

WaterSOLV™

FS-1

CHEMTIGATION FLOW SWITCH

Installation and Operation Manual

Optimum for Viable Flow Rate Irrigation Systems operating from flow meters.

Manufactured by:



Scottsdale, AZ

www.HCTLLC.com

Manual Version No. 1.1.24-01

WaterSOLV™

Intelligent Chemigation Simplified



DESIGNED FOR **WaterSOLV™** CHEMISTRY
NO MORE BULK DELIVERIES
OPERATE UP TO 3 PUMPS
MANAGE APPLICATION RATES
INJECT WITH VARYING FLOW
NO PROBES REQUIRED
PLUG AND PLAY LOW MAINTENANCE

WWW.HCTLLC.COM



Before Getting Started

These systems are designed as do it yourself (DIY), with a few exceptions. The equipment and pumps are globally universal for HCT's WaterSOLV™ Program, and HCT's Chemistry, most all pump stations in the agronomical marketplace, including agriculture, turf and landscape. If there is substantially more flow, than the normal, the FS-1 can "piggy back" additional pumps, as many as six (6), as well as different pumps for different chemicals and different chemical output volumes.

How It works

The FS-1 is referred to as a "smart box" or a "flow switch chemical management system" or "a chemigation System". Its operation is quite basic;

1. Receive pulses from a flow meter
2. Pass the pulses through the controller, through the software, regulate the pulses to the pumps based on the chemical output settings that were entered for each pump from the FS-1's panel.
3. The pumps are setup to read signals – no adjustments to the pumps need to be made, they are set in a mode to read signals. They can however, be setup for a variety of other means however not necessary for the FS-1 WaterSOLV™ Program.
4. Three pumps are usually recommended in that plants are what they drink! We want to make the water, through the soil, a continuous rewarding drink.
 - a. WaterSOLV™ Curative – "Curative" – acid
 - b. WaterSOLV™ BC – Antiseptic and source of oxygen
 - c. Liquid Fertilizer, to sustain soil nutrition, when called for, needed, from proper analytical data.
5. Rack Systems – nothing better than having a platform for the controller and pumps that make the placement, operation and maintenance of the system work for us.

Requirements – Equipment

1. FLOW METER - If not ordered with the FS-1 when purchased, you must have a flow meter – not a flow switch, but a flow meter that sends signals based on the rate of flow. signal.
2. INJECTION PORT 1 - A port on the discharge side of the pump station for the injection quill extension. This assure the Curative is injected into the middle of the flow stream.
3. INJECTION PORT 2 - Liquid fertilizer is ideally placed in the discharge line as well, so you will need secondary port on the discharge line for Liquid Fertilizer.
4. INJECTION PORT 3 - WaterSOLV™ BC is injected to suction side of the pump station, usually into the wet well. It is beneficial for keeping the sump water from turning rancid, but also for the pump station equipment, keeping it clean, slime and scale free, while also preventing corrosion from the water itself.
5. ELECTRICAL POWER – The FS-1 is plugged into your power. Each pump is plugged into the FS-1. If a pump is located past the cord lengths provided, an extension cord may be used, or, an outlet for the pump may be put in place. Note: the pump is operated by flow signals and the communication cord. Power simply puts the pump on/off so that when signals are sent it can operate.
6. RACK SYSTEMS – usually mounted to a wall using lag bolts (provided) – Pole mount adaptors are also available.

Equipment Notations

- FLOW METER - Installing a flow meter that came with the system
 - 1 ½ inch NPT minimum for the Flow Meter (Top to no more than 30 degrees to the side)
 - Or – connecting your existing flow meter to the FS-1 Switch Box.
 - FLOW METER PORT INTO PIPE - THIS SHOULD BE DONE BY A PIPE FITTER IF ONE DOES NOT EXIST.
 - Flow meters are designed to operate ideally at a 15 degree angle from the top of the pipe.

- PIPE NIPPLETS (for threading in injection quills)
 - ¾ in. NPT, two on the discharge side of the pump station
 - PIPE NIPPLETS ARE NOT PROVIDED. THIS SHOULD BE DONE BY A PIPE FITTER TO DRILL THE HOLE IN THE PIPE, IF THE ITEMS DO NOT ALREADY EXIST.
 - Nipples should be placed on the side of the pipe at 90 degrees.

- ELECTRICAL
 - FS-1 Control Box - Within 5 ft. of an outlet
 - Pumps – within 8 ft. of FS-1 Control Box or an outlet or extension cable will be necessary
 - EVERYTHING IS PLUG & PLAY EXCEPT FOR THE CONNECTION OF THE FLOW METER CABLE TO “YOUR” FLOW METER. CONNECTION TO OUR FLOW METER IS PLUG AND PLAY.
 - The pump and flow meter cables are 25 ft. long.
 - Electrical for the FS-1 which can service all the pumps - 110V, 25 amp

- INSTALLATION
 - DIFFICULT – NO - COMPLICATED – YES – VERY UNIQUE
 - STEP BY STEP INSTRUCTIONS - YES
 - CONNECTION OF THE FLOW METER TO “YOUR” EXISTING FLOW METER IS THE BIGGEST HURDLE EXPERIENCED. WIRING IS UNIQUE BETWEEN VARIOUS FLOW METERS.
 - THE CONNECTION OF “OUR” FLOW METER IS A PLUG CONNECTION, NOTHING TO FIGURE OUT.
 - No overhead chemical lines.
 - Chemical lines of walkway traffic isles should be covered with vinyl electrical conduit

- PLACEMENT
 - Equipment – ideally inside
 - Avoid exposure to direct sunlight (UV) as well as extreme temperatures.
 - Chemistry
 - All the chemicals may be kept inside
 - THREE (3) requirements
 - WaterSOLV™ BC has to be kept out of exposure to direct sunlight, UV, away from heat
 - WaterSOLV™ Curative will change color over time. It is VERY fummy. The fumes are NOT corrosion inhibited, like the liquid itself is. To avoid things rusting, the chemical container is kept sealed – tubes into the container, tubes out of the container. Any leaks or areas of vapor release, can be resolved with baking soda and water.

- All chemical products, in case of accidental leakage, need to drain separate paths. At concentration, these products mixed together are volatile
- Safety and signage
 - See Safety and Signage paragraph

*These tasks should be done by a qualified and licensed provider.
HCT and their Dealers are not usually licensed to do this work, there are government restraints as well.*

*No lines are to be run overhead
Protective vinyl conduit is provided by the Customer or supplied at additional cost*

All of these items are addressed in detail on the manual below.

Pre-installation Information

PLEASE COMPLETE PRIOR TO ORDERING INSTALLATION

To expedite an installer's ability to serve you on one visit, one trip, they need to know a lot of information. Otherwise, it could result in multiple trips, more time, and more expense. The following information will help alleviate these situations.

1. The system has to be de-pressurized to install the discharge line injection quills and if a flow meter is being installed.
2. DIY or Assisted Installation
 - a. This is a Do-it-Yourself Chemigation System, except for electrical, flow meter/pump station connections, any welding necessities for nipples, mounting racks and pumps, placement of chemistry, initial layout. Each system is unique, and requires coordination of the trades and perhaps some special parts. This is not the typical service provider you might be accustomed to like a plumber, electrician or appliance dealer, the variables and disparity in the chemigation and chemicals are too vast.
 - b. Some people want TURN KEY installation, which is doable, but with your help we can avoid the costs of multiple visits to assure everything is set for a one stop install. In preparation of supporting you throughout the process and thereafter, we need the following information.

Please complete the information and send it to HCT or your HCT Dealer.

No. of Installation Sites:

Site Addresses, names / descriptions:
Provide a map pin if desired.

Customer(s)

Name, Mobile Phone and email address

WaterSOLV™ Dealer

Name, Mobile Phone and email address

Customers Pump Station Provider

Name, Mobile Phone and email address

FS-1 System Installer

Name, Mobile Phone and email address

1. EQUIPMENT

No. of FS-1 Units to be installed at the site:

No. of pumps to be installed per FS- 1 unit:

FS-1 Mounting – Wall or pole mount:

Pump Mounting – Wall or pole mount:

FS-1 Control Box - Within 8 ft. of power:

Pumps – within 85 ft. of FS-1 Control Box:

Additional Cords are not provided. Pumps may be powered separately but within 25 ft. of the box

If pole mount, are poles in place and set in the ground, do the poles meet the specified diameter - Elec. Conduit Pole (5 ft. x 1.25 in.)

Are the chemicals in place and compliant to the safety placement and pump location necessities?

WaterSOLV™ BC placement is not exposed to the ultraviolet rays of the sun

Flow Meter

Using existing meter or meter supplied

Meter in place in pipe (yes/no)

Existing meter model and serial number

System Dynamics

What is the systems typical maximum flow rate, gpm?

Water and Soil Chemistry

Do you battle shells in the lines

Have you completed a source water analysis

Have you completed a source water bacteria analysis (total bacteria)

Have you developed a soil remediation plan

Analytical Data

Test	Pending	On file
Water Analysis		
Water Bacteria Analysis		
Available Soil Nutrition Analysis		
Total Soil Digestions		

Treatment Rate Settings

(Duplicated data for our files)

Treatment Product	Remediation ppm	Treatment ppm
PPM of WaterSOLV™ Curative		
PPM of WaterSOLV™ BC		
Duration, months		Ongoing

What rate do you want the fertilizer put out at, ppm	
--	--

Topical treatment plan for challenged areas

WaterSOLV™ pHix (yes or no)

WaterSOLV™ GROW

What is your primary, initial objectives (infiltration, transition, troubled spots, green grass)

Anything else?

PERSONAL PROTECTION EQUIPMENT (PPE) & Safety

Pressurized water and volume in case of leaks or spillage

Acid Neutralizer (Baking soda, 1 lb for every gallon of acid on hand at any given time)

Eye wash and shower station

Security from unauthorized access

Chemical Placards

These can be supplied at additional cost

Multilingual Placards

These can be supplied at additional cost

ADDITIONAL FEES

Notices: Existing corrosion, system shut down, relieve pressure, startup, are coordinated with the customer and their pump station provider.

Existing equipment removal, ancillary parts and labor, return visits / travel, all are at additional expenses.

Site Inspection, design layout and production, follow-up, oversight, periodic maintenance, service delivery inspection, RETURN VISIT FOR ADJUSTMENTS, all are at fee.

NOTATIONS

1. Rack System does not include the pole for pole mounting. The pole is specified in the manual, and is a standard electrical conduit pole available at most hardware stores.
2. Vinyl conduit is typically used where chemical lines run across traffic areas or lay upon corners or rough edges. The vinyl electrical conduit is not included.
3. FLOW METER connections, unless using the flow meter ordered and provided, are unique to the varying flow meters and pump stations. The FS-1 has been compatible with every flow meter we have encountered to date, though varying connection options. If you are not sure about the connection – PLEASE ARRANGE IN ADVANCE TO SCHEDULE AN ON-STAND-BY APPOINTMENT WITH OUR ENGINEER(S).
 - a. Our engineer(s) are on PST time zone (California).
4. Pump setup videos are available from our website: <https://hctllc.com/chemigation>
5. After an Installation, please do a thorough inspection. See Installation Checklist in the Table of Contents.

