



# INSTALLATION AND OPERATING INSTRUCTIONS MANUAL

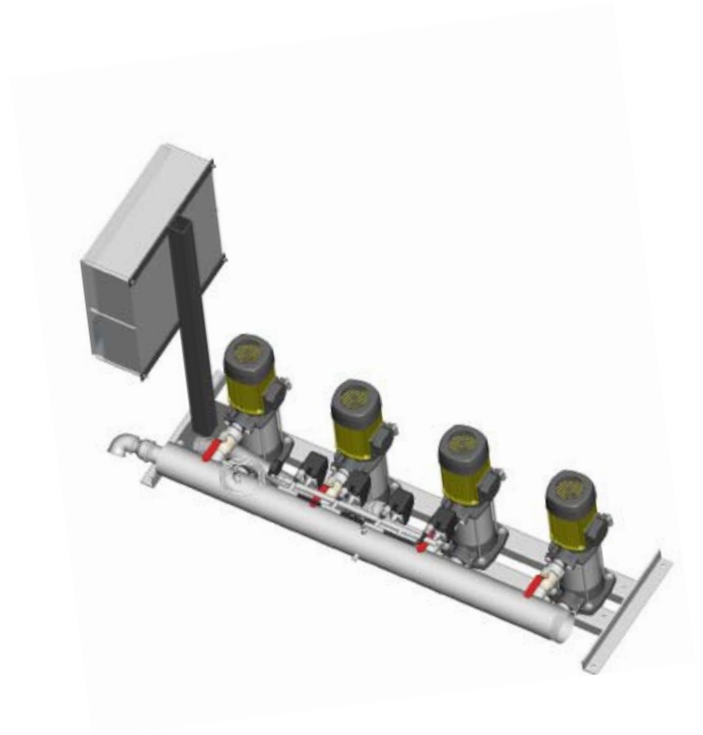
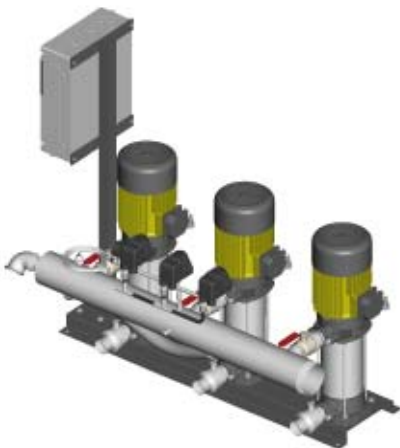
## Owner's manual

### FIXED SPEED BOOSTER SETS SERIES:

CPD: Two pumps

CPT: Three pumps

CPC: Four pumps



## INSTRUCTIONS FOR INSTALLATION AND USE

2009



**CAREFULLY READ THIS MANUAL THOROUGHLY BEFORE THE  
INSTALLATION OF THE BOOSTER SET.**

## INDEX

1. OVERVIEW .....	page 3
2. INSTALLATION.....	page 4
3. PIPING.....	page5
4. SUCTION .....	page 5
5. PRIMING.....	page 6
6. SETTINGS .....	page 8
7. START-UP .....	page9
8. MAINTENANCE .....	page 10
9. TROUBLESHOOTING .....	page10
<b>ANNEX: MEMBRANE TANK PNEUMATIC CONNECTION</b>	

## 1. OVERVIEW

The ESPA CPD CPT CPC booster set series are designed to boost clean water in pressurization systems for housing, industrial or irrigation installations.

The booster set consist in two pumps for CPD, three pumps CPT and four pumps CPC in a common chassis connected in parallel in duty assist configuration. The set is controlled by one pressure switch per pump regulate in cascade operation. The set operation is in fixed speed in DOL pump. The set includes suction and discharge manifold, one closing valve and check valve per pump. On the instrumentation manifold is a pressure gauge. The system must be equipped with a membrane tank or expansion vessel.

The pressure switches are fitted on the discharge manifold but the pressure is read though a pneumatic pipe connected on the membrane tank top.

The booster set is controlled by an electrical control panel according with the system requirement, single-phase or three-phase control panel, in DOL or Star-delta starting.

### OPERATING LIMITS

Ambient temperature	0 - 45 °C
Liquid	Clear water
Fluid temperature	40°C
Operation	Continuous (s1)
Minimum inlet pressure	According to NSPH curve and flow resistance the level should be raised by a safety margin of at least 0.5 metres.
Maximum discharge pressure	See the hydraulic performance curves. Up to 8-10 bar for 0-10 bar pressure switches. For higher pressures, pressure transducer 0-25 bar
Starts per hour	Max. 60 up to 3 KW Max 40 from 4 KW to 7.5 KW Max. 30 from 11KW to 15 KW

## 2. INSTALLATION

The ESPA booster sets have to be installed in a well-ventilated rooms, allowing adequate clearance (see figure 1) in all sides and front for maintenance operation. The room has to protect as well the set of the weather.

