

Water Purification and Delivery RO System

Overview

The Pure Water System is in 2 Parts

RO Water Creation into customer IBC tank

DI Water Delivery from Tank to 4 Operators

RO Water Creation

- 1 - Carbon Filter 120,000 Gallons
- 3 - RO Membranes High Flow
- 3 - 12v RO Boost Pumps
- 3 - Tank Water Level Monitoring Probes Turn off Pumps
- 3 – Water Level flow valves for Positive Water Stop

Water Delivery– 4 Operators

- 4 - 1 Gallon per minute Pumps
- 4 - Pump Controller with Long Range Remote Fobs
- 4 - DI Filter Housings and 4.5x20 Inserts
- 4 – Bags of DI Resin
- 4 – Delivery Reels with 200ft of 3/8 Delivery Hose

The system can run from Tap Water Pressure

When there is 60PSI or over and 5 gpm or more from the tap water input hose it is not necessary to turn on RO Boost Pumps

Depending on Water flow, the operator can select No Boost, 1 RO Boost pump, 2 RO Boost Pumps or with 7 gpm available all three RO Boost pumps

Note:

The system is configured on 4 mounting plates, each plate has two bushings on u-bolts that allow the connection of the plates to the IBC container rails. It is recommended that additional attachments are made to the IBC to securely hold the plates to the IBC for travel

Filter Replacement

Replace the Carbon Filter every Quarter

Replace the DI Resin in the Cartridge when the TDS reading is above 10 TDS

When the TDS starts to creep above 1 or 2 on the TDS meter make sure you have a Resin Bag handy... There is a TDS meter per operator and cartridge

The RO Membrane's should last 5 to 7 years with the proper replacement of the Carbon filter and the RO Flush at the beginning and end of each job for 30 seconds or more

Power Requirements

The RO Creation System and the Operator Water Delivery system both have their own Power Requirements and Battery connection Cables (4 Gauge wire) and need separate battery banks

We recommend 4 qty 100-amp batteries for the RO Creation system

And 2 qty 100 Amp batteries for the 4 Operator Delivery System

Note:

We are providing 4-gauge wires to route to the battery packs but are not quoting batteries or attaching of the wiring to those packs

In rush current (for sizing)

3 RO Pumps 22 amps (12v) 66 amps 800 watts

4 Delivery Pumps 6 amps (12v) 24 amps 300 watts

Running Current

3 RO Pumps 16 amps (12v) 48 amps 600 watts

4 Delivery Pumps 4 amps (12v) 16 amps 200 Watts

Battery charger

This would be attached to the 12v batteries

When connected to the battery the in-rush is not an issue as the battery will absorb that

And you don't need to cover all of the current draw as the battery can drain and

charger as you use more or less current

Like: When the tank is full the RO pumps are off and the battery recharges

RO Water creation Pumps we recommend a 75-amp hour charger

Example 1

<https://theinverterstore.com/product/aims-ac-converter-battery-charger-12v-24v-smart-charger-75-amps-large-charging-capacity/>

Example 2

<https://www.ebay.com/itm/394989553595>

For the Water delivery Pumps, we recommend a 40amp charger

There is a charger like this that also offers a 200amp manual boost available at Harbor Freight

With the goals of a 75-amp 12v Charger will run the RO Creation from an extension cord

and the 40-amp charger for the Delivery Pumps will do the same

Mounting the plates

We recommend Four People for the task of attaching, as you need to move and hold the Operator Plate and the two Pump Plates together as they are attached to each other with wires and plumbing

Assign one person to each plate (3 Plates) first

Then carry the plates to the IBC

Start with the operator Plate, Place, "Hang it" from the top bar of the IBC, by setting the u-bolts on the top bar...

and as one person holds it there,

Then next person will "hag" the 3 Pump RO plate on the top bar to the right of the operator plate

and the 3rd plate the delivery plate hangs and then mounts to the middle bar below the 3 Pump RO plate. (person 3) The delivery plate will also have the input water line that will need to be routed to a convenient spot in the trailer

Once they are all in position and being held in place

Person 4 is now tasked with the opening the U-bolts and mount bushing, placing the mounting bushing over the IBC Rail, and putting the u-bolt back around attaching the u-bolt to the mounting bracket on the plate

There is a video instruction for this process.

Now mount the 4th plate (RO Membranes) to the right of the pump plates to the IBC. This will also have the RO Flush valve Trident attached set that on top of the tank for now

The plates all have a U-Bolt bracket on the top to attach each plate to the IBC

The Locations are pre-determined, and the plates will install on three sides of the IBC

The Operator Panel and RO Membrane Panels are meant to be installed on three sides of the IBC container.

