

Fertijet

Fertigation Control System

Installation Guide User Manual



Revision 1.0 - May 2019

Table of content

Introduction	3
Safety	4
Installation requirements	5
Fertilizer and acids types & concentration	7
Assembly	8
Maintenance	16
Troubleshooting	19
Illustrated part list	21
Appendix 1	24

INTRODUCTION

We thank you for trusting the core of your growing success in our hands.

We in Galcon are fully aware how critical the performance and the reliability of your machine is for your yields, and we are fully committed for supporting and serving this product.

In this manual you will find general information on how to unpack, connect, adjust and operate your new Fertijet machine. Fertijet machines comes with variety of booster pumps, Dosing channels, dosing valves and even pipe dimensions. Those components are subject for occasional changes as technology advances, and therefor will only be described here in a general.

Fertijet can be operated either by Galileo Greenhouse app or Open-Field app, and even by other, non-Galcon controllers. For operation please refer to the specific applications guiding book.

Multi-channel fertigation machines are needed because some fertilizers cannot be mixed with others.

Study your fertilizers and avoid wrong mixing. Failing it will result a quick ceramic sedimentation in the system that is very hard to remove.

Follow the instructions hereby step by step and don't hesitate to contact our local representative if necessary.

SAFETY



Electrical
Warning

All hazardous electric voltage jobs must be conducted by a local qualified electrician and according to local regulations.



Notice /
Caution

Do not leave the electric cabin, the motor cover or any junction box opened while the machine at work or while you are away.



Notice /
Caution

Some fertilizers and all acids are hazardous:

- a. Store them in a locked place, away from reach of children and animals.
- b. Always wear rubber-gloves and protecting-glasses when handling them.
- c. Never pour water or other liquids into concentrated acid!
- d. Wear a full-face mask when mixing acids.
- e. Mark your stock tanks clearly, stating the danger in each.
- f. Install a hands-free eye washing sink within a range of 15m from where the fertilizers are prepared.



Verify

All possible out-takes downstream the Fertijet must be clearly marked **NOR FOR DRINK**.

INSTALLATION REQUIREMENTS

Main line inlet:	50mm (1½") + Ball valve.
Length of inlet:	1,500mm (60") to Ensure good mixing (2 elbows or mixing chamber).
Main line outlet:	50mm (1½) + ball valve. Keep minimal length of the connecting pipes.
Foundation:	Concrete plate or pavement 4000*4000 mm. anchor the Fertijet frame to the base.
Environment:	Shaded and protected from rain and hail.
Power supply:	EU, Africa, Asia, Oceania: ~1 220v, ~3 400V 50Hz Americas: ~1 120v, ~3 220V, 400V, 480V 60Hz Japan: ~ 3 200V 60Hz LT tested: 5Ω or less.



Notice /
Caution

Do not connect local Neutral!

Fertilizer stock tanks:

Max elevation above dosing valves:	2,500mm (top of tank)
Min elevation below dosing valves:	1,000mm (Bottom of tank)
	100μ (130 mash) filter size ¾" or larger.

Ensure that any excess or leak of fertilizer is properly handled according to local regulations.



Notice /
Caution

Nominal working pressure:	Define at ordering
Minimum working pressure:	Standard - 3.5 bar

Maximum static pressure: 7.5 bar



Notice /
Caution

Hammer shock prevent setting: 9.5 bar



Important notice:

Notice /
Caution

To avoid the injection of chemicals to pipelines when not irrigating -

Verify on each installation:

- A. Water meter with electric pulse is mandatory on the pipe-line that the Fertijet is connected, before any distribution. The pulse size must enable reading (2 pulses) in less than 1 minute.
- B. Verify the validity of the water meter and its pulse daily.
- C. We strongly recommend an additional pressure switch to be connected to the controller as a delay condition element.
- D. Backflow preventer must always be installed upstream the Fertijet, unless direct pumping from irrigation-dedicated lagoon.

FERTILIZER AND ACIDS TYPES & CONCENTRATION

- a. All soluble fertilizer are permitted as liquids only.
- b. Maximum viscosity 20 cPa·s.
- c. Acids:

Dilute in water	Raw product	Type
Sulphuric Acid H ₂ SO ₄	98%	1:8
Phosphoric Acid H ₃ PO ₄	85%	1:5
Nitric Acid HNO ₃	60%	1:3

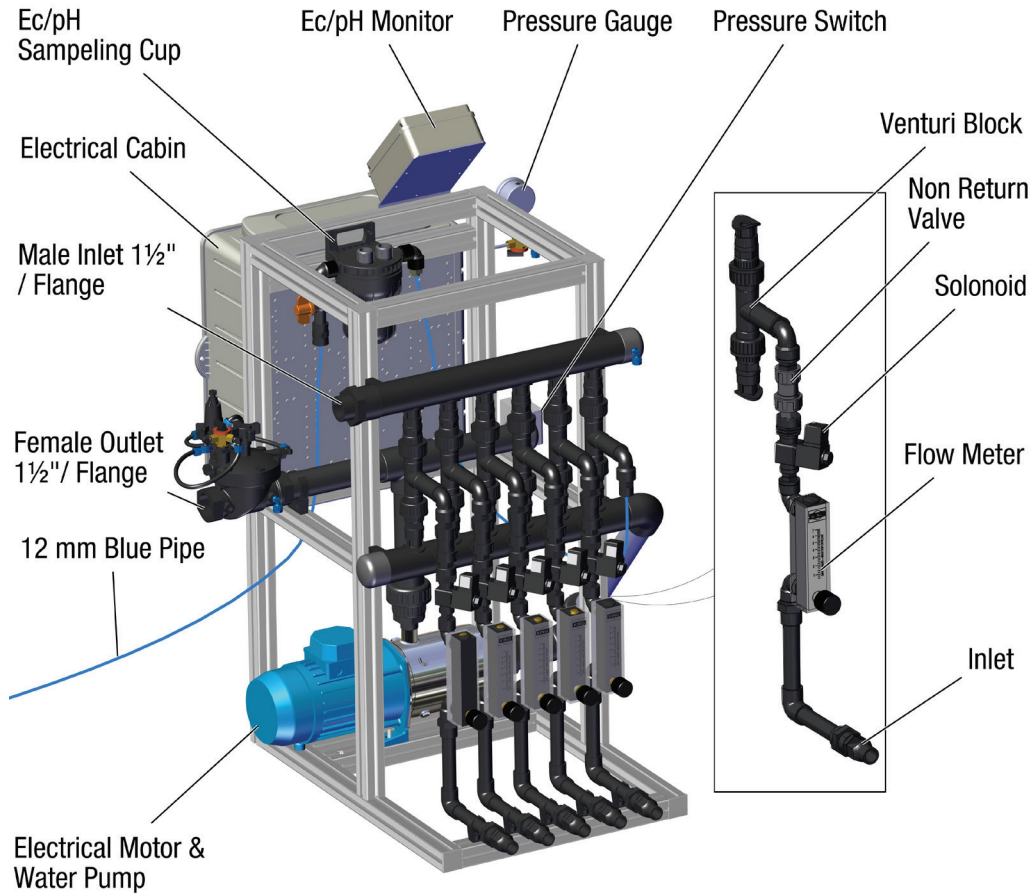
- d. Mixture limitation table:

	Magnesium Sulfate	MAG	Calcium Chloride	Calcium Nitrate	Potassium Sulfate	Potassium Chloride MOP	Potassium Nitrate	MKP	MAP	Ammonium Phosphate	Ammonium Nitrate
Urea	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Ammonium Nitrate	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Ammonium Sulfate	Green	Green	Gray	Gray	Green	Gray	Green	Green	Green	Green	Green
MAP	Red	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green
MKP	Red	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green
Potassium Nitrate	Gray	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Chloride MOP	Gray	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Potassium Sulfate	Green	Green	Gray	Gray	Green	Green	Green	Green	Green	Green	Green
Calcium Nitrate	Gray	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Calcium Chloride	Gray	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

Explanation for the table above:

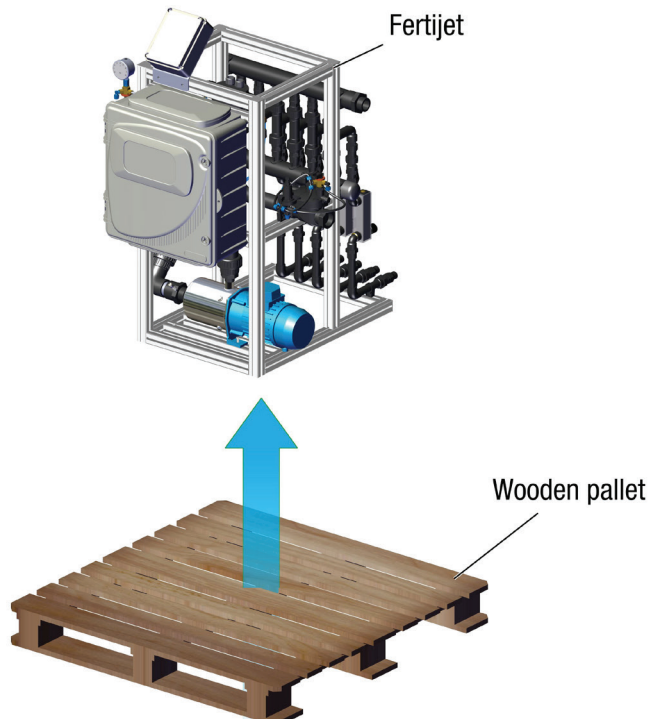
- a. Red or Gray combinations do not mix in the same stock tank!
- b. In most cases 1 kg fertilizer per 3 liters of water will allow complete dissolve. If temperature drop below 15°C (56°F) 1:3.5 is complementary.

ASSEMBLY



Unpack:

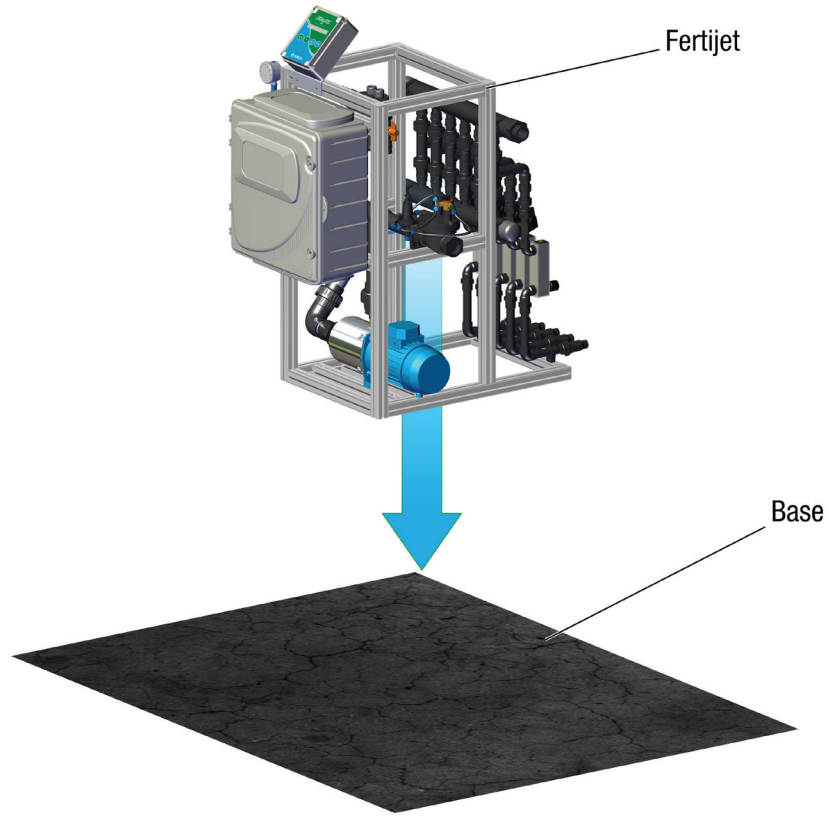
- Remove Fertijet out of its box
- Remove all plastic covers
- Remove all screws connecting Fertijet to wooden pallet