Gettin Started Checklist

1. You acknowledge the system has to be de-pressurized to install the Curative Injection quill system?
 Yes No
2. INSTALLATION ASSISTANCE
 - a. If necessary, coordinate a date and time, in advance, with our engineer, for the flow meter connection. They operate on PST (California) time zone. Date and time must be pre-arranged.
3. ADDITIONAL PARTS 7 TOOLS NEEDED
 - a. Razor blade
 - b. Electrical tape for pole mount rack systems
 - c. Concrete – if pole mount
 - d. Pole – if pole mount
 - e. Tubing cutter (for 3/8 and 1/4 poly and vinyl tubing)
 - f. Hacksaw for PVC
 - g. Wire ties (for tubing)
 - h. Pipe tape – do not use pipe dope, not compatible with WaterSOLV™ BC)
 - i. Drill, Impact Drill, Bits
4. LAYOUT
 - a. Location of Container Size
 - b. Distance to pump and distance to injection ports – compliant with pump and chemical necessities and guidelines (distance and WaterSOLV™ BC is not to be exposed to direct sunlight)
5. INSTALLATION CHECKLIST
 - a. This is a good point of reference before getting started
6. SAFETY
 - a. Essential for human health and safety before handling and placing chemistry
 - b. Site Placards
 - c. Employee Education
 - d. Personal Protection Equipment and fresh water rinse for eyes (critical) and skin.
7. DRAINAGE
 - a. In case of unforeseen chemical leaks, products are not to come into contact with each other as concentrates – whatsoever.
8. SPILL AND OR LEAK RECOVERY
 - a. Sodium Bicarbonate (baking soda) neutralizes the Water Curative – 1 lb. for 1 gl. of product
 - b. Water, 9 times the amount spilled, neutralizes the WaterSOLV™ BC
 - c. Both products can be washed into the wet well or ponds
 - d. Oxidation / corrosion from open Curative tanks can be mitigated by washing the surface(s) with soda water (baking soda and water).
 - e. Curative container must be kept closed, sealed, all tube fittings in and out, tight fitting (fumes are corrosive like pool acid).

Pump setup videos and this current manual are available online at:

<https://www.hctlc.com/chemigation>

Pre-arrange by appointment
Technical Support
Ontario, CA – PST Time Zone
Robert Bass – Developer Engineer - (480) 221-3128

Client Profile

To enhance our ability to serve you, PLEASE registered with us so that we can keep you informed of any improvements or enhancements. Complete this form, print this page and send it to us at info@hctlc.com. Receipt will be confirmed.

Absolute Minimum Data

Contacts & System

Item	Details
Date of Submission and Update(s)	
Installation Target Date	
No. of FS-1 Chemigation Systems	
Curative Pump "Serial #'s"	
BC Pump "Serial #'s"	
Fertilizer Pump "Serial #'s"	
Mounting Hardware Type	
Mounting Hardware ordered	
Electrical	
Product Location	
Signage	
PPE and Safety	
Drainage	
Container Sizes Curative	
BC	
Fertilizer	
Site Contact	
Who installed the system (Co, Name, email) List for both Pumps & flow meter if different	

System Dynamics

Maximum flow rate, gpm	
Discharge Pipe diameter (diameter inches/3.14)	
K-Factor & Offset	
Jockey Pump	
Flow Meter	
Injection Ports, quantity	
Challenges	
Analytical	
No. of Water Sources	
Type of water	
Shells	
Black Layer	
Standing Water	
Green Soils	
Age of Greens	
Fairway soil type and age	
Annual Water Usage	
Annual Rainfall	
No. Holes	
Total Acreage watered by pump station	
Your Trusted Advisor, water, soil, nutrition	
Your WaterSOLV™ Dealer	
Management Company	
HCT Notes:	

Please return to:

HCT, LLC
 7032 East Cortez Drive
 Scottsdale, AZ 85254
 (602) 615-4165 – info@hctllc.com | www.hctllc.com

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Warranty

LMI PD Pumps: Drive End: 2 years
Wet End: 6 months
Expected Life 6-10 years

The wet end is considered a consumable like breaks on a car because they flex. The manual states that they should be replaced every 6 months to a 1 year depending on frequency of use. The rebuild kits includes the diaphragm, seals, and valves. It can all be done in the field and is easy to do.

Rebuild Kits: Curative 250 PSI Pump – No. RPM-822 (PTFE)
BC 250 PSI Pump – No. RPM-A20A (PTFE)

FS-1:

Because there is no moving parts, except for the 1 mechanical relay that has a life of 10,000,000 cycles, we do 3 years on the FS-1. The PLC however, is only warranted for 2 years, the other components of the FS-1 would be warranted for 10 years.

Warranty is based on units being covered from the impacts of the environment, namely freezing and also direct exposure to the sun. Warranty does not cover misuse, abnormal operating conditions, or neglect of maintenance. Warranty does not cover the systems chemical transportation lines (suction and discharge lines), which may need replacement annually depending on exposure to the elements. If the pump diaphragm failed because of the lack of performing routine maintenance and the chemical then ruined the pump, the pump would not be covered under warranty. Transportation of products and on-site service calls are not part of the warranty.

Given that the pumps run each day for 6-8 hours usually, but never if it rains, pumps wouldn't need to be rebuilt for 1 to 1.5 year. The rebuild kits includes the diaphragm, seals, and valves. It can all be done in the field and is easy to do.

Preparations

Safety

2 ea. "Chemical Placards" placed on the exterior of the building where the chemistry will be located.

Multi-lingual Safety Chart placed adjacent to chemistry



Before using, read the Safety Data Sheet (SDS) for the chemicals.
 If you are unsure, ASK FIRST – ASK BEFORE PROCEEDING
 EMAIL OR CALL: WE WILL REPLY IMMEDIATELY – INFO@HCTLC.COM – (888) 788-5827

SAFETY GUIDELINES SNAPSHOT

Product Name	Web Guard® Pre-Mixed WaterSOLV™ Curative (EW, All Turf)	WaterSOLV™ BC	Web Guard® Concentrate WaterSOLV™ AG
Product Category	Pre-Mixed Turf	Microbiocide	Supplemental Aerial / Contact
Storage	Indefinite shelf life. Keep separate from Oxidizers.	Indefinite shelf life. Keep separate from Acids and Alkalis. Avoid heat and sunlight.	Indefinite shelf life. Keep separate from Acids and Alkalis. Avoid heat and sunlight.
Personal Protection Requirements (PPE)	Eye safety: Goggles or face shield. Skin: Long-sleeved shirt, pants, socks, shoes. Hand: Gloves. Respiratory: None.	Eye safety: Goggles or face shield. Skin: Long-sleeved shirt, pants, socks, shoes. Hand: Gloves. Respiratory: None.	Eye safety: Goggles or face shield. Skin: Long-sleeved shirt, pants, socks, shoes. Hand: Gloves. Respiratory: None.
Use of chemical days	Apply to turf.	Apply to turf.	Apply to turf.
Use of chemical rate	Follow label directions.	Follow label directions.	Follow label directions.
Emergency information	Call (888) 788-5827	Call (888) 788-5827	Call (888) 788-5827
Health Hazard	3	3	3
Environment	0	0	0
Reactivity	0	0	0
Corrosivity	1	2	2
Flammability	0	0	0
Stability	0	0	0
Other	OX	OX	OX
Special handling instructions	Neutralize with alkali, such as sodium bicarbonate, before disposal.	Neutralize with alkali, such as sodium bicarbonate, before disposal.	Neutralize with alkali, such as sodium bicarbonate, before disposal.
Spill/Leak	Neutralize with alkali, such as sodium bicarbonate, before disposal.	Neutralize with alkali, such as sodium bicarbonate, before disposal.	Neutralize with alkali, such as sodium bicarbonate, before disposal.

Safety Station

Eye wash (Safety shower (adequate water supply and access))

Personal Protection

HCl Acid Respirator - In case one needs to work with the acid chemistry, uncontained spilled, leaking, or in a confined area (fumes are horrendous, and breath taking).

Face Shield

Chemical Apron

Chemical Gloves / Disposable chemical gloves

Chemical shoes

Water Supply

Pressure and volume in case of product loss, product spill, chemical reaction (9 gl. of water for every gallon of product spilled)

Neutralizer

Sodium bicarbonate to neutralizer an acid spill (baking soda 1 lb. per gl. of Curative)

Handling and Containment

Handling - The products are concentrated and heavy, estimate 10 lbs for every gallon. Placing a drum under a pump can be too much task for a single individual, much less two people. Ideally a drum dolly is utilized.

Packaging - The program is also referred to as “packaged goods”. At the concentration and use rates, there is no need for bulk filling. 2 totes of Curative, 530 gallons, is equivalent to almost a full tanker truck of 93% sulfurous acid (5,400 gl.), or as much as 2 tanker loads of N-pHuric. Plan on using 1/10th amount of acid.

Double Containment - In residential/domestic applications, the BC and the Curative should be placed on complete product containing double containment trays. Secondary Containment Vessels for Drums (66 gal. containment) - <https://www.uline.com/Product/Detail/H-4032/Spill-Containment/2-Drum-Spill-Containment-Pallet?keywords=h-4032>

Separated Drainage - Alternatively, PVC drains could be put in place to receive spills, leaks or product loss to flow to large bodies of water/ponds.

Accidental Loss Provisions

Do the what if test! What if this line breaks? What if this valve breaks? What if this gets punctured?

How much product will you need to deal with?

Will the product stay separate?

How will you access and dilute or neutralize the products?

Before all that, how will you get to the personal protection equipment and safety tools?

Chemical container caps and Pump chemical tubing connections, must remain sealed and tubing should be tight fitting at connections, as well as when placed into caps.

Placement / Location

Containers & Usage

Very concentrated products. 3 ppm is 3 gl. per million gallons of water. Consider the below for the amount of water treated by a container of product;

1 ppm, in a 55 gl. drum, treats 55 million gallons of water

2 ppm, in a 55 gl. drum, treats 27.5 million gallons of water

2 ppm, in a 265 gl tote, treats 132.5 million gallons of water

4 ppm, in a 265 gl tote, would only treat 66.25 million gallons of water

It is common in “arid environments”, the Curative is ordered in 265 gl. totes and the BC is ordered in 55 gl. drums but chemical volume depends on specific factors;

Your Curative, ppm rate for Phase 1 soil remediation, then Phase 2, sustaining soil integrity. The same for the BC rate. So, if the ppm rate is 4 Curative, and 1.5 BC, plan on using 4 parts of Curative to every 1.5 parts of BC – for every 1 million gallons of water use.

Container Size

Common containers for efficacy and logistics are 265 gl. totes, and 55 gl. drums. Contrary to other acid products, you will use 1/10th the amount of acid product to achieve more beneficial and sustainable outcomes. If you used to order 600 gl. of sulfuric acid, you’ll likely use just 60 gl. of Curative. If you used 600 gl. of N-pHuric, you’ll use 30 gl. of Curative to achieve more beneficial and sustainable outcomes.

Container Dimensions

See also Table of Contents – Floor Diagrams

(gl. is for reference. Some containers are not filled to this total gallonage. BC is 53 gl. drum. Curative is 265 gl. tote, all to accommodate DOT requirements and safety necessities).