The Pump Plate will be mounted on the short side that on the Right Side of the Operator panel

Note:

In our testing we installed the Operator panel and the RO Membranes on the long sides of the IBC Tank. The pump plates were installed on the shorter side, you may want to review your installation to pick the side.

Correct Orientation

The plates are wired and plumbed in such a way that the

- The first Plate is operator plate

- To the right of the are the two pump plates

 - RO Plate (3 pumps, carbon filter) above the 4 Delivery Pumps

- To the Right of the pumps and opposite the Operator Plate is the RO Mount Plate

RO Flush Valve (from RO Membrane Plate)

Now mount the RO Flush Valve Trident to a spot on the IBC or Trailer Wall where the Operators can easily get to the Valves

RO Permeate to tank (from RO Membrane Plate)

RO Filtered (Permeate out lines) are also routed to the top of the tank to be installed into bulkhead fitting and tank float valve

Input Water Line

The input Water line (attached to the Carbon Filter) can be routed near the back of the trailer.

The RO Pump Lines (from the RO Pump Plate can now also) be connected to the RO Membranes

The Delivery Pump Plate water pickup lines can be routed to the top of the tank

4RO Water Creation

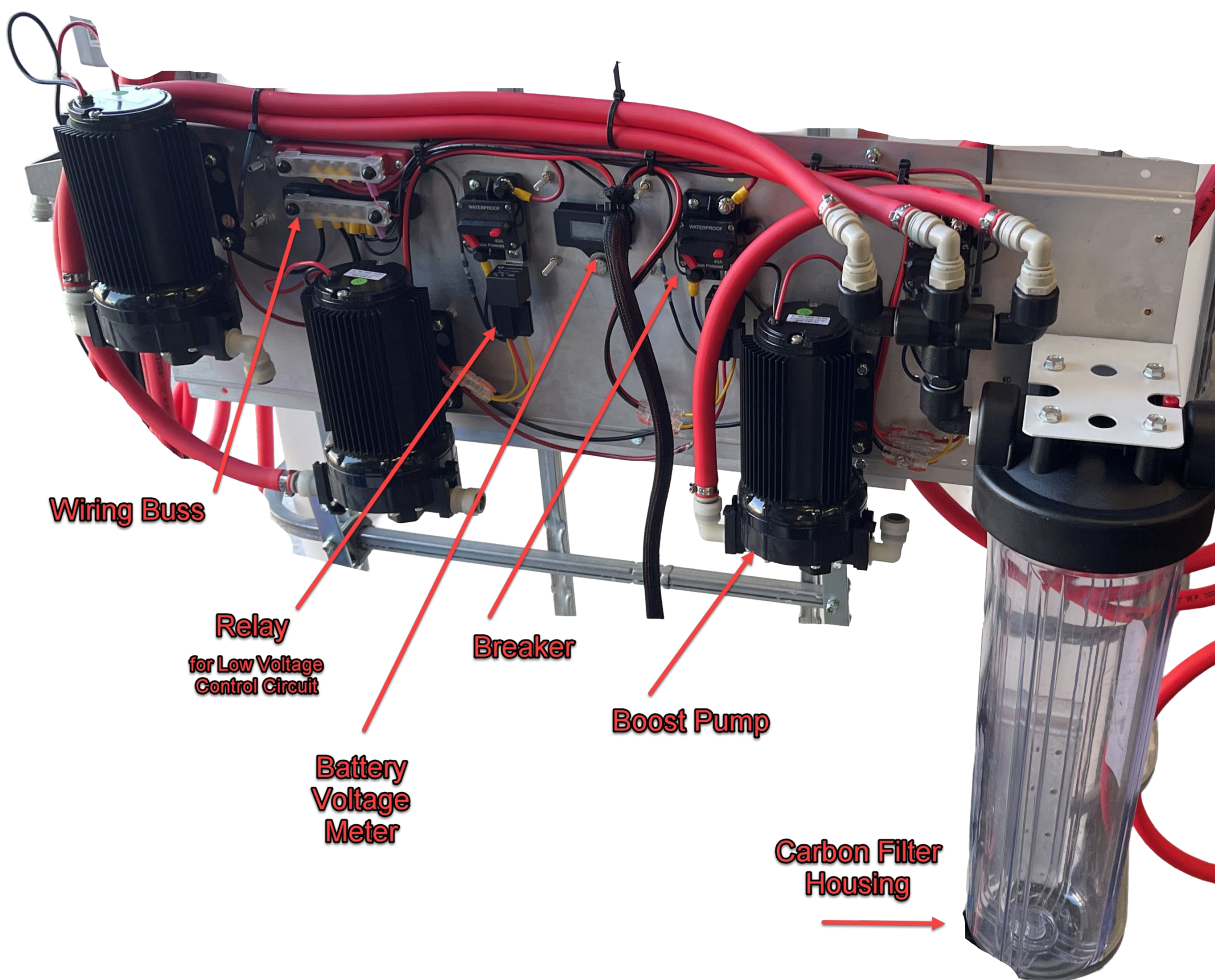
There are two mounting plates,

A) One that controls the RO Boost Pumps

The water flow through the Carbon Filter and out the plumbing 8 GPM

B) One that hold the RO Membranes

RO Control Plate Layout:



The Power is routed to the power panel via 4-gauge wire from the battery/power source.

There is a breaker for the high Amp Power that each pump uses, and it also powers the low amperage control circuit as well, the low amperage system controls a high-power relay for turning on and off the pump either manually or when the water level rises to the float switch.