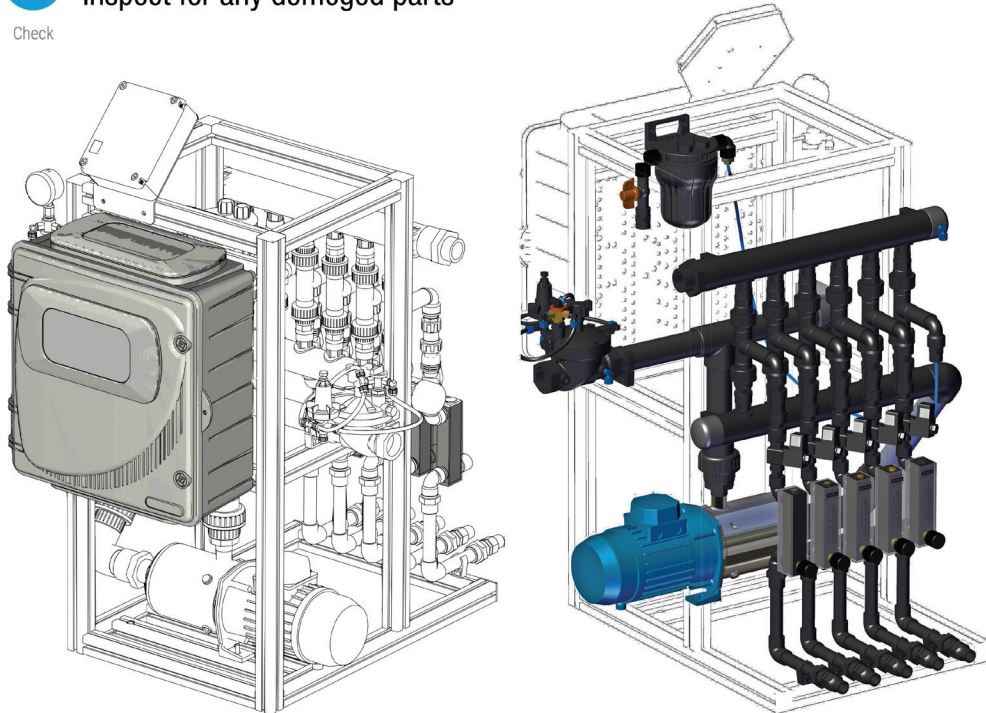
Assemble
/ Locate

Place on a solid and leveled base



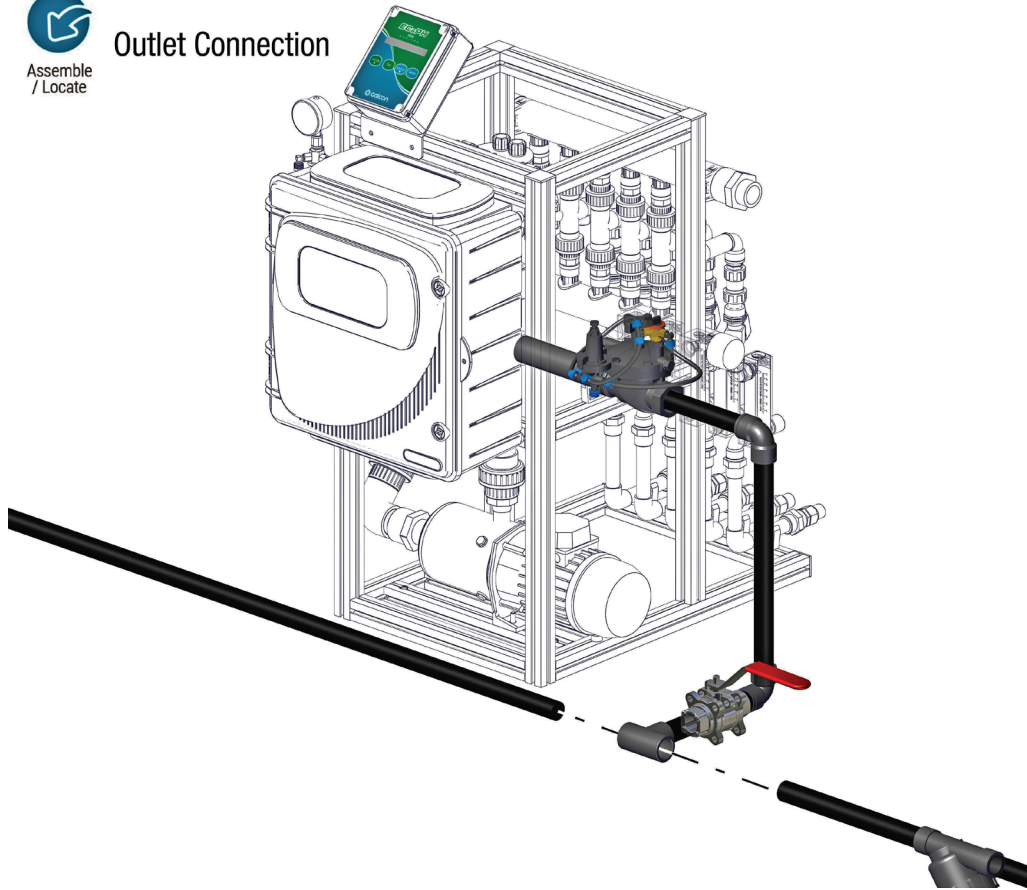
Check

Inspect for any demeged parts

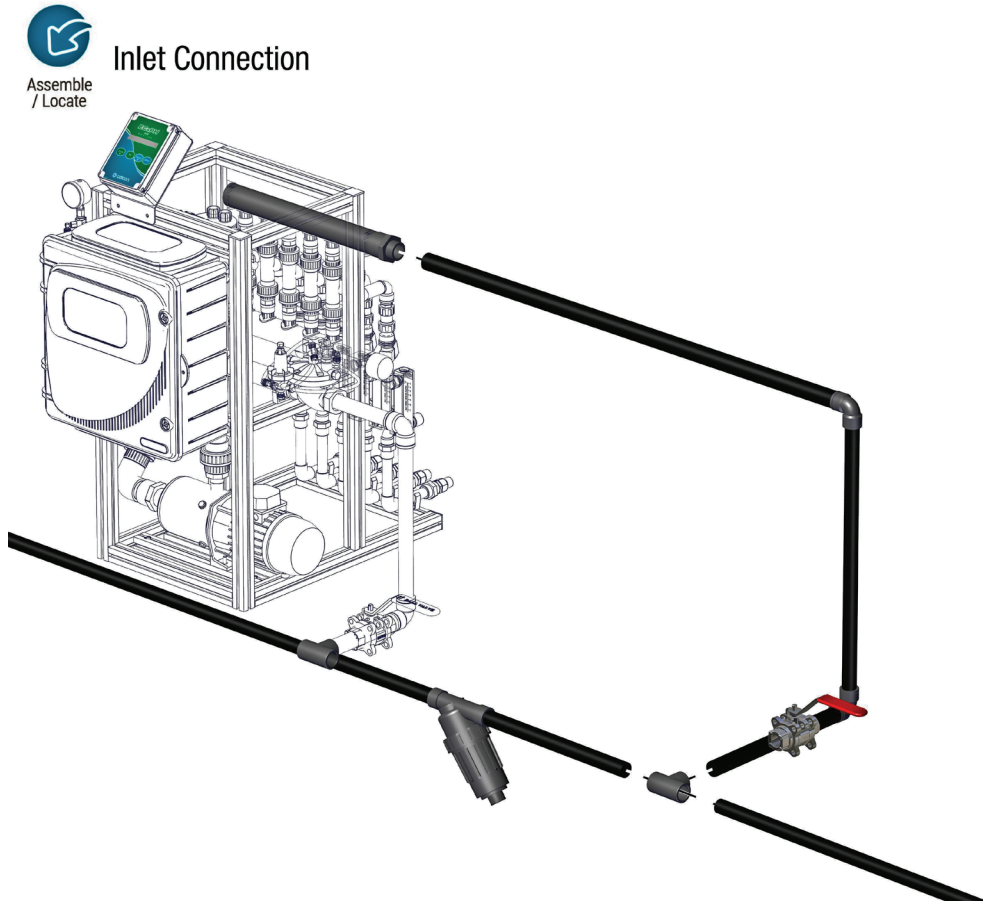




Outlet Connection

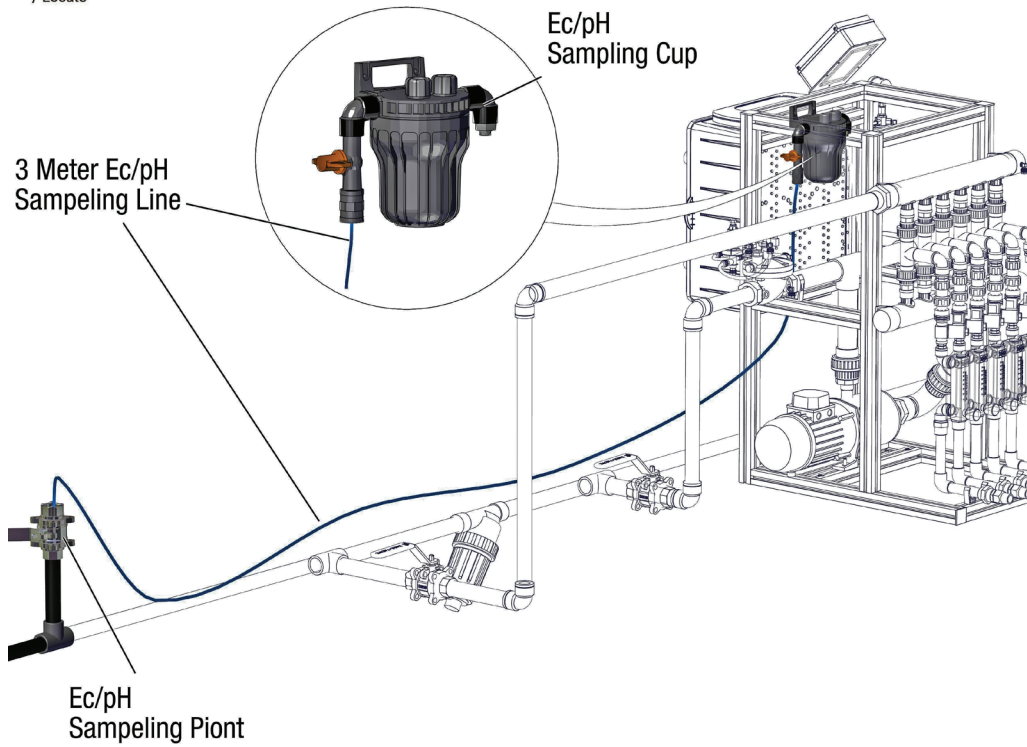


Inlet Connection

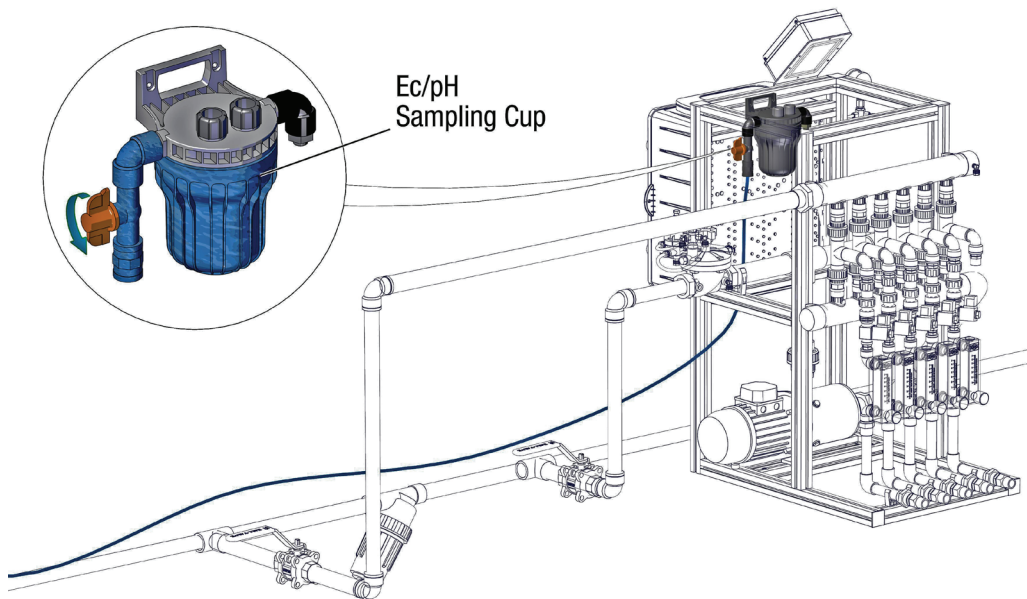