30 gl. Carboy (drum)

Dimensions 19 1/4" Dia. x 29" H

55 gl. drums:

Dimensions 23 1/4" Dia. x 34 3/4" H

275 gl. shuttle (tote / IBC):

Dimensions 48" L x 40" W x 46" H

Ventilation

With this WaterSOLV™ Curative Chemistry, in a closed containment area, DO NOT, rely on or depend on mechanical ventilation. Keep the container and ports for return lines tight. Minimize the release of fumes from the container. See also Table of Contents – Venting Tote, for additional details.

Security

The only provisions for security of this system is your lock on the FS-1 Switch Box, and three levels of security on the control panel. Security from theft is not provided for.

Container & Pump Location

Physics, pump functionality, safety, access, product replenishment, spill, leak, regulations, all play a role where we will place the chemistry. We need to start with functionality.

1. Location Decision No. 1 – Container location to pump location
 - a. Pumps “pump” chemistry well, they uptake chemistry poorly. For drums, or less, the pump needs to be above the container, no more than 5 ft. suction line, upright suction tube. Ideally the pump serving a tote, is no higher than 5 ft. (less height preferred). The distance from the tote to the suction intake of the pump should be minimized.
2. Location Decision No. 2 – Container location to safety, and drainage
 - a. These two chemicals, Curative and BC, in case of leak or spill, need to drain separate, then into a big body of water or into separate secondary containment. Suggestions include double containment containers, running drain lines to adjacent ponds.

If you experience a leak, or a broken line, punctured container, will the products drain separately, and safely?

3. Location Decision No. 3 – Container Location to Exposure

- a. The BC shall be in a shaded, well-ventilated area. It does not accept exposure to UV from the sun. It does accept to get warm. It must be kept shaded in a well-ventilated area.
- b. Curative, is like pool acid. You will find pool acid in the grocery store. It is sealed, not vented, in the grocery store. The same HAS TO OCCUR here. The Curative must remain sealed to prevent the release of fumes. The fumes are aggressive and corrosive. Tubing connections are made tight. Spills and leaks are neutralized with sodium bicarbonate (baking soda – 1 lb. per gallon of acid spilled, and water). If the pump draws down the tote, contracting the poly container, we suggest a pinhole be drilled on the top side of the contain, just enough to allow some air intake when the pump causes the suction.

Both products, stored properly, have a multi-year shelf life. Curative will change color, it will turn brown over time

4. Location Decision No. 4 – Container Locations to Pump Discharge Line

- a. For every ft. of pump discharge line, you loose some accuracy from the pump output. While this can be adjusted for in the pump setting, it has to be initially qualified.
- b. BC is injected on the suction side of the pump station. It is beneficial for the equipment to keep equipment corrosion and biologically clean. 30 ft. of tubing is provided.
 - i. Only use what tubing length is necessary, keep it as short as possible
 - ii. Never run discharge lines overhead
 - iii. Cover lines exposed to UV, Sun or traffic, with vinyl conduit.
- c. Curative is injected into the discharge side of the pump station, only, and through an extended injection quill, placing the chemistry into the center of the water line when delivered.
 - i. Only use what tubing length is necessary, keep it as short as possible
 - ii. Never run discharge lines overhead
 - iii. Cover lines exposed to UV, Sun or traffic, with vinyl conduit.

5. Location Decision No. 5 – Container Location to Placing new Product

- a. A tote is not handled without equipment and accessibility
- b. A drum is difficult to move as well, not probable or OSHA compliant to move single handedly.
- c. Risk of container damage by improper handling is too great from a safety perspective as well as cost of product.

6. Location Decision No. 6 – Distances

- a. Pump discharge lines – 30 ft.
- b. Pump suction lines – 5 ft.
- c. Switch Box to Pump communication cables - 30 ft.
- d. Switch Box to Pump power cables – 3 ft.
- e. Switch Box to Flow Meter cable - 25 ft.
 - i. Can be extended up to 1,000 ft
- f. Switch Box power cord – 4 ft.

Pump & Container Distances

1. Pump Suction Line – 5 ft.
2. Pump Discharge Line – 40 ft.
3. Pump electrical cord to FS-1 Switch Box electrical cord – 6 ft. (3 ft. each)
4. FS-1 Switch Box to power – 4 ft.
5. Communication cable from FS-1 Switch Box to Pump – 50 ft.
6. Signal Cable from FS-1 Flow Switch to Flow meter – 50 ft.

Pump Station Requirements

Pipe Nipple Requirements

1. Flow Meter: 1½ in. NPT or ISO 7/1-R 1.5 thread
2. Curative Solution – Pump Station Discharge Line – ¾ inch NPT minimum
3. BC Solution – Pump Station Suction Line – Inject through line and quill into suction side of the pump station or into the wet well

Note: It is not advised to pump the chemistry into ponds. Significant loss of chemical efficacy will occur.

Stands and Mounting Options

There are multiple ways to configure your setup, free standing, wall mount, a mixture of both. See examples at this link on our website and further details below. <https://www.hctllc.com/single-post/hct-chemigation-systems>

Electrical

Requirements: These pumps are rated for 110-230VAC. They come with a Nema 5-15P plug for 120VAC, but the plug can be cut and wired to 230VAC/1Ph without any issue. The maximum current is 0.35Amps.

The FS-1 plugs into a 110 v, 20 amp service. The pumps plug into pigtail cords from the FS-1, each pigtail designated "JUST" to power the pumps. The FS-1 is also connected to the pump stations flow system, which is either a switch (on/off) or a meter which will indicate flow (on), lack of flow (off) and how much flow to signal the pump how much chemistry to apply, based on the flow volume.

A flow switch: the pump distributes the amount of chemistry that is set at the pump. The same amount of chemistry all the time when the switch is on.

A flow meter takes a signal from the pump station meter, and adjusts the pumps output based on the settings entered into the FS-1 Control Panel.

Setting of the pumps may be adjusted (at the pump for switched connections) (at the FS-1 PLC screen for metered connections), to meet the chemical output necessities which may vary from time to time.

Cord Covers

Flemoon [3 Pack] Outdoor Extension Cord Safety Cover with Waterproof Seal, Weatherproof Electrical Connection Box to Protect Outdoor Outlet, Plug, Socket, Christmas Holiday Decoration Light, Black

https://www.amazon.com/Waterproof-Weatherproof-Electrical-Connection-Decoration/dp/B08CMQHYYL/ref=sr_1_12?crid=31YXJNC36DIOF&keywords=waterproof%2Boutlet%2Bcover&qid=1649113294&sprefix=waterproof%2Boutlet%2B%2Caps%2C126&sr=8-12&th=1

Product Application Rates

ppm means gallons per million gallons of water.

We can easily translate the products required ppm based on the water and soil analyses, your desired soils remediation timing, and dial it up or down to meet those desires and timing throughout the process. The process is initially soil remediation through the increased chemical use, then once the soil is working, treating the water to retain soil integrity. That's efficiency!

What we don't know are your system flow rates, are they the same all the time or do they vary – are they separated from fountains and features for irrigation? This is where you pump station provider comes in.

1. We need a dedicated irrigation loop for the irrigation alone.
2. We need wither a flow switch (on/off) or a flow meter (variable flow rates).
3. We need at minimum ½ inch (to ¾ in.) injection ports on the pump stations pressure discharge side. Preferable 3 each – Curative acid, BC and fertilizer. Ideally the BC will inject into the suction side of the pump station, versus the discharge side.

Support

We try to put all data and manuals online along with intuitive videos. Visit www.hctllc.com – Resources > Chemigation

We recommend making appointments for engineering assistance, where needed or where and when anticipated might be needed. Call us, (888) 788-5807 or email info@hctllc.com

System Components

FS-1 Switch Box

3 ea. 30 ft. Communication Cables prewired for the pumps.

1 ea. 3-2540-1 Flow meter (as of 10/2022)

Male connector on the end of the cable, and the FS1 has a cable with female connector to mate with the flow meter.

50 ft. of cable

All cables pre-wired, and connections keyed – simply mount the FS-1 and plug into power.

Curative Pump

1. PVDF Molded Head
2. PTFE Seals
3. 6 ft of 1/4" OD suction Tube
4. 40 ft of 1/4" OD Discharge Tube
5. PVDF Injection Check Valve
6. PVDF Foot Valve
7. Ceramic Weight
8. Tubing connections (yellow and black pieces)
9. 6 ft of 3/8" OD Vinyl Tube (Bleed tubing)
10. One (1) 1/4" Barbed Tee, Polypropylene
11. 3/4" MPT x 1/2" FPT PVC Schedule 80 bushing
12. 1/2" PVC/Viton True Union Ball Valve
13. Extended injection quill
14. 2 inch 1/2 x 1/2 MPT schedule 80 pipe (quill to ball valve)
15. Camlock Assembly where a tote will be used

BC Pump

1. Machined PVC Degassing Head
2. PVDF Multifunction Valve
3. PTFE Seals
4. 6 ft of 1/4" OD suction Tube
5. 40 FT of 1/4" OD Discharge Tube
6. 6 ft of 3/8" OD Vinyl Tube (Bleed tubing)
7. 6 ft of 1/2" OD Tube (Degass tubing)
8. PVC Injection Check Valve
9. PVC Foot Valve
10. Ceramic Weight
11. Tubing connections (yellow and black pieces)
12. PVDF Multifunction valve

Fertilizer Pump(s)

Fertilizer pumps are the Curative pumps
Unless otherwise specified

Thick Viscosity Pumps

Contact HCT or your dealer.

Options

1. Mounting Options
 - a. Wall mount or pole mount for the FS-1 Box
 - b. Wall mount or pole mount for the pumps – One pole does up to three pump mounts

Not Included

Not Included:

- 1) Wire ties
- 2) Vinyl electrical conduit (3/4 inch - for covering discharge chemical lines in areas of foot traffic and or wear)
- 3) Rack System – Poles