The Low amperage control consists of a s a RO On-Off switches (3 each) mounted on the Operator Panel and the tank level sensors (3 one for each pump)



Tank Probe

RO Pump On Off Switch

The low amperage circuit runs from the Breaker switched power, through the relay and on to the Tank Probe, then to the RO power switch right back to the relay.

Note: Be careful when installing Install the tank probe to pick a place where you can reach the underside of the hole to insert the Tank Probe wires and body into the hole

The RO pumps will be off when the probe senses the tank is full (and/or) when the RO Switch is off,

Note: the probes will need to be installed into the top of the customer IBC tank and the probe wires attached, in as shipped configuration the water probe sensors are not operative. (see video)

The high amperage current runs from the Battery with a 4-gauge wire to the Buss Bar

Note:

For any of the breaker Switches they are not meant for day-to-day operation, there are the resettable fuses for this system for all 7 of the pumps

The Buss Barr routes power to each of the Breaker Switches

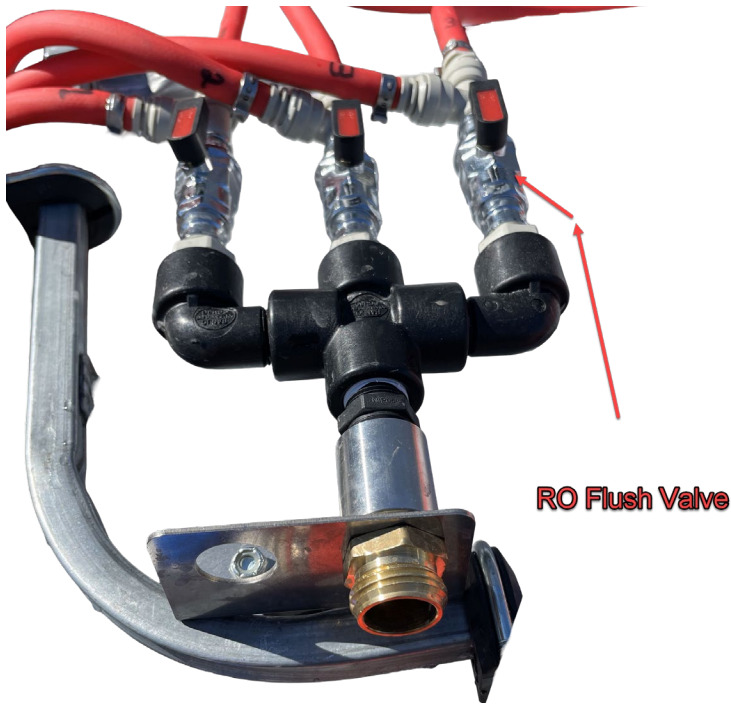
RO Pump Water Creation... The power from the breaker runs though the low amp circuit above which controls the relay to switch the high amp power on and off

Operator Water Delivery ... The breakers deliver power to the pump controllers.

Note: The Breakers should be turned off when performing pump replacement or maintenance on the delivery pump controllers.

RO Flush Valves

RO Flush Valves for each membrane are on a mounting bracket for easy positioning



The Flush Valves should be opened at the beginning of the job and allow water to freely flow for about a minute

They are in Flush Mode in the picture above

After flushing turn the valve 90 degrees to enter production mode for producing RO water.