Ec/pH Sampling connection



- The Ec/Ph electrode is a low-pressure probe.
- Never expose the electrode to a pressure exceeding 3.5 bar.
 - Prior to installation the electrode, fill the sampling cell with water.

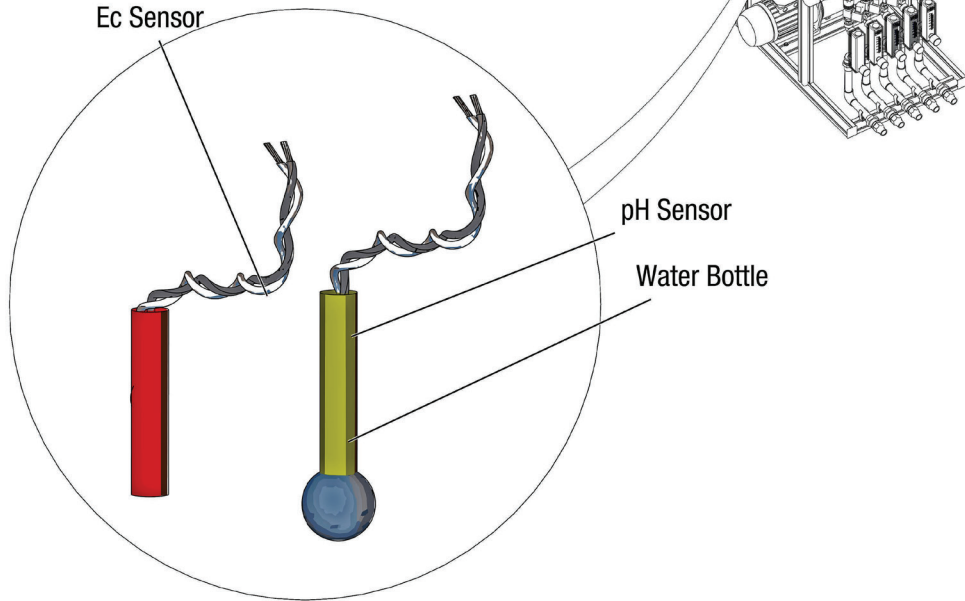




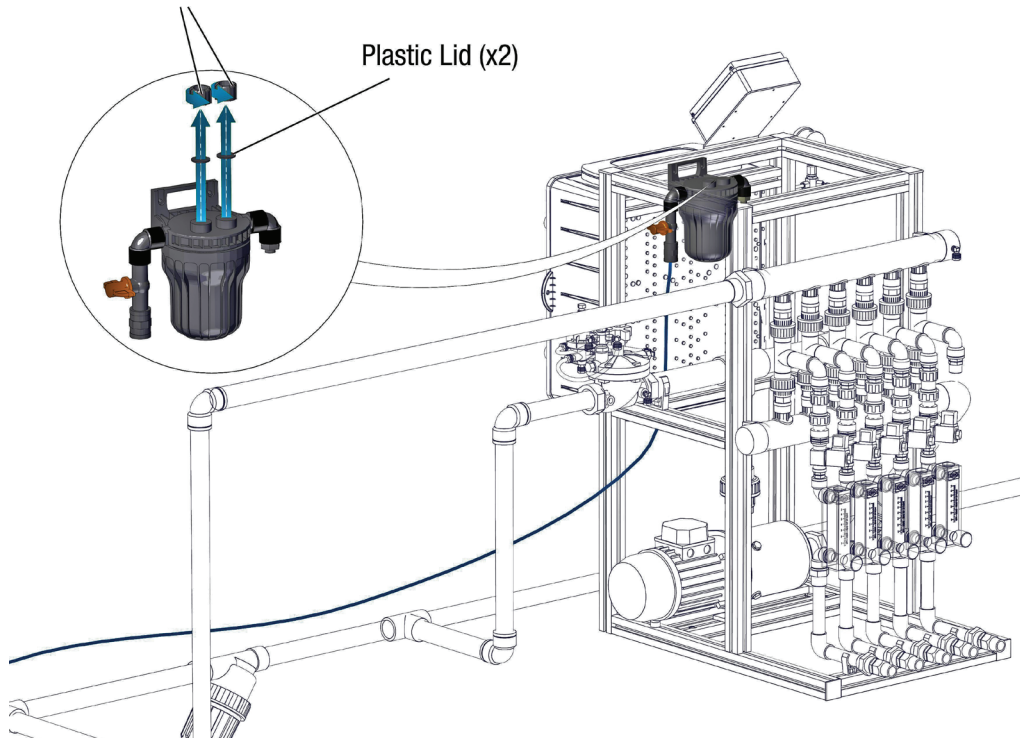
From Box



Make sure pH sensor is submerged in water at all times!