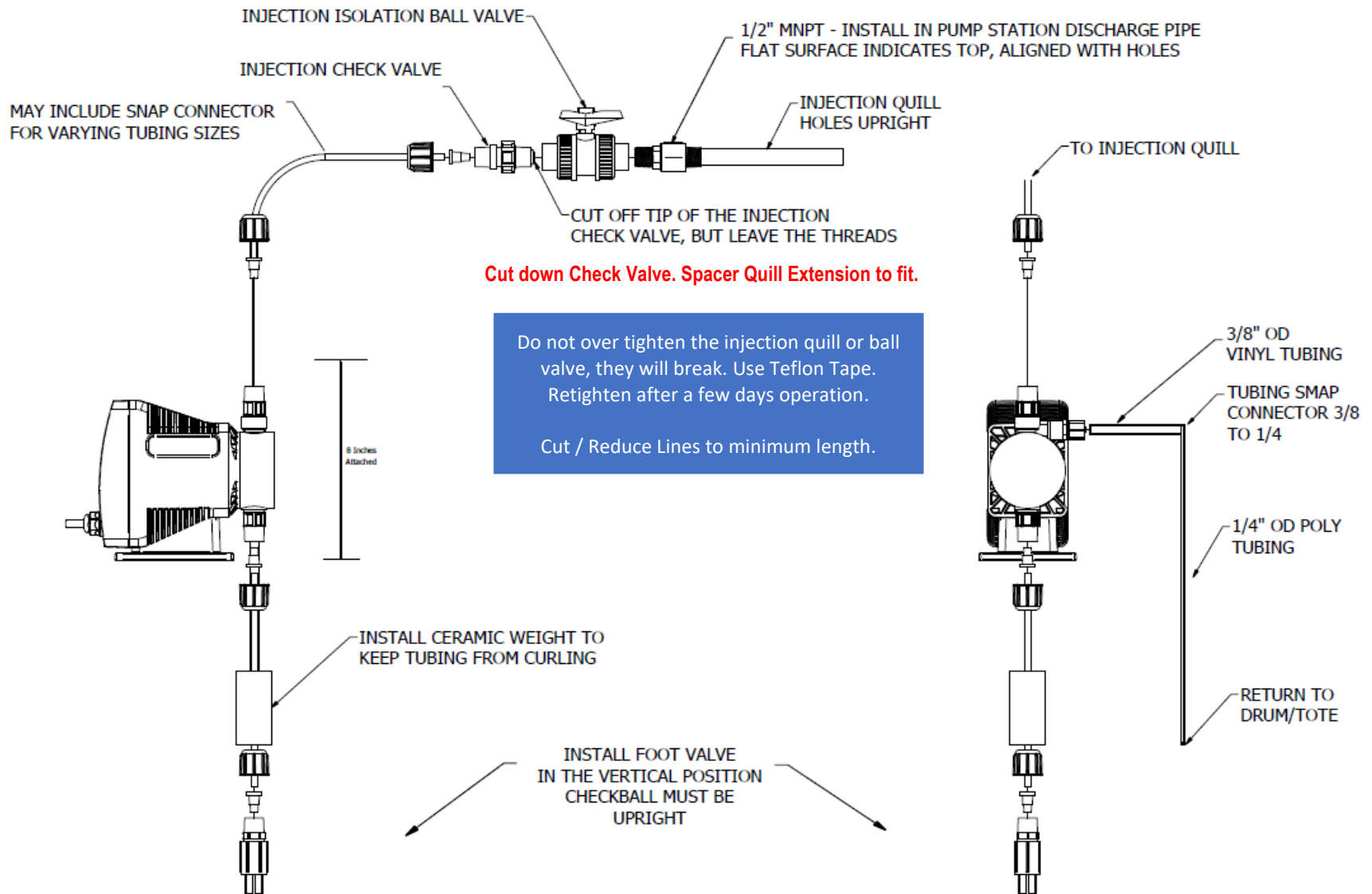
(All are available at retail hardware stores)

Sequential Procedures - Checklist

1. Setting / Placement of Chemistry
 - a. Access/Replacement of chemical containers
 - i. Covered / Vented BC
 - ii. Vented Curative
 - iii. **Separate drainage of each product**
2. Placement of Pumps
 - a. Distance to suction side of pump (5 ft.)
 - b. Distance to discharge side of the pump (40 ft.)
 - i. Curative to the discharge side of the pump station
 - ii. BC to the suction side of the pump station
 - iii. Fertilizer – likely to the discharge side of the pump station
 - iv. All tubing reduced to the minimum length, especially the suction side of the lines
 - c. Pump Mounting
 - i. (repeated) 5 ft suction limitation
 - ii. (repeated) Cable distance, pump to controller (40 ft.)
 - iii. Ease of replenishing product container
3. FS-1 Controller mounting
 - a. FS-1 Power
 - b. Distance to power pumps
 - c. Distance to run communication cable
 - d. Distance to run Flow Meter
4. Safety
 - a. Chemical Contact to Dangerous Products
 - i. Wood
 - ii. Fibers
 - iii. Raw Metals
 - iv. Heat
 - v. Flame
 - b. Emergency Contact Number
 - c. NFPA Placards
 - d. Safety Placards (multilingual)
 - e. **Eye wash**
 - f. **Water**
 - g. Spill
 - h. **Personal Protection Equipment / Ventilation / Access**
 - i. Respirator
 - ii. Water

- i. Safety Equipment / Access
- 5. Security
 - a. Minors
 - b. Theft
- 6. Drainage – Separation / Double Containment
- 7. Product Replenishment / Handling
- 8. Replacement Parts
- 9. Wear Parts

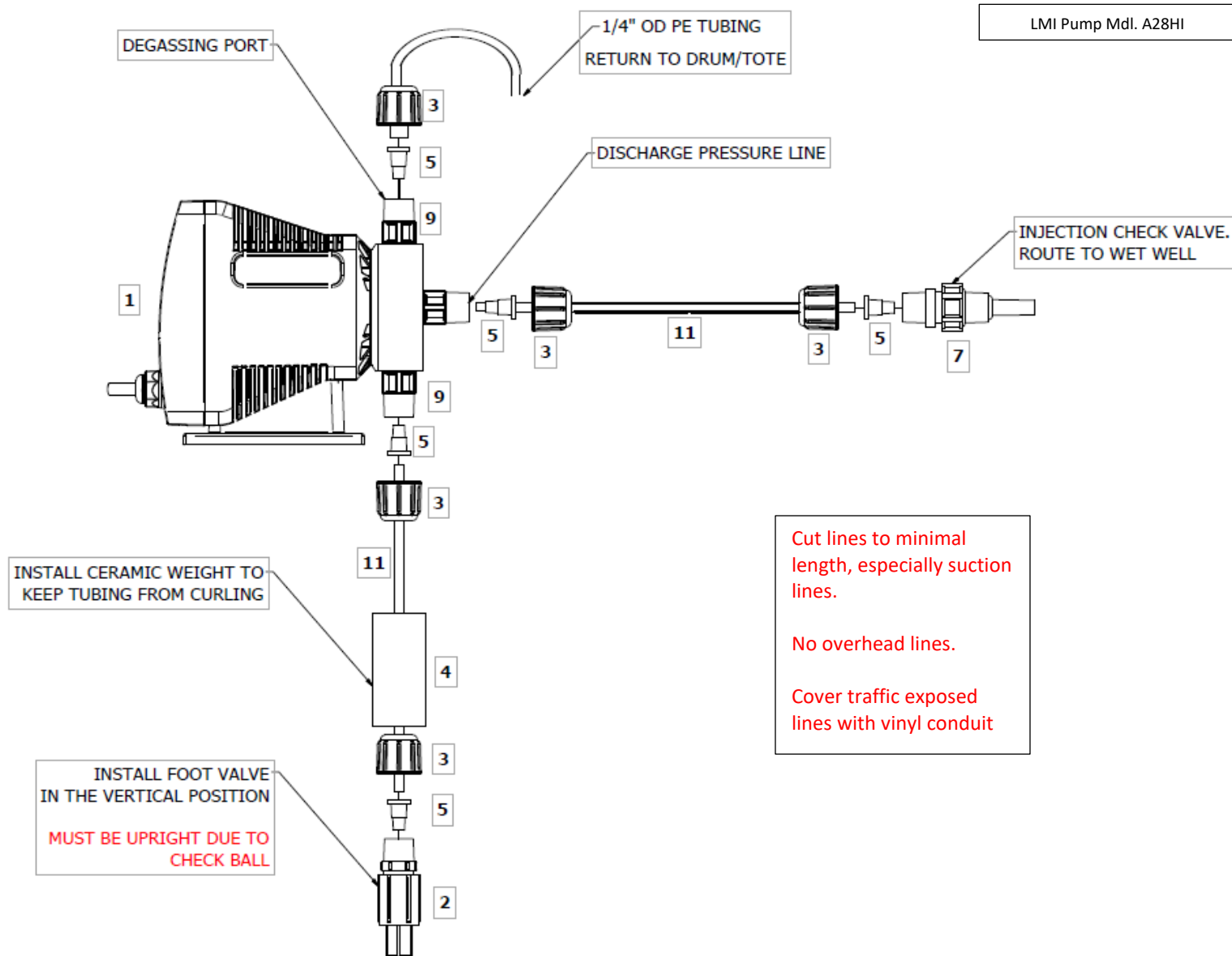
Pump, Fittings & Diagrams – Curative Pump



Pump, Fittings & Diagrams – BC Pump

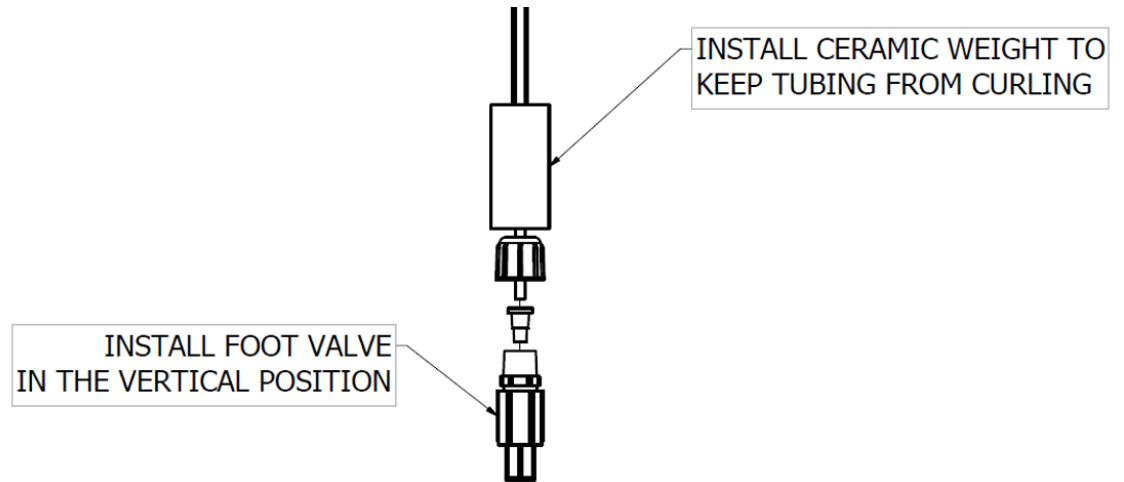
(Note Fittings differences. These are unique, they are unique compression fittings)

Keep fittings tight. Periodically, 2-3 times a year, assure pump head screws (4) are maintained tight.



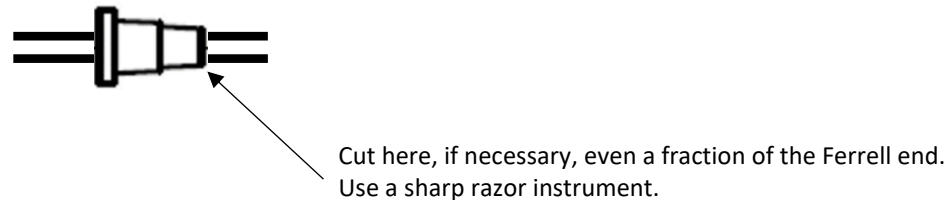
Fittings

1. For drum and pails, on the pump suction, first place the weight onto the line.
2. Then place the cap onto the line as illustrated.
3. Slide the compression up the line, at least 1.5 to 2 inches.
4. Push the line **all the way into the fitting.**
5. **Slide the compression fitting into place, firmly.**
6. Screw down cap to compress the compression fitting both into the fitting and onto the line.
7. Hand tighten, very firm.



To readjust a used compression fitting;

As the compression fitting is put together, it puts a compression ring on the tubing. Even with exceptional pressure, you will not likely get the fitting off. In some cases, you can slide the compression fitting up the line, then with force, slide it down and off. Otherwise, cut the tubing at the end of the fitting and the fitting will come off. You may or may not be able to re-use the compression fitting.