Route the flush water out to landscaping

A retractable hose reel could be used to route the flush water out to the landscaping

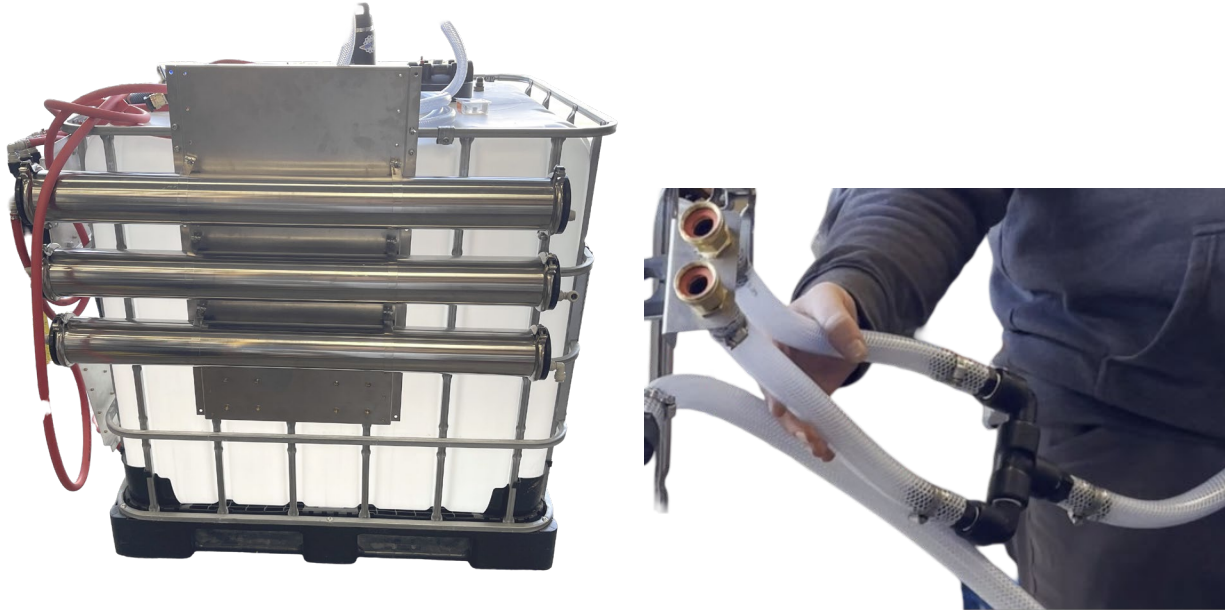
<https://www.amazon.com/SuperHandy-Retractable-Commercial-Industrial-Disconnects/dp/B082TZ9FWF>



Th RO Membrane Plate

This plate holds the housing and RO Membranes inside them for the RO purification of the water into the IBC Tank.

Shown here mounted to the IBC Tank



The Water Input line has two inlet hoses in order to get enough water.

The system ideally wants to receive 7 gallons per minute (GPM) at 60 psi

In our shop for instance we have two water sources, one is 4.5 GPM and the other is 6.8 gpm, together these offer enough water flow to run all three ROs membranes and pumps, the system could operate solely on the 6.5 gpm source, and we would recommend turning off the third RO Membrane Pump when doing so.

Not every site will have a single line with 7 GPM available

You should keep a Gallon Per Minute water meter available the water flow at each job site.

The Output of each of the RO Membranes is routed to a bulkhead fitting with an attached Water Float Valve

Install the 3 vales and fittings onto the top of the IBC Tank

Attach the water lines from the RO Center (permeate) output lines to the Tank Float Valve Bulkhead fitting