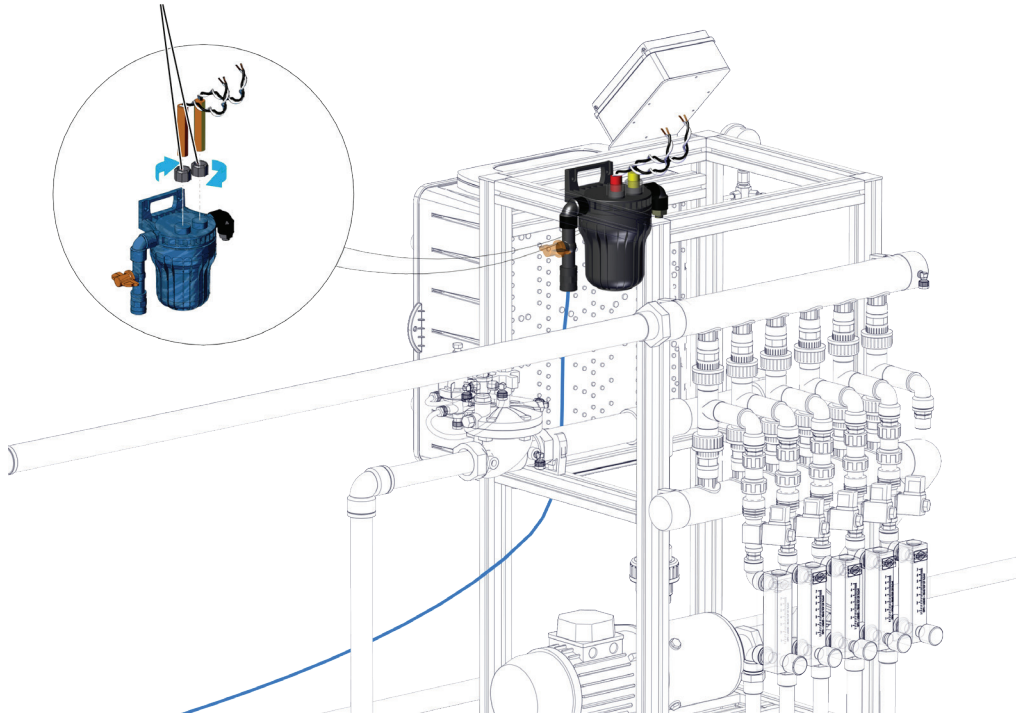
Ec/pH Sensor Covers





Ec/pH Sensors

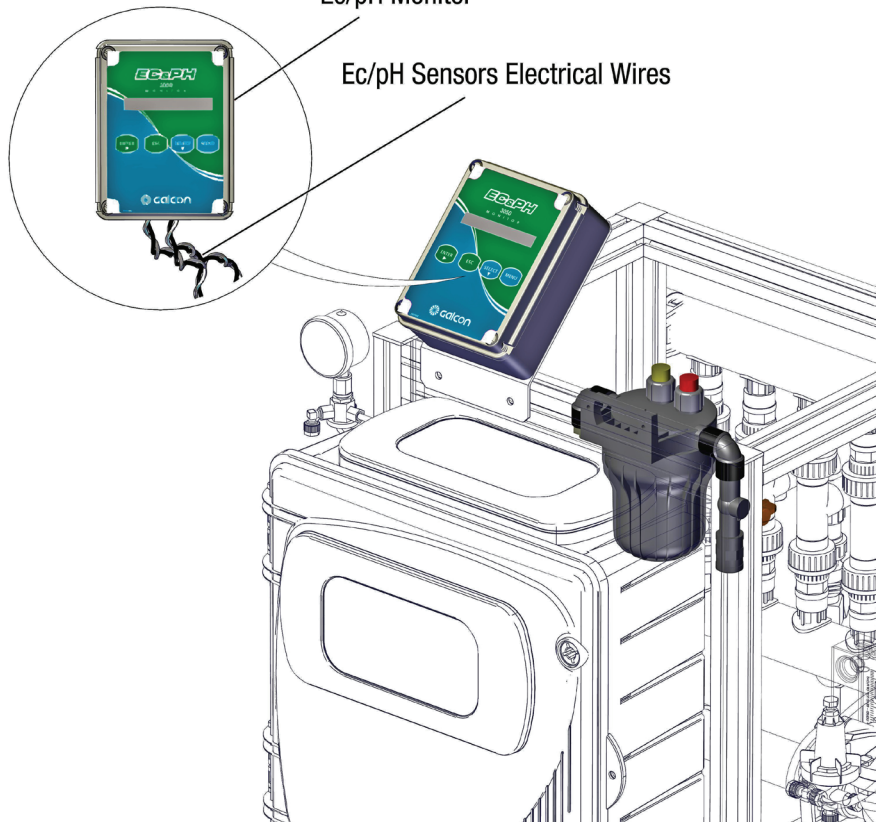
Ec/pH Sensor Holders



Wire

Ec/pH Monitor

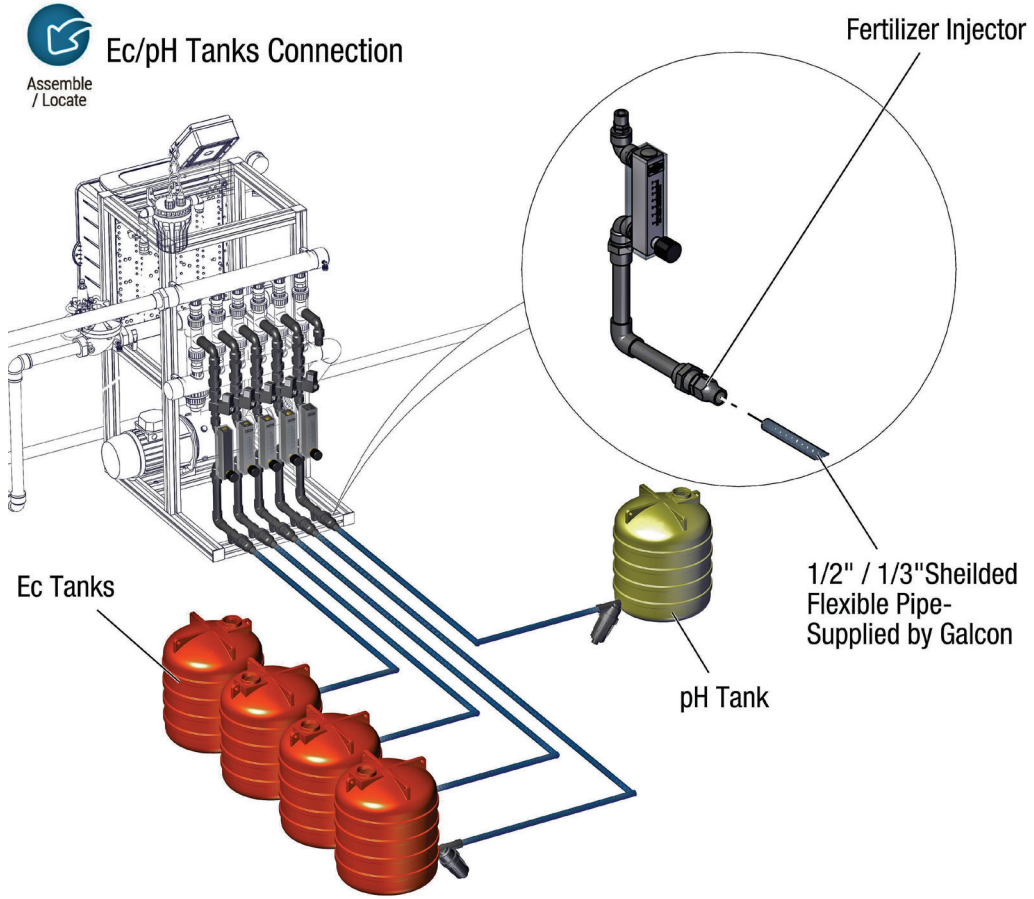
Ec/pH Sensors Electrical Wires





Ec/pH Tanks Connection

Assemble / Locate



Electrical Cabinet

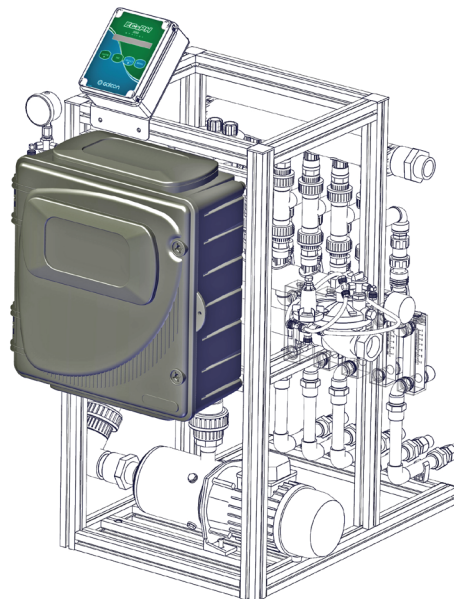
Wire



Electrical Box wiring shall be performed by an authorized electrician, according to local laws and regulations.

Electrical Warning

Electric drawing can be found on the cabinet door.





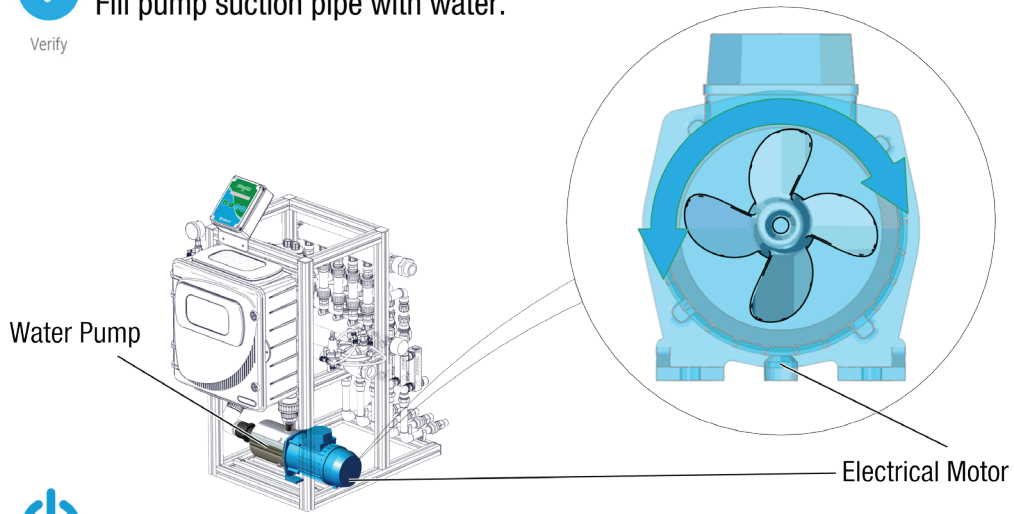
Notice /
Caution

Prior to operating the pump, verify that the valves of the flow regulators are almost completely closed. This will prevent the flow meter ball from getting stuck at the top of the flow regulators!



Verify

Fill pump suction pipe with water.



On / Off

Start the pump for short period time. Make sure Electrical Motor turns according to the direction stamped on motor housing!



Verify

Now your Fertijet is ready for configuration, calibration and to fertigate.

MAINTENANCE

Component	Action	1 month after the first operation	Weekly	Monthly	Quarterly	End of season
Electrical Connections	Pull down the key of Fertijet's main thermo magnetic switch supply and tighten all the screws of the electrical board.	▲				
	Check the insulation and sulfation of the cables and terminals.	▲				
	Check the electrical offset between the supply lines and the electro pump.	▲				
	Check the protection breaker of the electro pump.	▲				
Fertilizer tanks filters	Cleaning with water.		▲			
	Cleaning with acid.			▲		
Fertijet electropump	Flow clean water for 5 minutes.				▲	
	Check the gaskets and gears.					▲
	Measure the insulation of the electropump motor.					▲
Electrovalves 24v	Wash out the crystallized minerals and lubricate the plunger with silicon oil.			▲		▲
Venturi fertilizer injectors	Wash out the crystallized minerals in venturis and flowmeters.			▲		
	Check the regulation of the flowmeters knobs.		▲			
Ec/ph electrodes	Cleaning electrodes and sampling cells.		▲			
	Electrodes calibration.			▲		
	Change of electrodes.					▲

winterization