Winterization

1. Clear any lines subject to freezing (both discharge and suction lines. Ideally blow clear with compressed air.
2. Clear the pump head if subject to freezing. Ideally clear with compressed air pushing air up the suction end, with the pump operating (manual priming mode).
3. Rinse any discharge areas
 - a. Curative – baking soda and water
 - b. BC - water
4. Consider performing annual maintenance

Annual / Periodic Maintenance

Item 1 – Plunger - Replace

Item 2 - Pressurized Discharge Lines. Check to see if any are brittle, if so, replace entirely.

Compression ferals can be cut back to get off, and also to re-use.

Item 3 – Both (2) of the O-rings on the priming valve.

Item 4 – Each and every Cartridge Valve (6 for BC) (6 for Curative)

Foot Valve, Injection Quill, Connector Fittings

Sequence: Slide on cap, slide on Ferrule, push tube as far down into the hole as possible, hold tube in hole, slide down ferrule, lower and tighten cap.



Foot Valve



Injection Check Valve

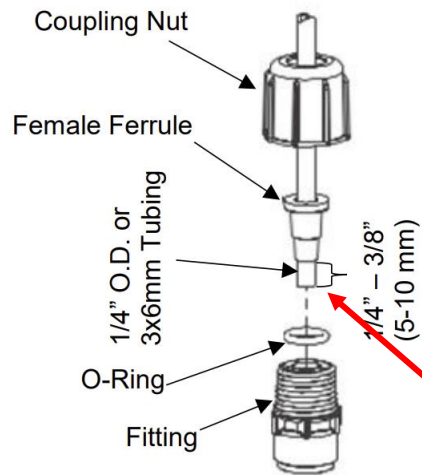


Figure 4: 1/4" OD Tubing Connections

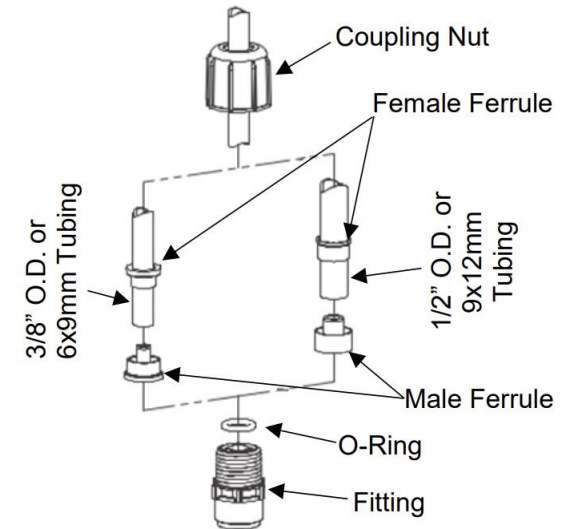
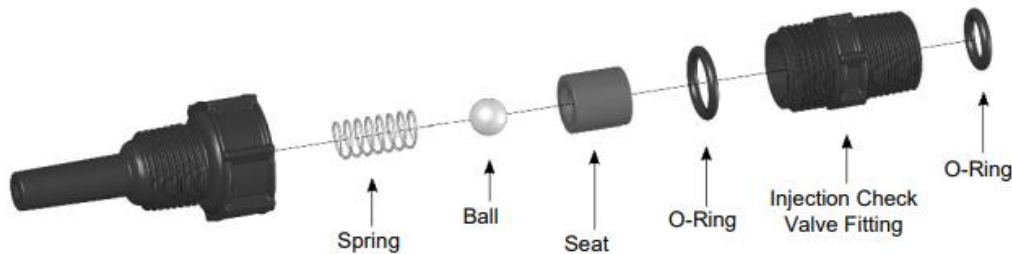


Figure 5: 3/8" or 1/2" OD Tubing Connection

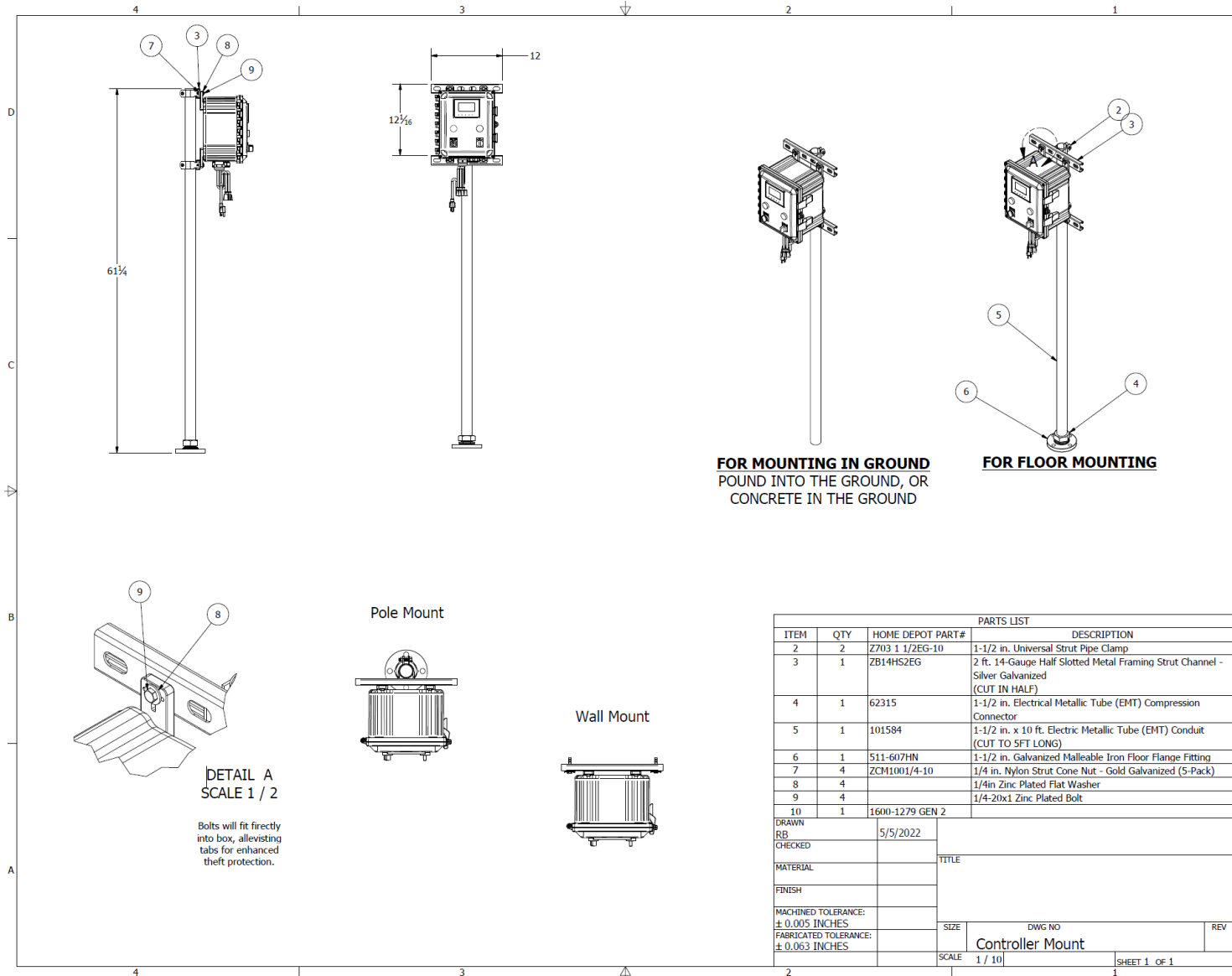
Push "line" all the way down into the fitting before sliding the compression fitting down



Do not over tighten the three-way valve or the injection quill or ball valve, they will break.

Mounting Hardware (Optional)

FS-1 Pole or Wall Mount



Pole or Wall Mount

Pump Mount – multi pole or wall

Mid-mount platform preferred
51 ¹/₁₆

Side-mount platform
50

BC Pump only view

WALL MOUNT
18 ³/₄

FLOOR MOUNT

GROUND/CONCRETE MOUNT

Up to 3 pumps on the same pole
19 ¹³/₁₆

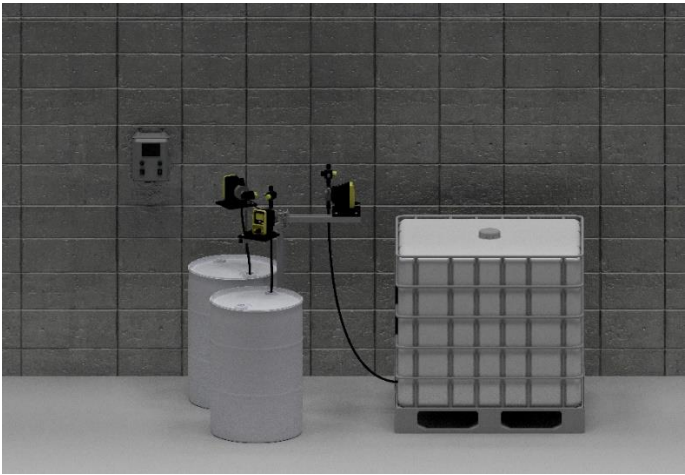
DETAIL A
SCALE 0.22 : 1

PARTS LIST				
ITEM	QTY	VENDOR	PART NUMBER	DESCRIPTION
1	2	HOME DEPOT	ZCM1001/4-10	1/4 in. Nylon Strut Cone Nut - Gold Galvanized (5-Pack)
2	1	JL WINGERT	PD741-A28HI (PTFE)	BC PUMP
3	1			7"x8"x1/2" THICK POLYETHYLENE BOARD
4	1	McMASTER-CARR	3198T2	18" LONG STRUT WITH MOUNTING PLATE
5	2	McMASTER-CARR	3023T26	1-11/16" ID PIPE CLAMP HANGER, THERADED
6	1	HOME DEPOT	101584	1-1/2 in. x 10 ft. Electric Metallic Tube (EMT) Conduit
7	1	HOME DEPOT	62315	1-1/2 in. Electrical Metallic Tube (EMT) Compression Connector
8	1	HOME DEPOT	511-607HN	1-1/2 in. Galvanized Malleable Iron Floor Flange Fitting
9	2			1/4" PLATED WASHER
10	2			1/4-20x1 HEX HEAD PLATED BOLT
11	4			3/8" PLATED WASHER
12	2			3/8-16x1 HEX HEAD PLATED BOLT

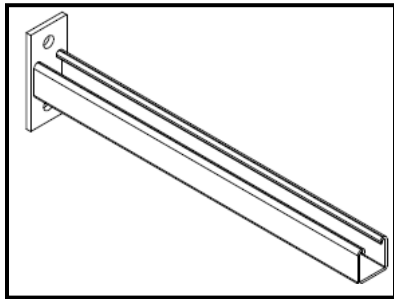
DRAWN: RB
CHECKED: 5/17/2022
MATERIAL: TITLE: A
FINISH: TITLE: A
MACHINED TOLERANCE: ± 0.005 INCHES
FABRICATED TOLERANCE: ± 0.063 INCHES
SCALE: 0.11 : 1
DWG NO: Pump Shelf
REV: SHEET 1 OF 1