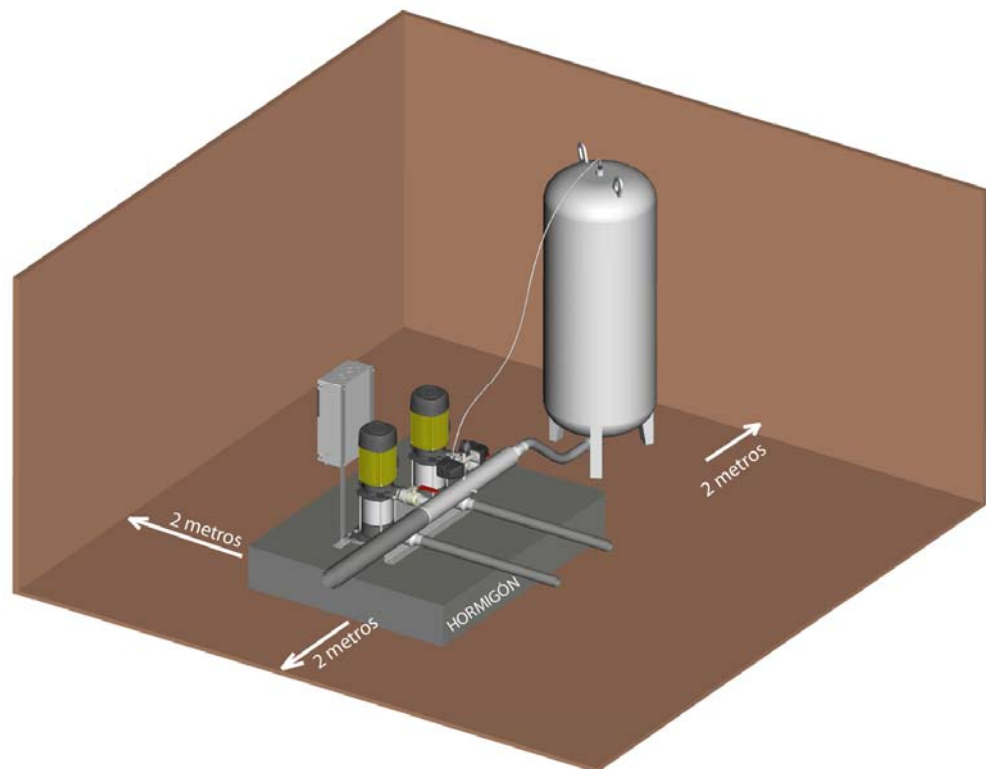


**The booster set cannot operate in the following conditions**

- 1 – Out in the open air.
- 2 – Rooms with danger of flooding.
- 3 – Rooms with no ventilation.
- 4 – Explosive ambient requiring ATEX protections.

The set has to be fitted on a concrete bed or a safe floor and study surface. Foot mounting are provided with the set to reduce the vibrations.

Figure 1



**The room has to be provided with a well sized draining system in to avoid flooding in case of fault or for maintenance works.**

Before to install the set, make sure that the set did not suffer any damage during transportation.

### 3. PIPING

The pipes connected to the set must be adequately sized (if possible to manifold diameter). Provide expansion joints and suitable pipe supports to avoid undue stress or vibrations from the installation to the set.

The pumps foot is provided with arrows that shows the water circulation direction.

You can use either end of manifold, but don't forget to plug unused end.

The suction pipelines size is very important to ensure the right suction of the pumps.

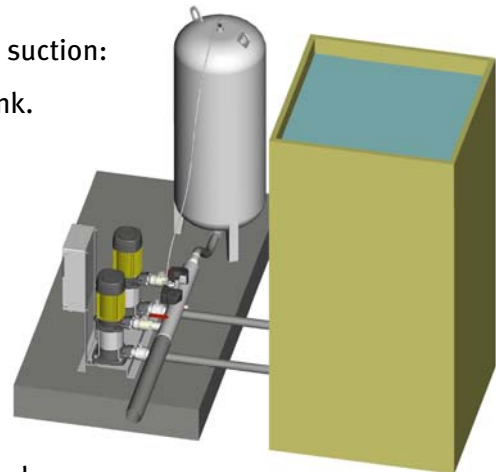
### 4. SUCTION

To ensure the right suction of the complete set, verify the right connection of the pipe to avoid any air inlet on the system.