Winter time in frost-tend area may become harmful for all irrigation components if not well prepared.

The following steps guide you to safe winterizing. Follow them strictly.

The best time to begin winterization actions is the morning following the last day of the irrigation Season.

Winterizing

1. Wash all remains of corrosive materials. Fill fresh water in the fertilizer tanks (in case you have some Fertilizer left for next season, fill a bucket with water and place it instead of the tank) and operate The system with a program that will use all the injectors. Ensure a leach of 20 liters (4 gallons) atleast for each injector.
2. Close all manual valves and turn off all pumps switches. Define the Elgal controller “not active”.
3. Disconnect the machine inlet and outlet pipes from the main pipe and tip their content off.
4. Apart all the available records and bleed any remains of water from the venturi injectors, electric Valves, check valves and other parts.
5. If main fertilizer nc valves exist – make sure to dry all the 8 mm command hoses, the solenoid Valve, and both upper and lower chambers of each valve.
6. Open the booster pump’s draining cork and leave it opened for one hour.
7. Verify draining of all pipes.
8. Remove one of the probes from the ec-ph sampling cell and drip-in 50cc (2 oz) of concentrated antifreeze material. Return the probe to its place and fasten its bolt.
9. Clean the machine of all external remains of corrosive materials. Cover the machine with a sheet.

Do not shut down the controller’s power supply, leaving the elgal controller powered off for long Time may cause extensive use of the memory and shorten its life.

EC/pH Electrodes

Clean the EC/pH electrodes on a weekly basis. Thus it is recommended to remove any impurity on the electrodes for 10 minutes with the acid solution prepared in the acid tank.

Use 4.0 and 7.0 Buffer solutions for the pH, and the 1.4 mS/cm solution for the EC.

For the pH electrode, measure how long it takes the electrode to reach a reading of 4.0 to 7.0. For this exercise use the pH 4.0 and 7.0 solutions; Whereas if the time elapsed exceeds 30 seconds, the pH electrode should be replaced to assure control.