Mounting Images

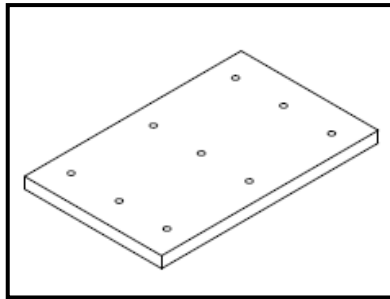
Turf & Landscape



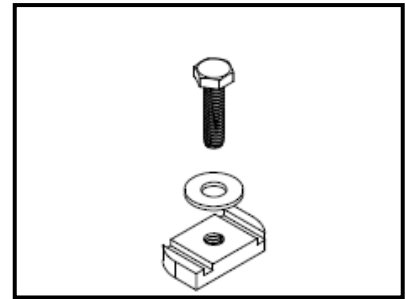
Pump Wall Mount Kit
Items included in the kit:



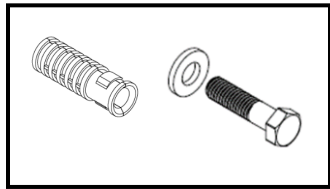
Wall Mount Strut x 1



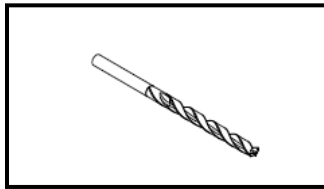
Polyethylene Pump Shelf x 1



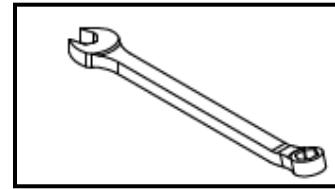
Shelf Mounting Hardware x 2



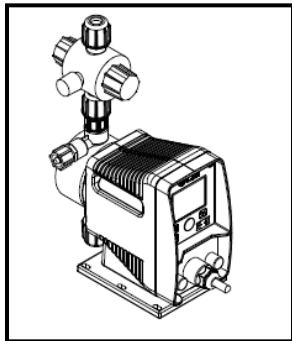
Lag & Lag Bolt x2



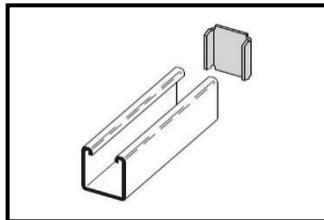
Drill & Drill Bit for Anchors



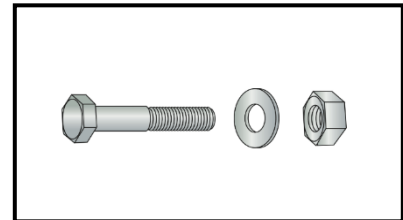
7/16" Wrench for Shelf Hardware



Metering Pump x 1

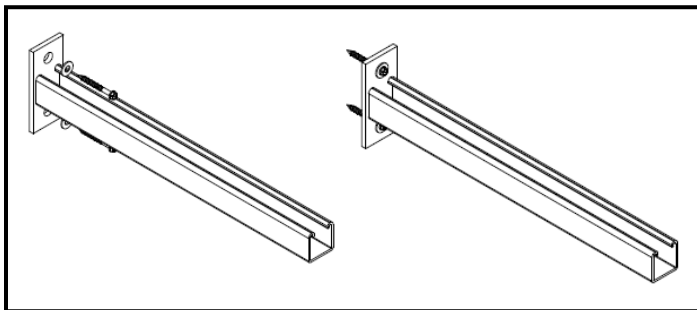


Strut Channel End Cap



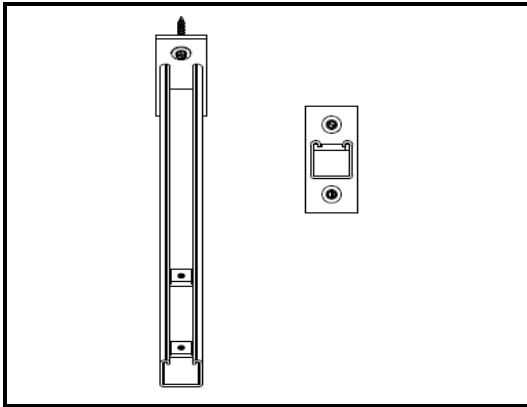
Pump Mount Bolt
1/4 x 1 1/2, hex bolt, washer & nut

Step 1:



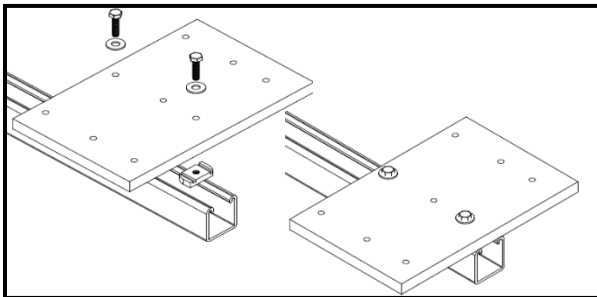
Using the appropriate drill bit, drill the wall for the anchors. Mount the Strut to the wall using two (2) anchors that are suitable for the type of wall being installed on. **Make sure the bottom of the strut is no more than 48 inches, or 4 feet, above the ground.**

Step 2:



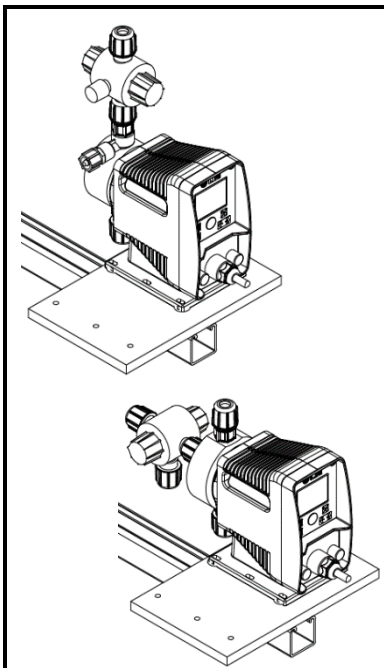
Once the strut is mounted to the wall, install the supplied 1/4-20 strut nuts. Use the predrilled pump shelf as a guideline for spacing the two (2) nuts.

Step 3:



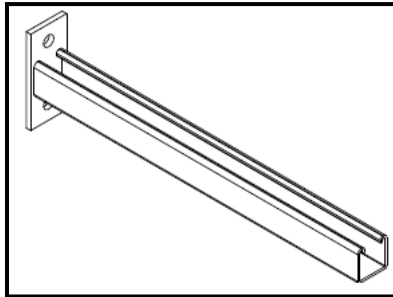
With the nuts installed, bolt the shelf to the strut using the supplied bolts and washers. Once bolts have been loosely installed, use a 7/16" open-end wrench or socket wrench.

Step 4:

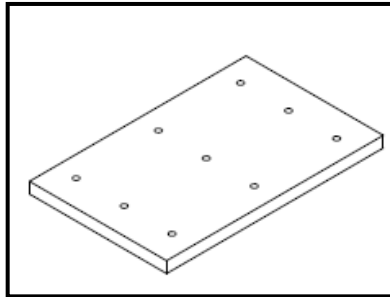


Finally, bolt the pump to the shelf. Ensure that there is clearance for the suction fittings before tightening the hardware.

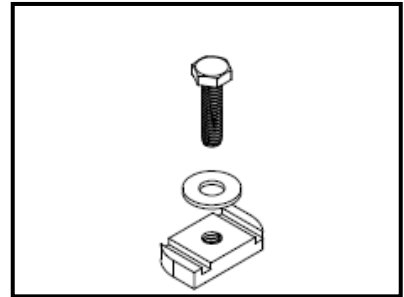
Pump Floor Mount Kit
Items included in the kit:



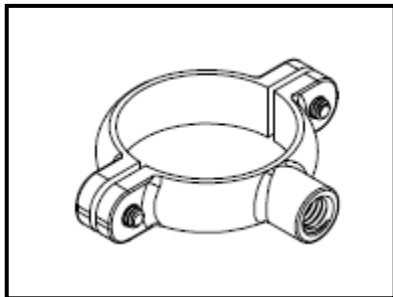
Strut x 1



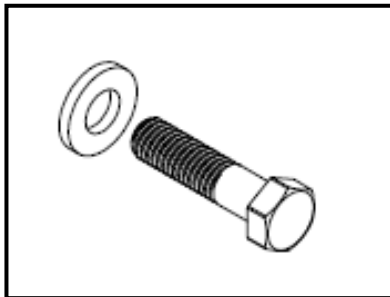
Polyethylene Pump Shelf x 1



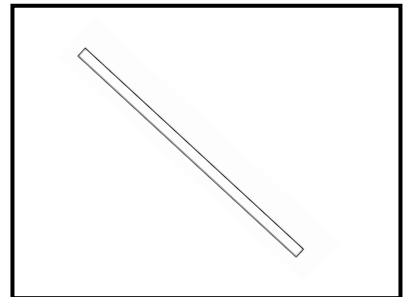
Cone Nut, bolt & Washer x 2



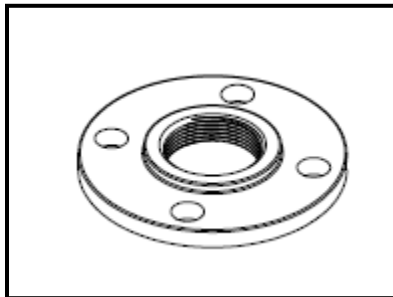
Pole Mount x 2



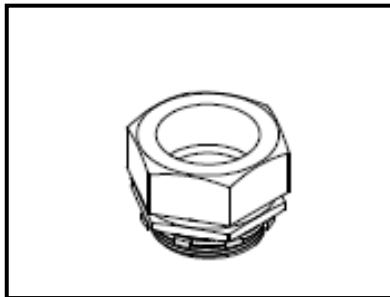
Pole Mount Hardware x 2



Elec. Conduit Pole
(5 ft. x 1.25 in.)



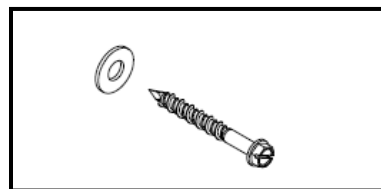
1-1/2" NPT Floor Flange x 1



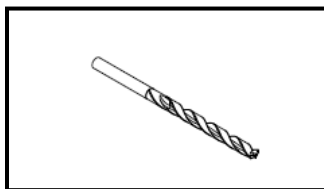
1-1/2" EMT Conduit Adapter x 1

POLE NOT INCLUDED
This is 1 1/2 inch EMT Electrical Conduit. Any other size will NOT fit other components. You might cement a PVC pipe into the ground then insert the pole into the PVC pipe.