The suction can be in load (positive suction) or negative suction:

1 – Positive suction from a breaking or accumulation tank.

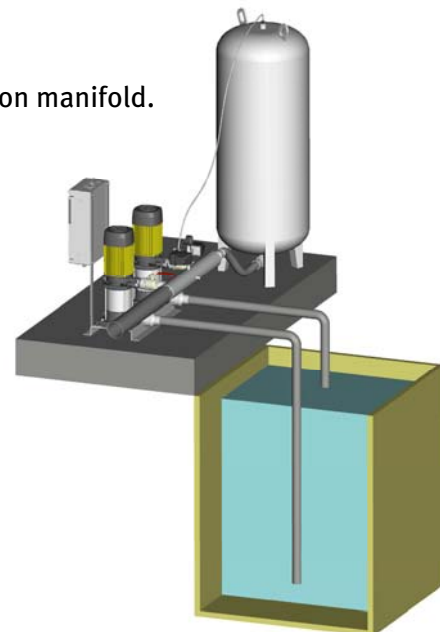
The set is provided with suction manifold.



2 – Negative suction form a breaking or accumulation tank.

In case of negative suction, the set is provided without suction manifold.

The suction pipeline should be separate for each pump.



## **PROTECTION AGAINST DRY RUNNING.**

The electric panels are ready for connection of a float switch in the suction tank or a low pressure switch in the suction manifold (recommended value 0.2-0.4 bar). Electrode probe suction can be fitted on the suction manifold as option to avoid the dry running operation. Refer to the panel wiring diagram for connections. The triggering of the protection device can be delayed by making suitable adjustments on the control panel. When the minimum pressure conditions are restored, the pumps start up automatically. The protection is not operational in the Manual mode operation.

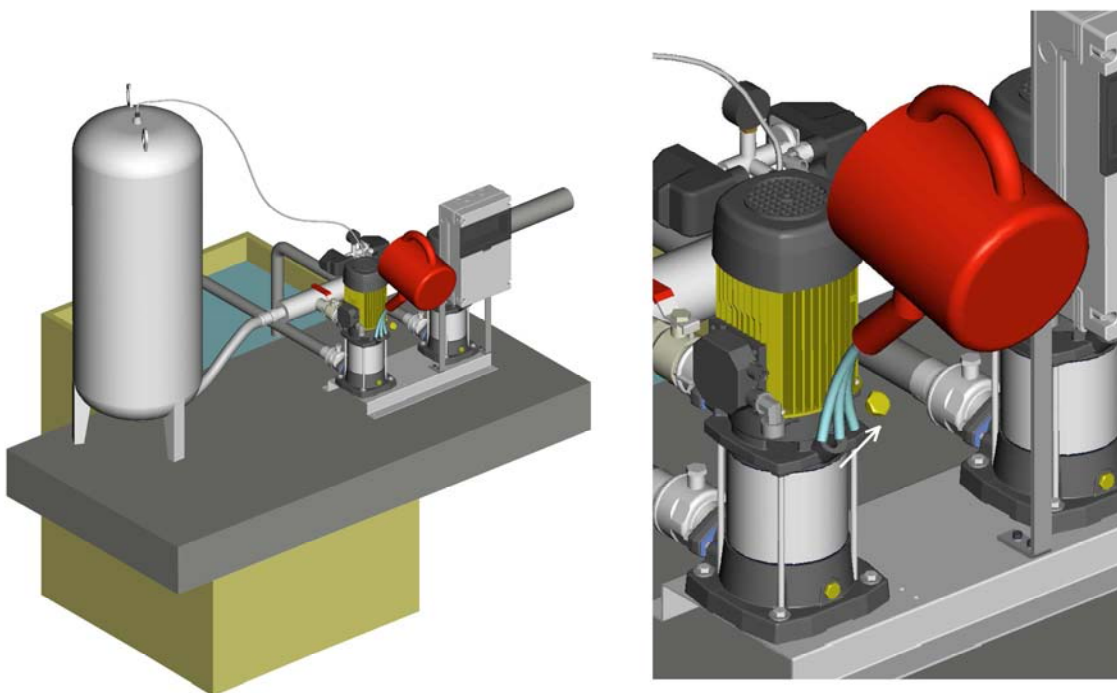
**WARNING: THE BOOSTER SETS ARE SUPPLIED WITH THE PROTECTION DISCONNECTED (FACTORY SETTING).**