to test

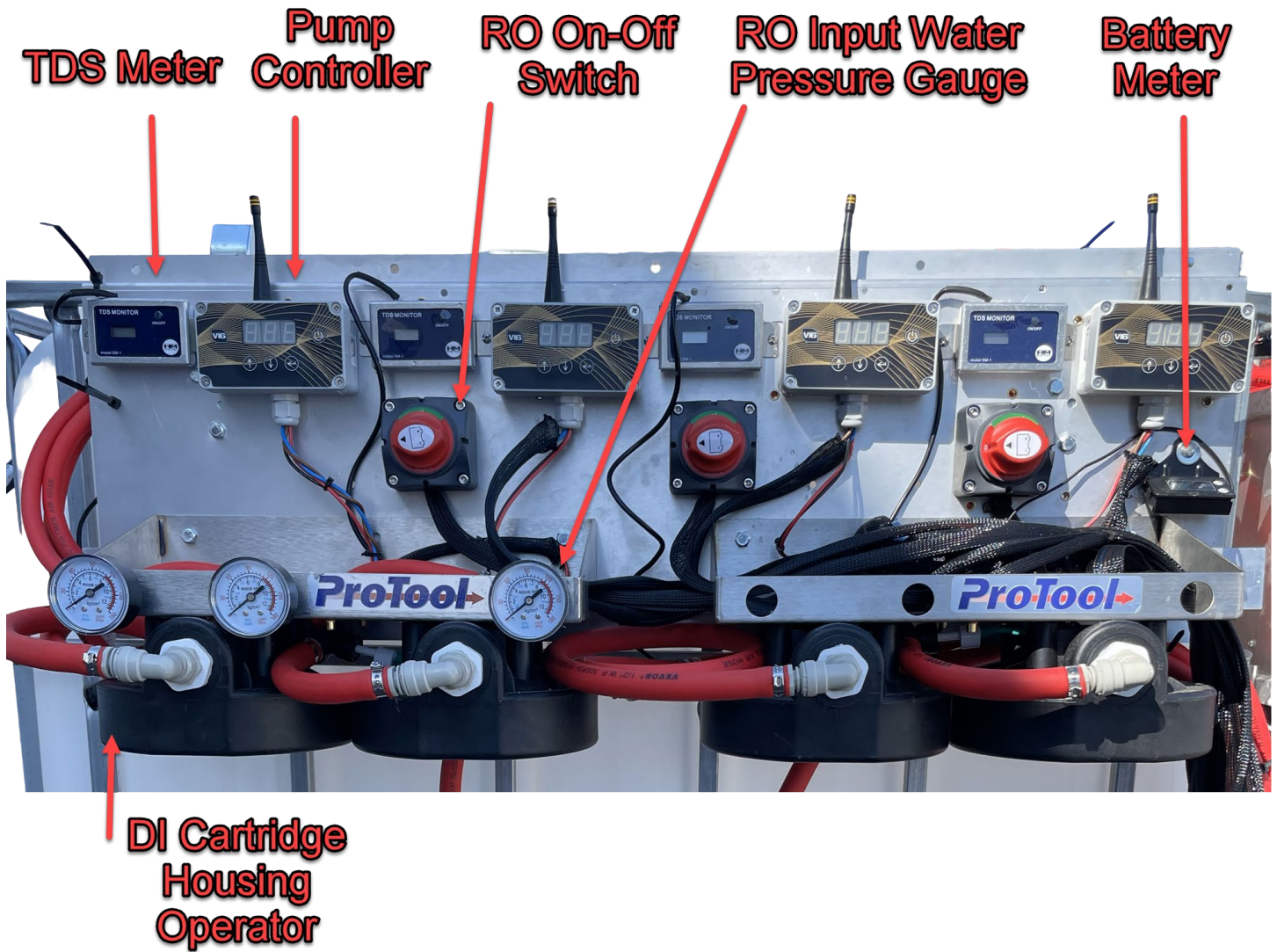


Water Delivery – Operator Plate

The Operator Delivery side consists of two plates

The Operator Panel or control station, offers the ability to

- Turn on and off the Operator Delivery Pumps (4) to one of the 4 reels
- Review the TDS of that operators Water Delivery
- Change the DI Resin Cartridge specific to that Operator and TDS Meter
- Review RO Membrane Input Water Pressure individually (3 Gauges)
- Turn on and off the RO Boost Pumps



Water Delivery – Pump Plate

The 4 Operator Pumps, Input Power from 4 Gauge Cable and breaker switches are located together on this plate which mounts below the RO Booster Pump Plate