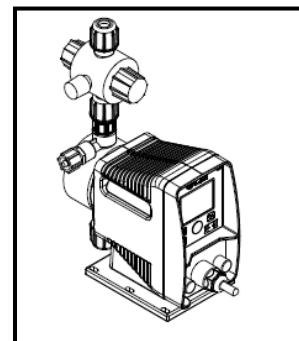
Items not included, but needed:



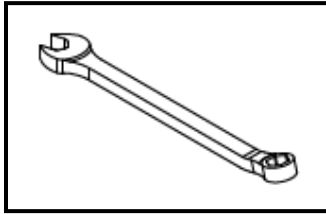
Concrete Anchors/Hardware x2



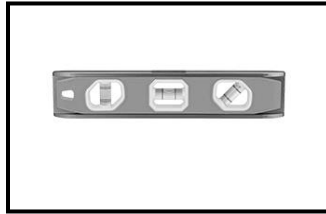
Drill & Drill Bit for Anchors



Metering Pump x 1

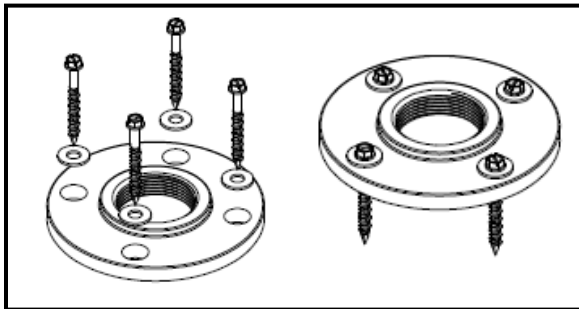


7/16" and 9/16" Wrench
or Socket, Phillips and
Flat screwdriver



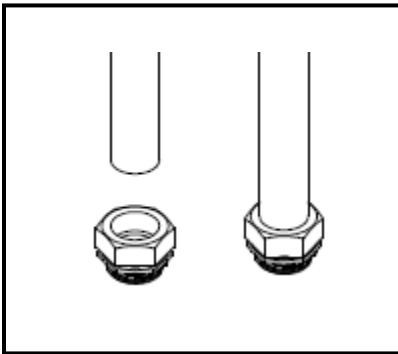
Level

Step 1:



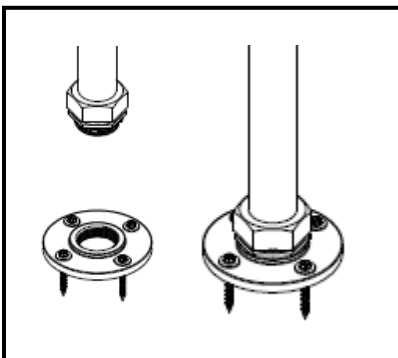
Place Floor Flange in the desired location and mark the four (4) bolt holes. After the holes have been marked, drill the four (4) holes with the appropriate size bit. Then set the flange in place and secure with the appropriate anchors. Check with local codes for anchor requirements.

Step 2:



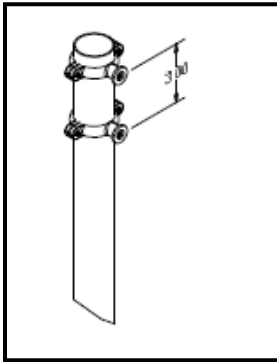
Slide the piece of EMT conduit into the adapter. Once the conduit is fully inserted, tighten the compression nut to secure the adapter to the conduit.

Step 3:



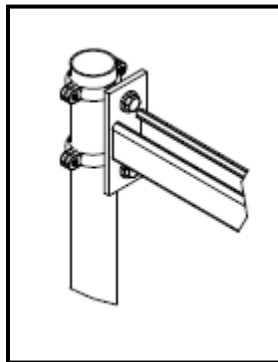
Next thread the conduit and adapter assembly into the floor flange. Once installed check to see if the pole is plumb and level. If it is not, then the floor flange may need to be shimmed to achieve plumb and level.

Step 4:



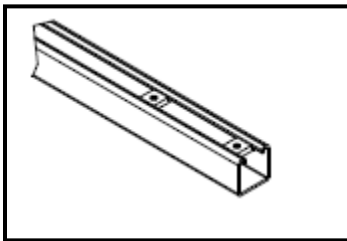
Once the concrete has set, install the two (2) pole clamps. Install the clamps so they are 3" apart.

Step 5:



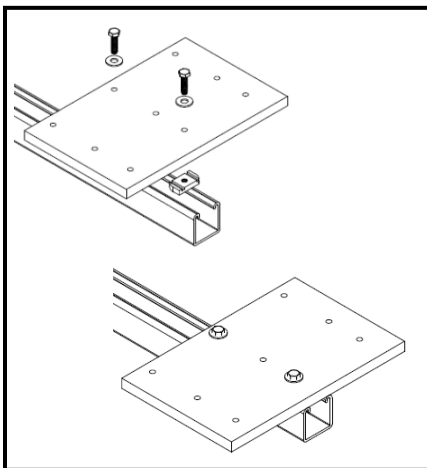
Next install the strut using the supplied 3/8" hardware and a 9/16" wrench or socket.

Step 6:



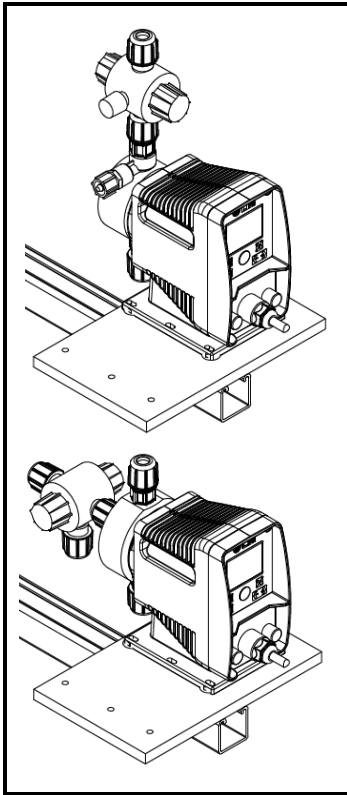
With the strut securely fastened to the pole, install the 1/4-20 strut nuts.

Step 7:



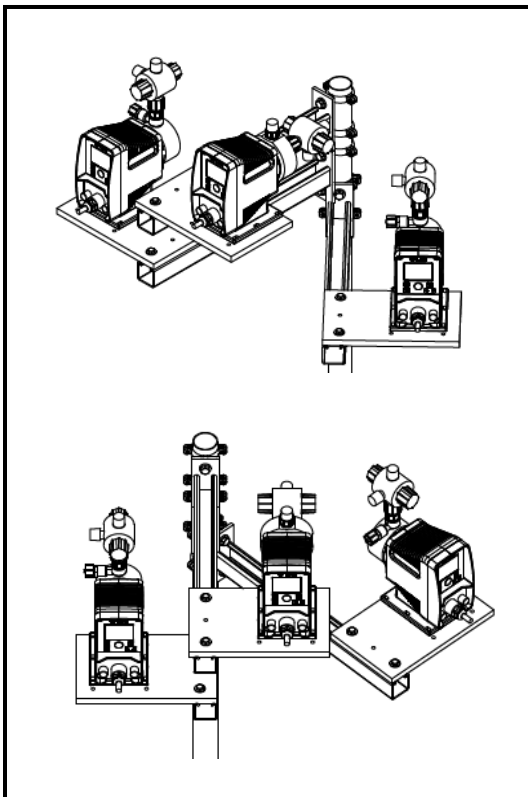
Next, using the supplied 1/4-20 bolts and washers, bolt the Pump Self to the Strut using a 7/16" wrench or socket.

Step 8:



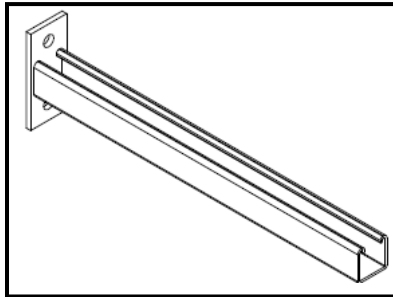
Finally, bolt the pump to the shelf. Ensure that there is clearance for the suction fittings before tightening the hardware.

Multiple Pump / Pole Configuration

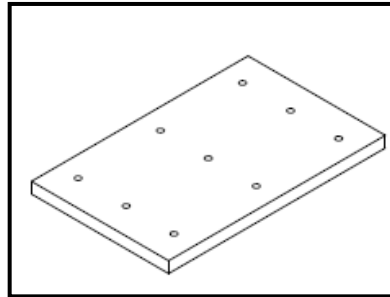


If installing 2 or 3 pumps, repeat Steps 4-8 for each pump.

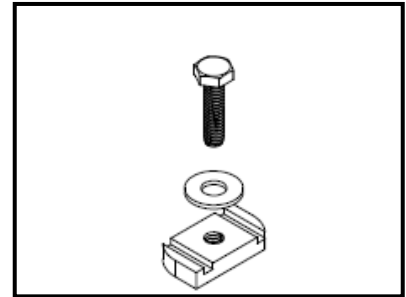
Pump Buried Pole Kit
Items included in the kit:



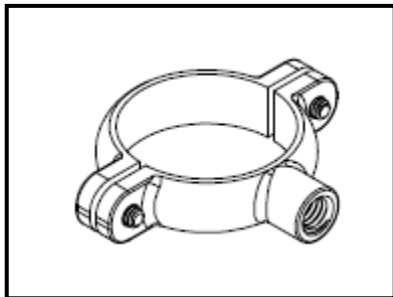
Strut x 1



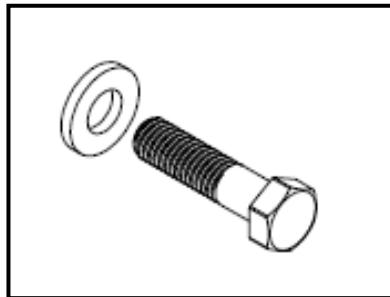
Polyethylene Pump Shelf x 1



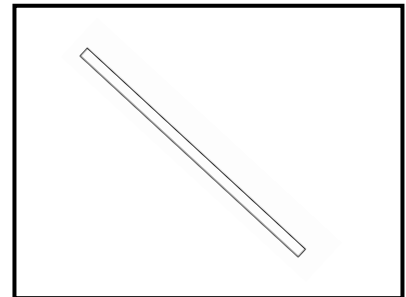
Shelf Mounting Hardware x 2



Pole Mount x 2

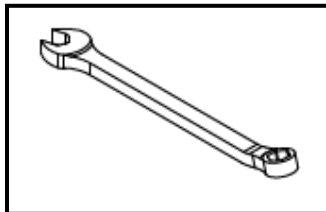


Pole Mount Hardware x 2

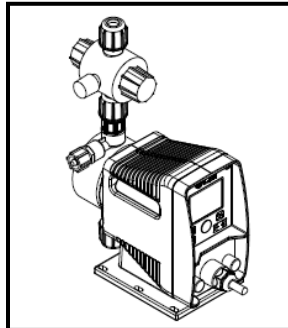


Pole (5ft Long x 1.25 in.)

Items not included, but needed:



7/16" and 9/16" Wrench
or Socket, Phillips and
Flat screwdriver

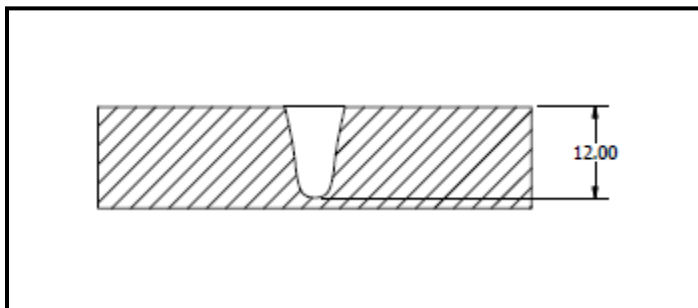


Metering Pump x 1

POLE NOT INCLUDED

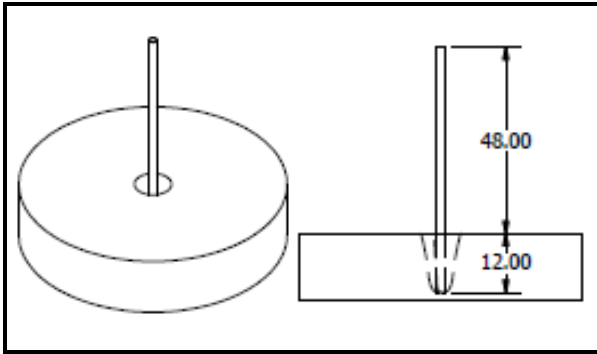
This is 1 1/2 inch EMT Electrical Conduit. Any other size will NOT fit other components. You might cement a PVC pipe into the ground then insert the pole into the PVC pipe.