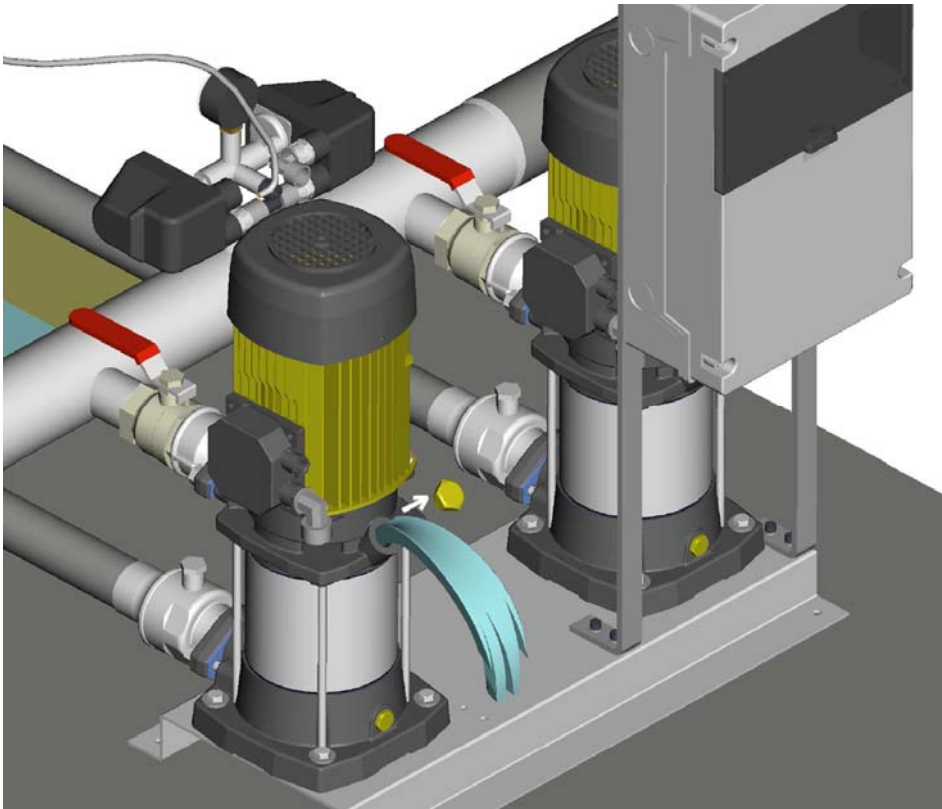
## **5. PRIMING**



**PROCEED TO THE PUMPS PRIMING BEFORE TO START UP THE SYSTEM.**

To prime the pump, open the priming plug on the pump, feed with clean water and ensure that the air is completely removed inside the pumps. Replace the priming plug. Then, start up the pump in Manual operation using the switch mode on the control panel.





The installation and electric connections must be made by a qualified electrician in accordance with local codes. Before making the connections, disconnect the power supply. The wiring diagram provides the necessary information for connection and the required power supply values.

Single –phase version: The motor is protected against overload by a built-in motor protection. If required by local codes, install an additional protection device. Suitable cable of appropriate gauge must be connected to the panel: L1 and N to the main switch terminals. PE to the ground terminal marked on the wiring diagram.

Three-phase version: The motor is protected against overload by an automatic manual reset switch. . Suitable cable of appropriate gauge must be connected to the panel: L1, L2, and L3 to the main switch terminals. N to the neutral terminal .PE to the ground terminal marked on the wiring diagram.

### **Tank selection.**

To ensure efficient operation, the set must be connected to a membrane tank.  
In case of danger of water hammer, a suitable expansion vessel has to be provided.

See the Annex C for the membrane tank connection.

## 6. SETTINGS



**DANGER RISK OF ELECTRO SHOCK**

**DISCONNECT THE POWER SUPPLY BEFORE ANY ADJUSTMENTS.**

The starting and the stopping of the pumps are determinate based on the pressure switch settings. Each pressure switch is connected to a single pump; though the pump will change according to cyclic changeover.

The pressure differential is the difference between the starting and the stopping pressures. Set the same differential pressure for all the pumps.

The typical value for the differential value is 1,5 – 1 bar.

The operation method is as follows:

- The tank supplies water demand by a user.
- When the pressure drops to the first pump starting pressure, the first pump is started.
- If the demand increases and the pressure drops to the second pump starting point, the second pump is started in assistance; and so on with the third and fourth pumps in case of CPT and CPC sets.
- When the water demand decreases, and the pressure rises to the stopping values, the pumps are stopped consecutively up to the first pump stopping value.



## Pressure switches.

The pressure switches are set at the factory according to values that depend on the type of pump.

See annex D: Pump Regulation.