This is connected to the Operator Plate both with wiring and plumbing hoses

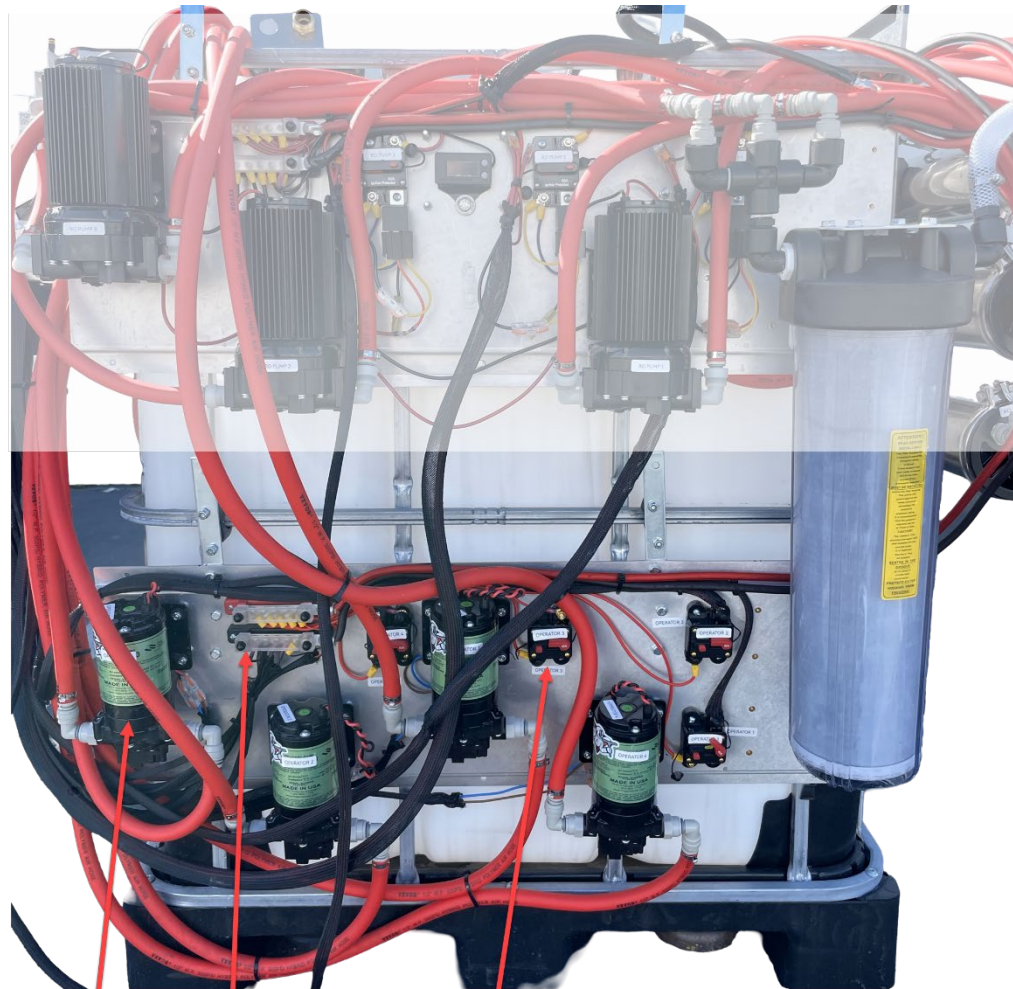
The water lines (hoses) that draw from the tank are connected to the input of each of these pumps,

The inlet lines are attached to bulkhead push fittings.

This fitting will need to be installed into the top of the customer IBC Tank



The Operator Delivery Pickup



Delivery Pump

Power Buss Barr

Breaker Switch

Installing the Bulkhead Fittings

The Draw Tubes from the pumps will have the Bulkhead fittings on them

Remove each one and install the Bulkhead into the IBC Tank

Note the Draw lines are installed from inside the tank into these fittings so install where you can reach the underside of the bulkhead fitting to insert the push-fit connector into the bottom of the bulkhead fitting

The Draw Lines were shipped in a separate box and look like this:



The Male Garden Hose fitting on the end is just used as a weight to keep the end of the draw hose on/near the bottom of the tank.

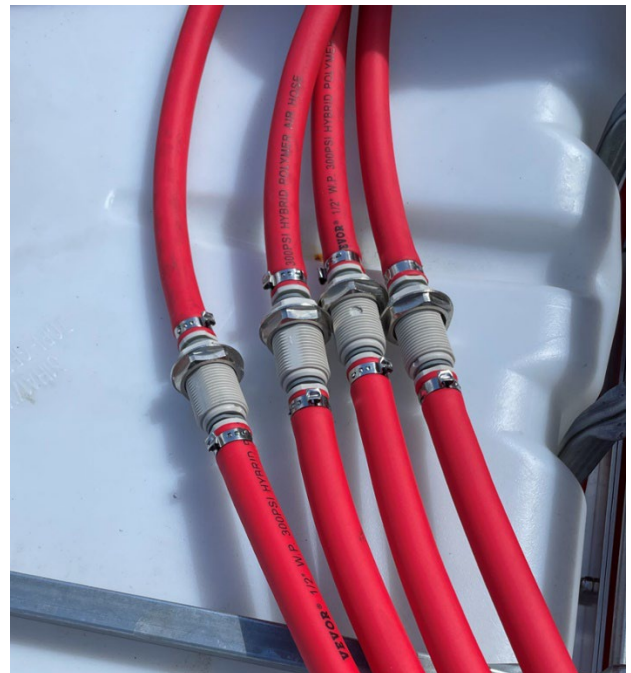
When connected:

The bulkhead would be installed into the top of your IBC first

Comment:

We went with 4 DI housings and drew RO Purified Water from the IBC tank because DI water quickly returns to RO Water when left standing in a tank.