TROUBLESHOOTING

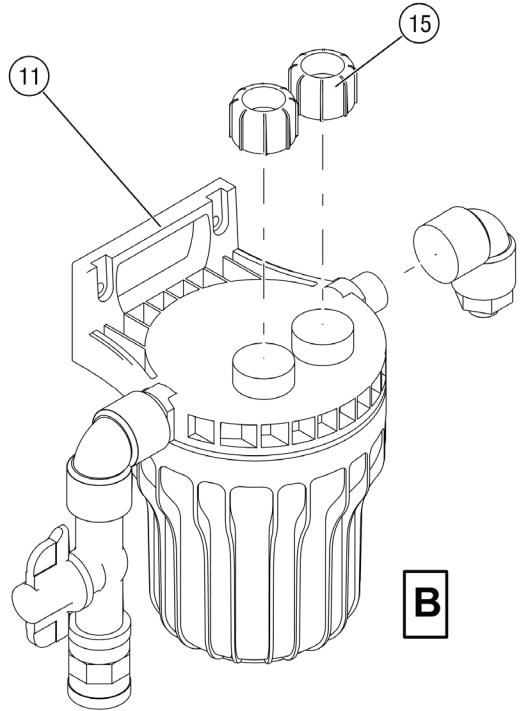
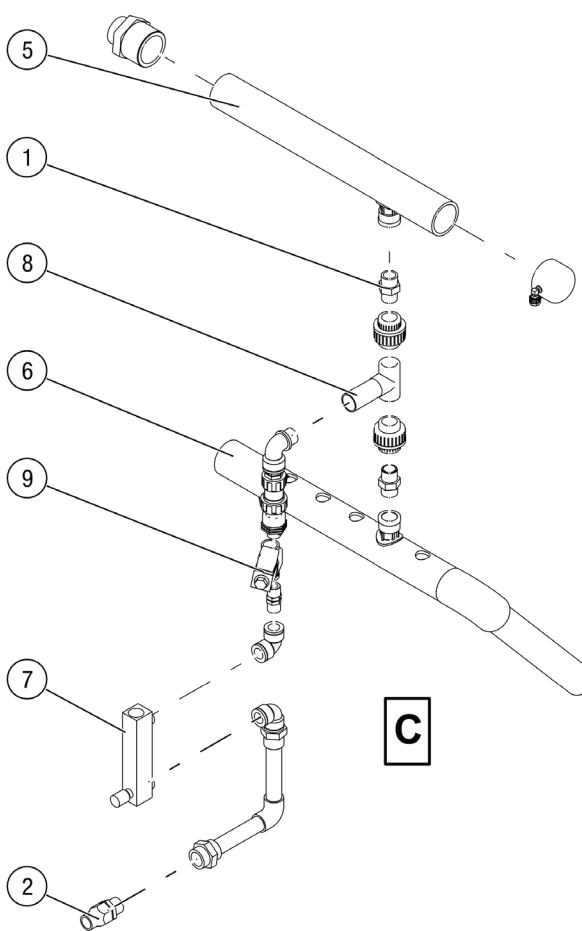
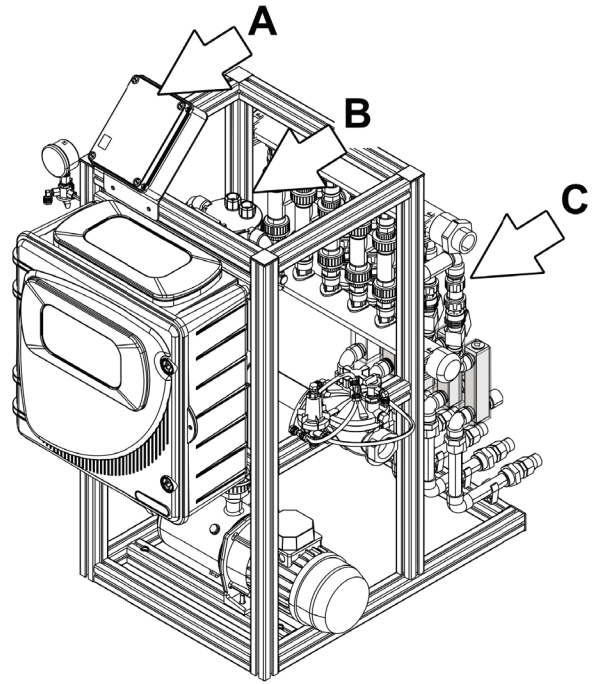
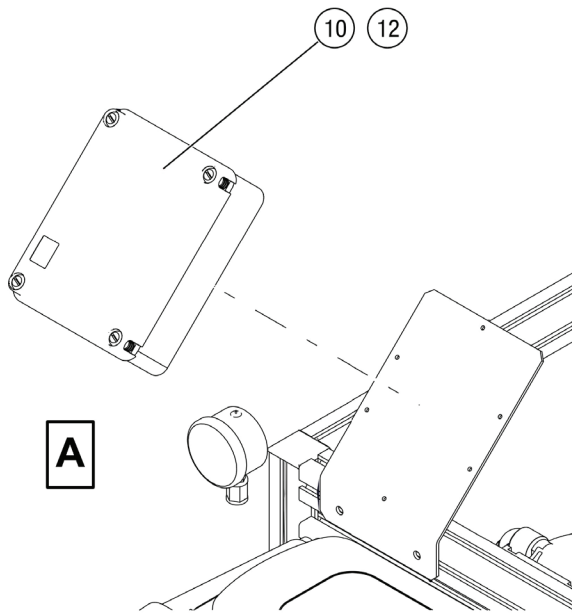
Symptom	Possible reason	Solution
The booster pump doesn't start when commanded.	<ul style="list-style-type: none"> a. Check the main power. b. Check the ~24v breaker in the Fertijet. c. Check the ~24V fuse in the Galileo. d. Make sure line pressure is above the stated value of the pump. 	
The booster pump rotates but no suction power.	<ul style="list-style-type: none"> a. Check the motor direction. It must be as indicated by the arrow on the motor or on the pump body. b. Open the union (or flange) at the pump inlet and verify the free flow of water into the pump. 	<ul style="list-style-type: none"> a. Change the sequence between 2 phases (By electrician)
Difference between the line pressure and the suction pressure is less than 25 m	Check if the venturi blocks orifice has been deformed and replace them if necessary.	

Symptom	Possible reason	Solution
The pressure gauge between the Venturi and the pump often indicates -5 m or less.	Increase the line pressure or adjust the PSV at the pump outlet to higher pressure.	
Dosing valve doesn't respond to command.	Replace the dosing valve.	
Dosing valve 'ticks' but no flow is detected.	<ul style="list-style-type: none"> a. Check the fertilizer supply. Saturated fertilizer sometimes crystalizes at cold environment. b. Check the inner parts of the dosing valves. c. Check the non-return valve and the venturi inlet for chips of plastic that may escaped the tank's filter 	<ul style="list-style-type: none"> a. Dissolve with water b. Some of the valve parts, like spring and diaphragm are replaceable.