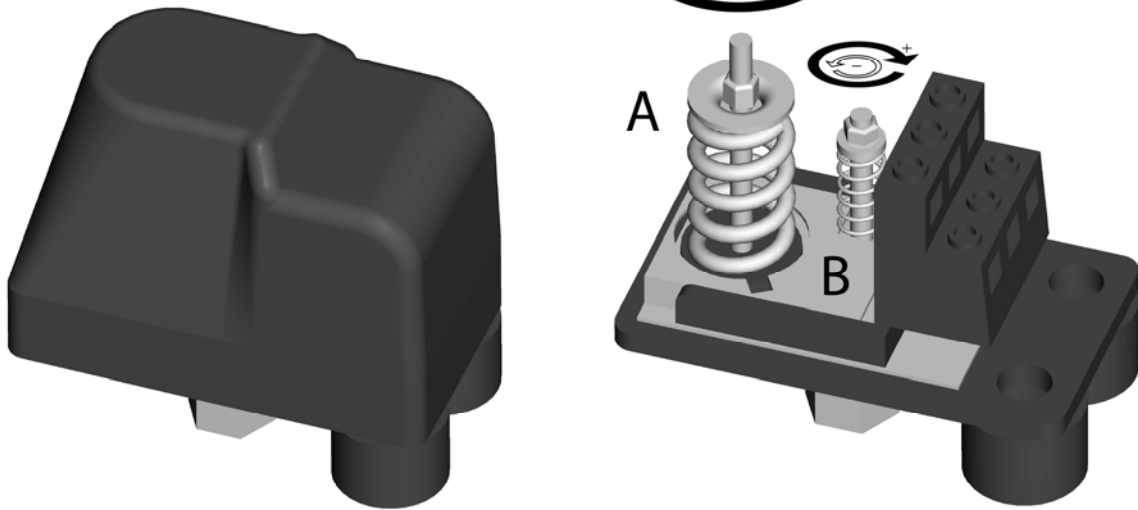
The setting can be modified according to the hydraulic conditions of the system and the suction pressure.

Make the required adjustments to the pressure switch to modify the settings:

- Stop pressure.
- Differential pressure.

Adjustment of the differential pressure determines the start pressure:

- A. Stop pressure
- B. Differential pressure



## 7.START-UP.

Before the start-up verify:

- There is any damaged component of the set
- The water supply is connected in the right conditions.
- Check that the power supply has the suitable parameters according with the set features.
- Check the tank pre-charge. To ensure the proper operation the membrane tank must be pre-charged to the minim activation pressure value of 0.7 under the set point pressure.
- Close the pump delivery valves.
- Ensure that the set is completely primed.
- For the three-phase versions, check the current value set on the switch on the electric panel against the motor rated current.
- Connect the power supply.
- Operate the switch on the panel and select the manual operation.
- Start the first pump.
- For three-phase versions, check the rotation direction: if incorrect, swap two power supply phases.
- Slowly open the pump delivery valve and bleed the air.
- Repeat the above operations for the second, third and fourth pumps if exist.

## 8. MAINTENANCE

**Electric pump maintenance:** See the electric pump instruction manual.

**Electric panel maintenance:** The electric panel do not require any maintenance.

**Membrane tank maintenance:** See the tank instruction manual, check the pre-charge pressure at least once per year.

## 9.TROUBLESHOOTING



### DANGER

The maintenance and repair operations must be performed by qualified personnel. Before servicing the set, disconnect the power supply, and make sure there is no pressure in the hydraulic components.

Problem	Cause	Solution
Set is off	Power supply disconnected	Connect power supply
	Blown fuse	Replace fuse
	Dry running protection activated	Wait the water level required in suction line.
Motor does not start	Power supply disconnected	Connect power supply
	Triggering of motor protection	Eliminate malfunction
	Single-phase : motor terminal protector	Single-phase: wait for automatic reset.
	Three-phase: automatic switch in electric panel	Three-phase: Reset the automatic switch
	Defective motor	Replace / repair the motor
Frequent start-up and stops	Defective tank	Replace / repair the tank
	Incorrect pressure switches adjustment	Increase the differential pressure or stop pressure.
The motor starts up but stops immediately	Defective tank	Replace / repair the tank
	Incorrect pressure switches adjustment	Increase the differential pressure or stop pressure.