Making DI water into a tank and leaving it in the tank over the weekend and the DI water will be RO Water come Monday.



It is best to treat/polish the RO Water immediately before using it on the glass

Reference Items:

Pump Controller

The pump controller will require calibration and fob pairing

You can find the manuals instructional videos on our website

Enter 150-5452 in the search box

<https://www.iracenstein.com/p/pump-controller-v16-wfp-link-long-range-remote-control-15-amp-12v/150-5452>

Manual PDFs are on the documents tab, the Instructional Videos are on the man screen

Wire Size

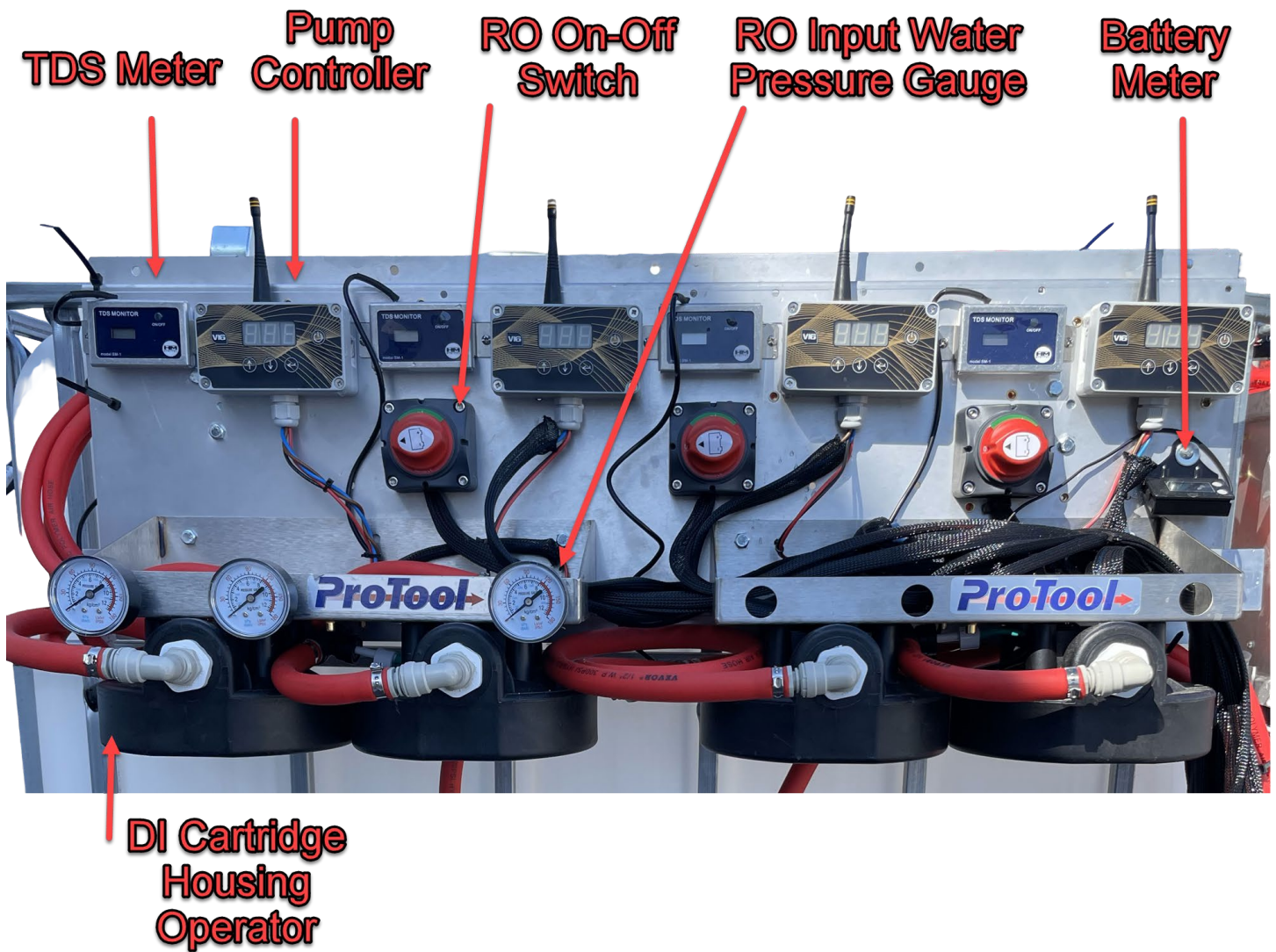
This is a chart that describes wire sizes needs for amperage and run length

The 4-gauge wire is sufficient for the run that the system delivered with.