ILLUSTRATED PART LIST

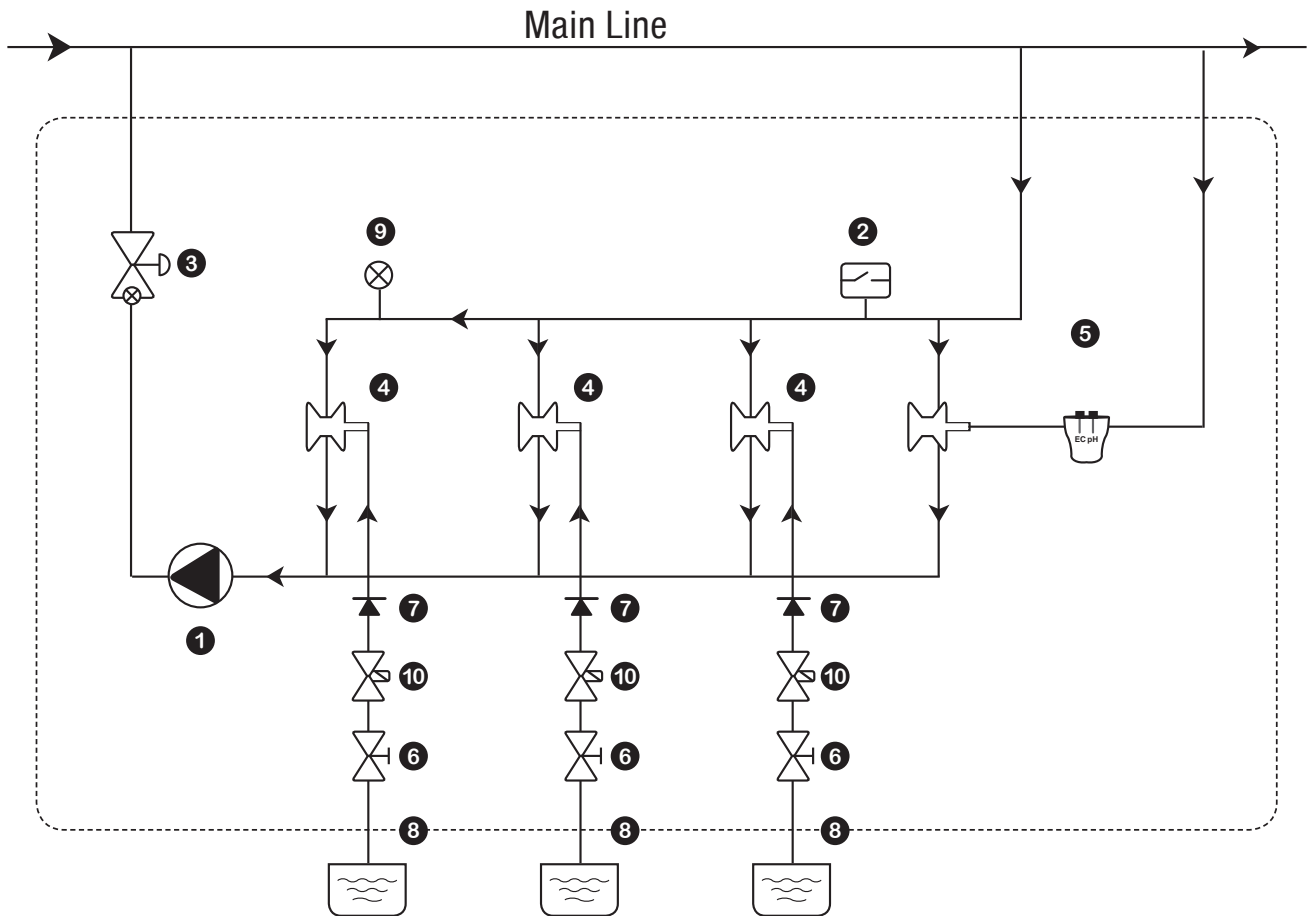
#	Serial Number	Description
1	P0A0RP2503A	Repl. 3/4" Non-Return Valve
2	P0A0RP2500A	Repl. 3/4"-20 Not-Lock Barb Fitting Ext Thread
3	P0A0RP2501A	Repl. 6 Bar Pressostat
5	PFA0RP2300A	Repl. 4 Channel Upper Manifold Assembly
5	PFA0RP2301A	Repl. 5 Channel Upper Manifold Assembly
5	PFA0RP2302A	Repl. 6 Channel Upper Manifold Assembly
5	PFA0RP2303A	Repl. 8 Channel Upper Manifold Assembly
6	PFA0RP2304A	Repl. 4 Channel Lower Manifold Assembly
6	PFA0RP2305A	Repl. 5 Channel Lower Manifold Assembly
6	PFA0RP2306A	Repl. 6 Channel Lower Manifold Assembly
6	PFA0RP2307A	Repl. 8 Channel Lower Manifold Assembly
7	PFI0RP2000A	Repl. 60 L/H Flow Meter Assembly
7	PFI0RP2001A	Repl. 160 L/H Flow Meter Assembly
7	PFI0RP2002A	Repl. 350 L/H Flow Meter Assembly
7	PFI0RP2003A	Repl. 700 L/H Flow Meter Assembly
7	PFI0RP2004A	Repl. 1200 L/H Flow Meter Assembly
8	PFI0RP2005A	Repl. 120 L/H Venturi Unit
8	PFI0RP2007A	Repl. 350 L/H Venturi Unit
8	PFI0RP2008A	Repl. 700 L/H Venturi Unit
8	PFI0RP2009A	Repl. 1200 L/H Venturi Unit
9	PFS0RP2100A	Repl. 1/2" 50Hz Fertigation Valve GEM-SOL
9	PFS0RP2101A	Repl. 1/2" 60Hz Fertigation Valve GEM-SOL
9	PFS0RP2102A	Repl. 1/2" 50Hz Fertigation Valve SIRAI
9	PFS0RP2103A	Repl. 1/2" 60Hz Fertigation Valve SIRAI
10	PPH0RP7500A	Repl. ECPH Display Card
11	PPH0RP7501A	Repl. ECPH Electrode Sampling Cell
12	PPH0RP7504A	Repl. ECPH Main Card
13	PPH0RP7505A	Repl. ECPH Measuring Unit W/O Electrodes
15	PPH0RP7507A	Repl. Low Pressure EC Electrode Assembly

#	Serial Number	Description
15	PPH0RP7508A	Repl. Low Pressure PH Electrode Assembly
16	PFE0RP7000A	Repl. 3 Venturi Channel Activation Module
17	PFI0RP2010A	Repl. 120 L/H 50Hz Venturi Channel Assembly
17	PFI0RP2011A	Repl. 160 L/H 50Hz Venturi Channel Assembly
17	PFI0RP2012A	Repl. 350 L/H 50Hz Venturi Channel Assembly
17	PFI0RP2013A	Repl. 700 L/H 50Hz Venturi Channel Assembly
17	PFI0RP2014A	Repl. 1200 L/H 50Hz Venturi Channel Assembly
17	PFI0RP2015A	Repl. 120 L/H 60Hz Venturi Channel Assembly
17	PFI0RP2016A	Repl. 160 L/H 60Hz Venturi Channel Assembly
17	PFI0RP2017A	Repl. 350 L/H 60Hz Venturi Channel Assembly
17	PFI0RP2018A	Repl. 700 L/H 60Hz Venturi Channel Assembly
17	PFI0RP2019A	Repl. 1200 L/H 60Hz Venturi Channel Assembly
18	PPH0RP7502A	Repl. 3 Bottle Calibration Set EC1.4+PH
19	PPH0RP7503A	Repl. 3 Bottle Calibration Set EC0.5+PH
20	PPH0RP7506A	Repl. ECPH Assembly For Fertigation System



APPENDIX 1

Schematic Diagram



- ❶ Pump
- ❷ Pressostart
- ❸ Psv Pressure Sustaining Valve
- ❹ Venturi
- ❺ EC/pH Sampling Cell
- ❻ Manual Valve
- ❼ Non Return Valve
- ❽ EC/pH Tank
- ❾ Pressure
- ❿ Solenoid Gauge



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