Problem	Cause	Solution
The motor runs but no water is delivered	No water on suction side or inside the pump	Fill the pump or suction manifold-piping / open the closing valves.
	Air in suction piping or pump	Bleed the pump, check the suction connections
	Loss of pressure on suction side	Check the NPSH and, if necessary, modify the system
	Check valve jammed	Clean the valve
	Clogged pipe	Clean the pipe
	Incorrect rotation of three-phase motors	Change direction of rotation
Pump leaks water	Defective mechanical seal	Replace the mechanical seal
	Undue mechanical stress on pump	Support the pipes
Too noisy	Water return when pumps stop	Check the check valve
	Cavitation	Check suction
	Pump rotation hindered	Check for undue mechanical stress on the pump

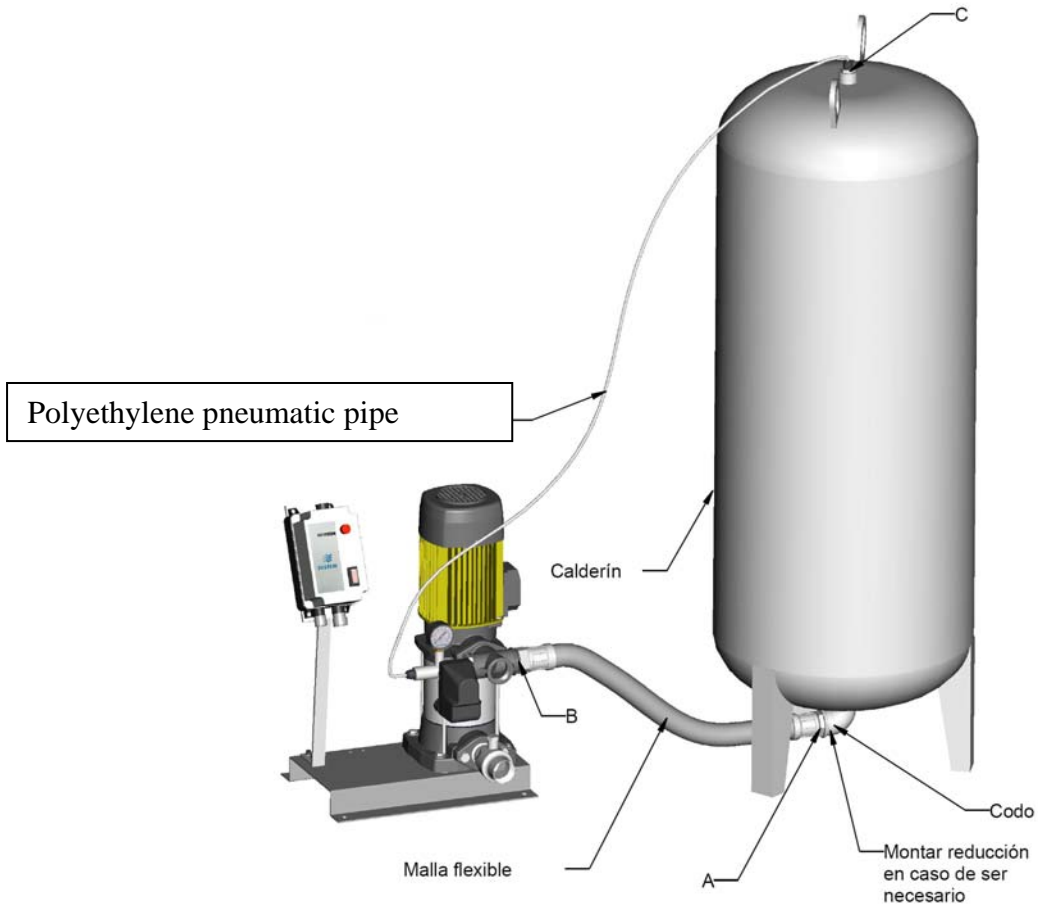
## ANNEX: membrane tank connection

A – Flexible discharge pipe and membrane tank connection

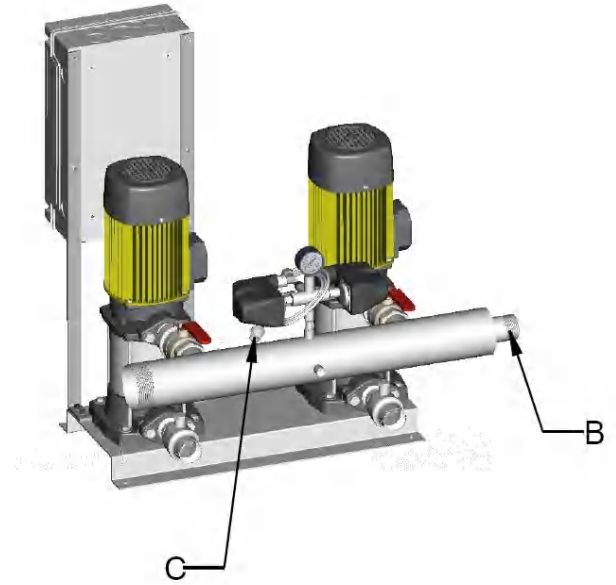
B – Flexible pipe and discharge manifold connection.