Amps @ 13.8 Volts	LENGTH OF WIRE American Wire Gauge (AWG)						
	0-4 ft.	4-7 ft.	7-10 ft.	10-13 ft.	13-16 ft.	16-19 ft.	19-22 ft.
0-10	16-ga.	16-ga.	14-ga.	14-ga.	12-ga.	10-ga.	10-ga.
10-15	14-ga.	14-ga.	14-ga.	12-ga.	10-ga.	8-ga.	8-ga.
15-20	12-ga.	12-ga.	12-ga.	12-ga.	10-ga.	8-ga.	8-ga.
20-35	12-ga.	10-ga.	10-ga.	10-ga.	10-ga.	8-ga.	8-ga.
35-50	10-ga.	10-ga.	10-ga.	8-ga.	8-ga.	8-ga.	6 or 4-ga.
50-65	10-ga.	10-ga.	8-ga.	8-ga.	6 or 4-ga.	6 or 4-ga.	4-ga.
65-85	10-ga.	8-ga.	8-ga.	6 or 4-ga.	6 or 4-ga.	4-ga.	4-ga.
85-105	8-ga.	8-ga.	6 or 4-ga.	4-ga.	4-ga.	4-ga.	4-ga.
105-125	8-ga.	8-ga.	6 or 4-ga.	4-ga.	4-ga.	4-ga.	2-ga.
125-150	8-ga.	6 or 4-ga.	4-ga.	4-ga.	2-ga.	2-ga.	2-ga.
150-200	6 or 4-ga.	4-ga.	4-ga.	2-ga.	2-ga.	1/0-ga.	1/0-ga.
200-250	4-ga.	4-ga.	2-ga.	2-ga.	1/0-ga.	1/0-ga.	1/0-ga.
250-300	4-ga.	2-ga.	2-ga.	1/0-ga.	1/0-ga.	1/0-ga.	2/0-ga.

Daily Operator Use

The operator concentrates their attention on the
Water inlet Connection and Water Flush First
Then the Operator Panel



Daily Operator Use

- 1) Arrival on Site
 - a. Determine the amount of water in GPM and pressure is available
 - b. Lots of water and pressure (7GPM at 65psi) all is well

If not enough water

 - c. Is the job big enough to try and source a second spigot?
 - d. If just one and less than 7 GPM, then only 1 or 2 of the RO pumps will be turned on but that is for later
- 2) Attach the inlet feed water source
- 3) Plug in the Trailer to building power
- 4) Attach the RO Flush hose and place in the landscaping
- 5) Open the Flush Valves (3 Valves) prepare to Flush for a minute while setting up
- 6) Turn on the Feed Water
- 7) Flush for 1 minute
- 8) Tuen the RO Flush Valves into production mode
- 9) Review Water Availability and size of job, # operators
- 10) Review Water Availability and size of job, # operators
 - a. If you have great water pressure and flow
 - b. Only going to support 2 operators
You probably don't need to pump
 - c. If you need flow for 4 operators and the water is 7 GPM but low pressure, then
Turn on 2 or 3 RO pumps
- 11) Select an operator Number (1 to 4)
 - a. Find the Remote Fob
 - b. Open the end of the delivery hose on the Reel
 - i. Do not attach a pole yet
 - c. Turn on the controller using the enter button
 - d. Use the fob to start flow
 - e. Check the TDS on the TDS meter
 - f. If less than 10 continue,
 - i. more than 10 TDs change resin
 - ii. (or select a different operator position)
 - g. When TDS is low use the fob to turn off the flow and now attach the pole
- 12) Ready to clean

Daily Operator Use

End of Job

- 1) Turn off the pump controller/ fob
- 2) Disconnect the pole
- 3) Roll in the pole hose secure the Reel
- 4) When everyone is done
 - a. Open the RO Flush Valves (3)
 - b. Pause a moment (30 second or more)
 - c. Turn off the feed water from the tap
 - d. Recall the RO Flus water hose
 - e. Disconnect the Inlet Feed Water