work on the system, make sure the power is turned off and locked to prevent it from being inadvertently turned on.**

### Pump

The bearings and seals require no maintenance.

### Settings

To ensure proper operation and reliable, the preload pressure tank membrane and the pressure switch setting should be checked regularly, at least once a year.

### Antifreeze protection

If the pressurization system is not used during periods of ice, manifolds, pumps and membrane tank must be drained to avoid damage.

## 13. Table detection of faults

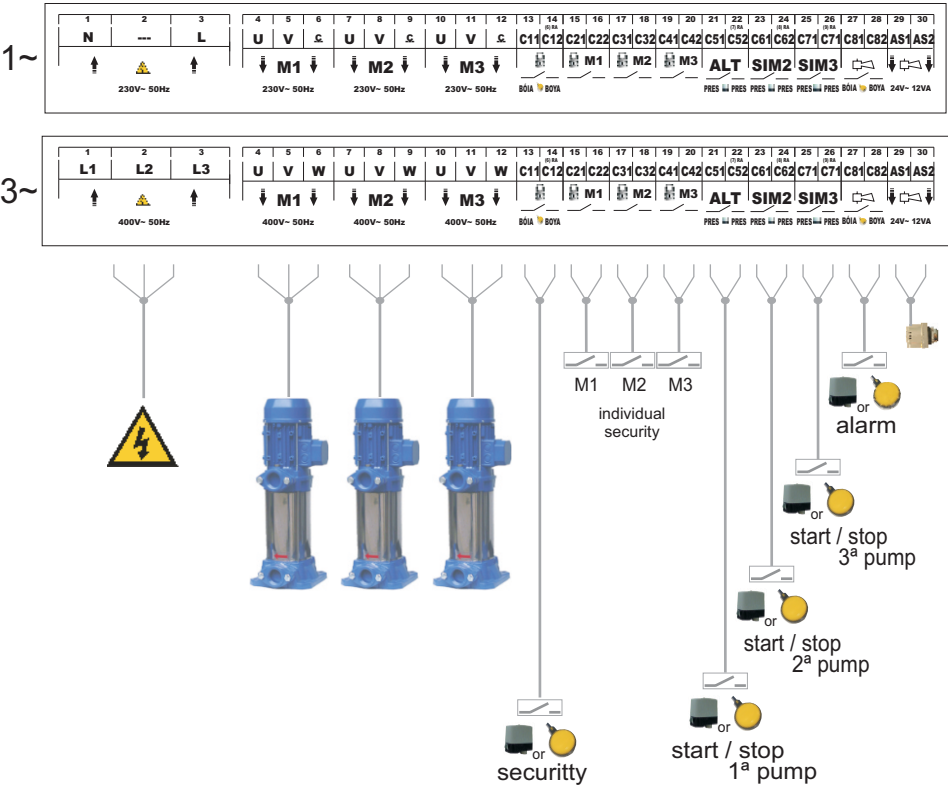


**Before starting any work on the pressurization system, make sure that the power supply was turned off and can not be reconnected inadvertently.**

Fault	Cause	Solution
The system does not work after startup	a) The effective pressure is greater than or equal to the pressure boot setup. b) Power supply switched off. c) The automatic circuit-breakers stopped. d) Thermal relay activated. e) Damaged differential circuit breaker. f) Pressure switch damaged. g) Pump blocked. h) Motor damaged.	a) Wait until the pressure decrease, or reduce the pressure on the discharge side. Make sure that the system boots. b) Connect the power supply c) Correct the failure and start the circuit breakers. d) Correct the fault and reset the thermal relay. e) Replace the differential circuit breaker. f) Replace the pressure switch. g) Eliminate the cause of the blockage. h) Repair or replace motor.
The pump starts, but stops immediately.	a) Incorrect configuration of the pressure switch. b) Pressure tank pre-charge incorrect. c) Protection against dry running on.	a) Increase the stop pressure and / or pressure differential. b) Check the preload pressure. c) Check the conditions of entry and make sure that the liquid flows freely to the pump.
Starts and stops frequent.	a) Incorrect configuration of the pressure switch. b) Pressure tank pre-charge incorrect. c) Deposit of membrane damaged.	a) Increase the stop pressure and / or pressure differential. b) Check the preload pressure. c) Repair or replace the membrane tank.
The pumps are running, but do not provide water.	a) The pump / suction pipe are blocked due to impurities. b) Valve retention standing or locked in the closed position. c) Air in the pump / suction pipe. d) The motors in the wrong direction of rotation.	a) Clean the pump / suction pipe. b) Check and repair the valve. c) Purge the pumps. Check for leaks in suction. d) Change the direction of rotation (replace two phases of power supply).
The pump works in reverse when it is turned off.	a) Leakage in suction pipe b) Foot valve damaged	a) Repair or replace suction line. b) Repair or replace foot valve.
Leak in the seal.	a) Damaged seal.	a) Replace the seal.
Noise	a) The pumps are cavitation.	a) Check suction conditions (pump, piping, valves and suction filters, if any).

14. Annexes

ANNEX 1: Wiring



ANNEX 2: DECLARATION OF CONFORMITY

The TRI system , referred to in this statement are in accordance with Directive 73/23/EEC (the Low Voltage Directive). Full compliance with essential requirements of the Directive is verified for compliance with standard EN 60335-2-41.

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