C – Polyethylene pipe connection to the membrane tank, for the pressure signal to the pressure switches.

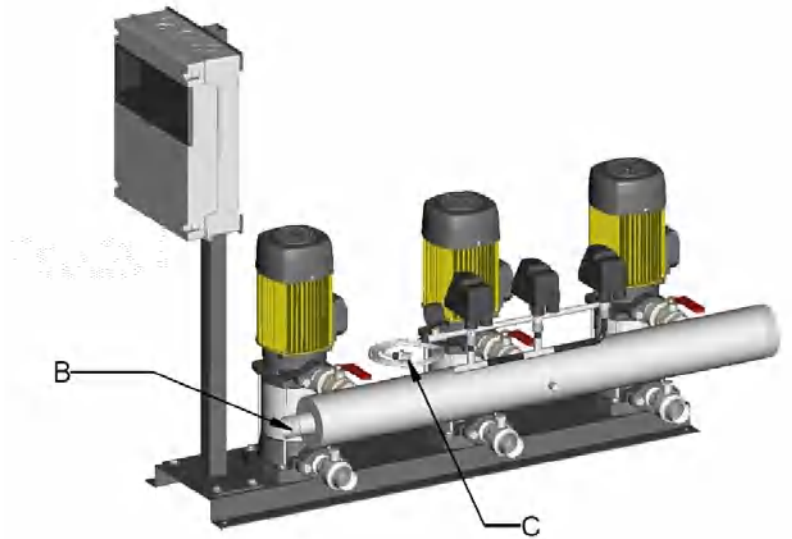
### SINGLE PUMP SET



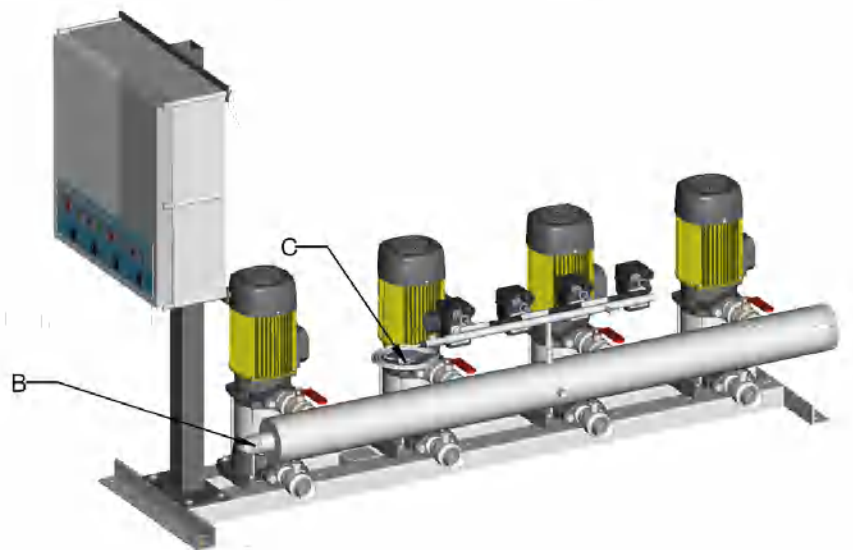
CPD: Two pumps set.



CPT: Three pumps set.



CPC: FOUR PUMPS SET



		Diferencial: 1,5 kgs.									
GRUPOS HIDRONEUMÁTICOS DE PRESIÓN		CODIGO EQUIPO		Regulación 1er. Presostato		Regulación 2o. Presostato		Regulación 3er. Presostato		Regulación 4o. Presostato	
		230 v.	400 v.	A	P	A	P	A	P	A	P
Grupos simples	Monofásicos	CPM PRISMA253	-----	1,8	3,3						
		CPM PRISMA254	-----	2,3	3,8						
		CPM PRISMA353	-----	2,5	4						
		CPM PRISMA354	-----	3,5	5						
		CPM PRISMA355	-----	4,5	6						
		CPM MULTI204	-----	3	4,5						
		CPM MULTI205	-----	3,5	5						
		CPM MULTI354	-----	3,5	5						
		CPM MULTI355	-----	4,5	6						
	Trifásicos	CP PRISMA253/2	CP PRISMA253/3	1,8	3,3						
		CP PRISMA254/2	CP PRISMA254/3	2,3	3,8						
		CP PRISMA353/2	CP PRISMA353/3	2,5	4						
		CP PRISMA354/2	CP PRISMA354/3	3,5	5						
		CP PRISMA355/2	CP PRISMA355/3	4,5	6						
		CP MULTI204/2	CP MULTI204/3	3	4,5						
		CP MULTI205/2	CP MULTI205/3	3,5	5						
		CP MULTI354/2	CP MULTI354/3	3,5	5						
		CP MULTI355/2	CP MULTI355/3	4,5	6						
		CP MULTI356/2	CP MULTI356/3	5,5	7						
		CP MULTI358/2	CP MULTI358/3	6,5	8						
CP MULTI3510/2	CP MULTI3510/3	7,5	9								
Grupos dobles	Monofásicos	CPDM PRISMA253	-----	1,8	3,3	1,3	3,3				
		CPDM PRISMA254	-----	2,3	3,8	1,8	3,8				
		CPDM PRISMA354	-----	3,5	5	3	5				
		CPDM PRISMA355	-----	4,5	6	4	6				
		CPDM MULTI204	-----	3	4,5	2,5	4,5				
		CPDM MULTI205	-----	3,5	5	3	5				
		CPDM MULTI354	-----	3,5	5	3	5				
		CPDM MULTI355	-----	4,5	6	4	6				
		Trifásicos	CPD PRISMA253/2	CPD PRISMA253/3	1,8	3,3	1,3	3,3			
	CPD PRISMA254/2		CPD PRISMA254/3	2,3	3,8	1,8	3,8				
	CPD PRISMA354/2		CPD PRISMA354/3	3,5	5	3	5				
	CPD PRISMA355/2		CPD PRISMA355/3	4,5	6	4	6				
	CPD MULTI204/2		CPD MULTI204/3	3	4,5	2,5	4,5				
	CPD MULTI205/2		CPD MULTI205/3	3,5	5	3	5				
	CPD MULTI354/2		CPD MULTI354/3	3,5	5	3	5				
	CPD MULTI355/2		CPD MULTI355/3	4,5	6	4	6				
	CPD MULTI356/2		CPD MULTI356/3	5,5	7	5	7				
	CPD MULTI358/2		CPD MULTI358/3	6,5	8	6	8				
	CPD MULTI3510/2		CPD MULTI3510/3	7,5	9	7	9				
	CPD MULTI554/2		CPD MULTI554/3	3	4,5	2,5	4,5				
	CPD MULTI556/2		CPD MULTI556/3	4,5	6	4	6				
	CPD MULTI557/2		CPD MULTI557/3	6	7,5	5,5	7,5				
	CPD VE1215/2	CPD VE1215/3	6,5	8	6	8					

<b>Grupos triples</b>	<b>Trifásicos</b>	CPT MULTI354/2	CPT MULTI354/3	3,5	5	3	5	2,5	5		
		CPT MULTI355/2	CPT MULTI355/3	4,5	6	4	6	3,5	6		
		CPT MULTI356/2	CPT MULTI356/3	5,5	7	5	7	4,5	7		
		CPT MULTI358/2	CPT MULTI358/3	6,5	8	6	8	5,5	8		
		CPT MULTI3510/2	CPT MULTI3510/3	7,5	9	7	9	6,5	9		
		CPT MULTI554/2	CPT MULTI554/3	3	4,5	2,5	4,5	2	4,5		
		CPT MULTI556/2	CPT MULTI556/3	4,5	6	4	6	3,5	6		
		CPT MULTI557/2	CPT MULTI557/3	6	7,5	5,5	7,5	5	7,5		
		CPT VE1215/2	CPT VE1215/3	6,5	8	6	8	5,5	8		
		<b>Grupos Cuádruples</b>	<b>Trifásicos</b>	CPC MULTI354/2	CPC MULTI354/3	3,5	5	3	5	2,5	5
CPC MULTI355/2	CPC MULTI355/3			4,5	6	4	6	3,5	6	3	6
CPC MULTI356/2	CPC MULTI356/3			5,5	7	5	7	4,5	7	4	7
CPC MULTI358/2	CPC MULTI358/3			6,5	8	6	8	5,5	8	5	8
CPC MULTI3510/2	CPC MULTI3510/3			7,5	9	7	9	6,5	9	6	9
CPC MULTI554/2	CPC MULTI554/3			3	4,5	2,5	4,5	2	4,5	1,5	4,5
CPC MULTI556/2	CPC MULTI556/3			4,5	6	4	6	3,5	6	3	6
CPC MULTI557/2	CPC MULTI557/3			6	7,5	5,5	7,5	5	7,5	4,5	7,5
CPC VE1215/2	CPC VE1215/3			6,5	8	6	8	5,5	8	5	8