Step 1:



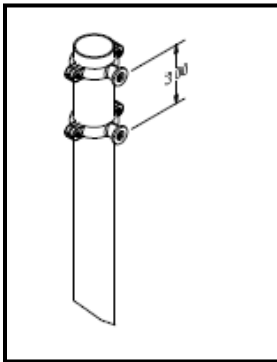
Dig a hole 12" (1 foot) deep in the ground to place the PVC or to secure the pole directly. Wrap the area of the pole that will be in the concrete with electrical tape to minimize corrosion of the pole.

Step 2:



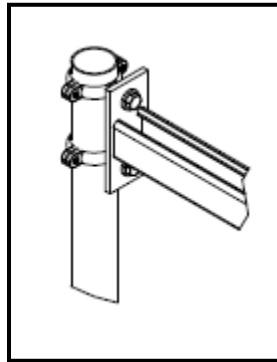
Using the appropriate amount of concrete for the size hole that was dug, mix the concrete and pour into the hole. Place the supplied galvanized pole into the hole before the concrete sets. Make sure the top of the pole is no more than 50" above the ground. Ideally the top will be at 48". Before the concrete sets, ensure that the pole is plumb and level in all directions.

Step 3:



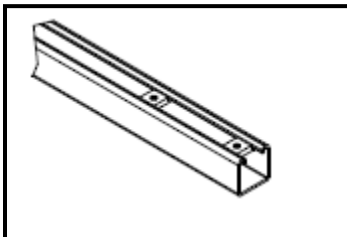
Once the concrete has set, install the two (2) pole clamps. Install the clamps so they are 3" apart.

Step 4:



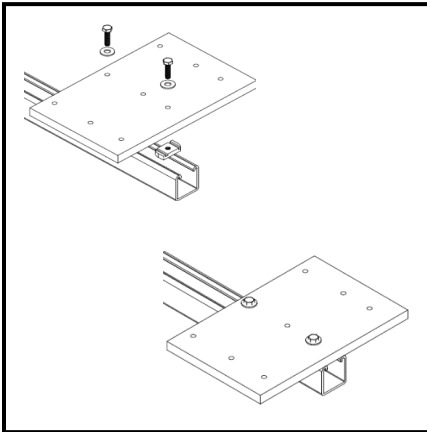
Next install the strut using the supplied 3/8" hardware and a 9/16" wrench or socket.

Step 5:



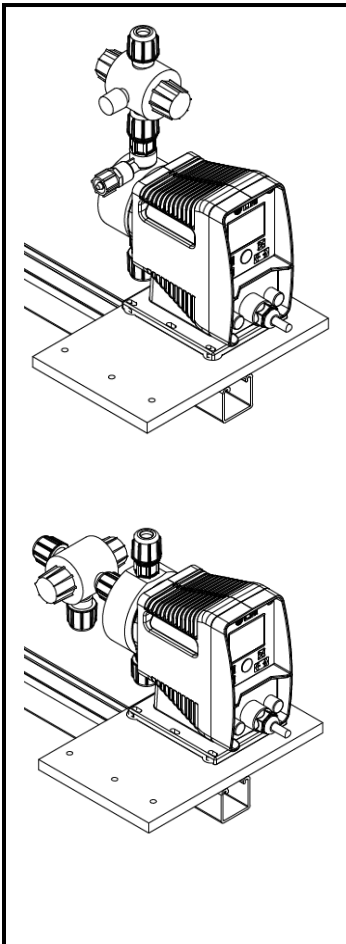
With the strut securely fastened to the pole, install the 1/4-20 strut nuts.

Step 6:



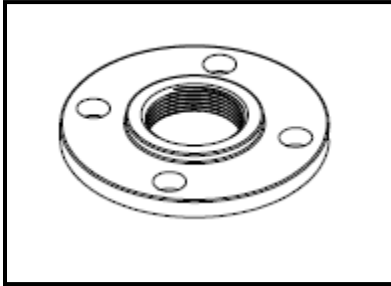
Next, using the supplied ¼-20 bolts and washers, bolt the Pump Self to the Strut using a 7/16" wrench or socket.

Step 7:

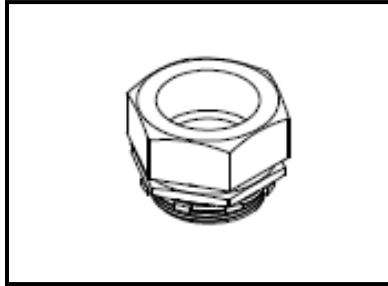


Finally, bolt the pump to the shelf. Ensure that there is clearance for the suction fittings before tightening the hardware.

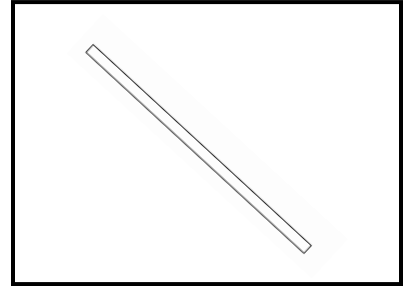
FS-1 Floor Pole Mount Kit
Items included in the kit:



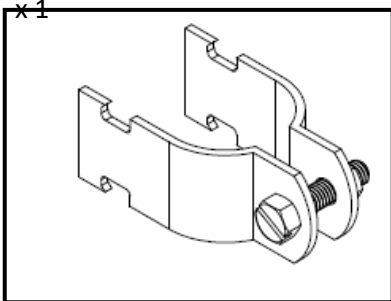
1-1/2" NPT Floor Flange x 1



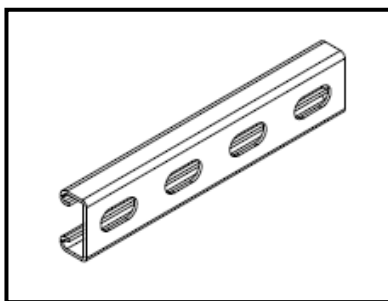
1-1/2" EMT Conduit Adapter x 1



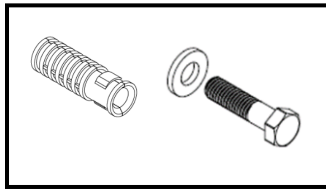
Pole (1 1/2" x 5 ft Long)



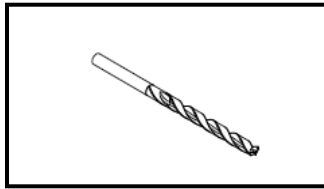
2" Unistrut Pole Clamp x 2



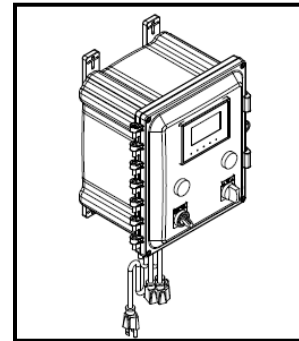
Shallow Strut (12" Long) x 2



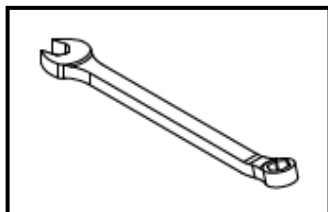
Concrete Anchors/Hardware x2



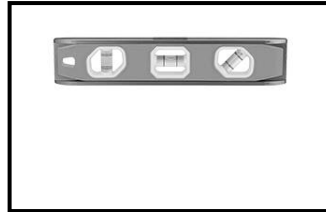
Drill & Drill Bit for Anchors



FS1 Controller x 1

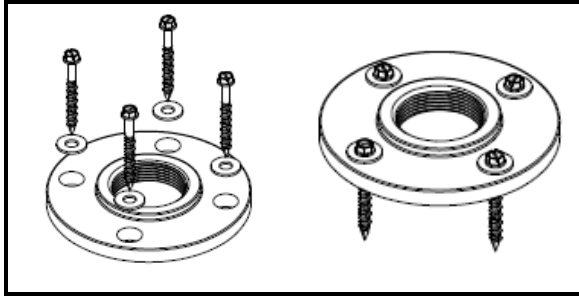


7/16" and 9/16" Wrench
or Socket, Phillips and
Flat screwdriver



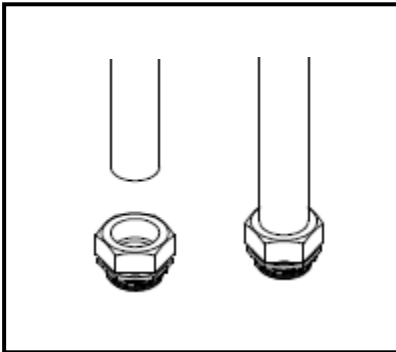
Level

Step 1:



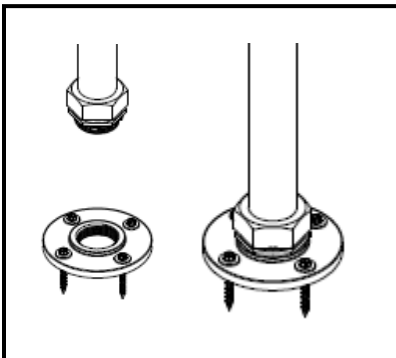
Place Floor Flange in the desired location and mark the four (4) bolt holes. After the holes have been marked, drill the four (4) holes with the appropriate size bit. Then set the flange in place and secure with the appropriate anchors. Check with local codes for anchor requirements.

Step 2:



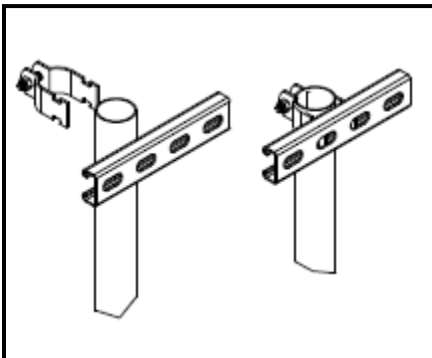
Slide the piece of EMT conduit into the adapter. Once the conduit is fully inserted, tighten the compression nut to secure the adapter to the conduit.

Step 3:



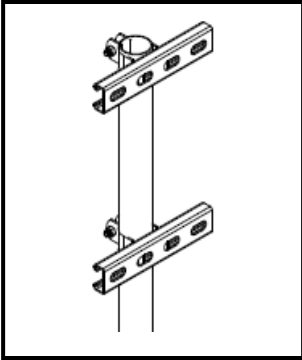
Next thread the conduit and adapter assembly into the floor flange. Once installed check to see if the pole is plumb and level. If it is not, then the floor flange may need to be shimmed to achieve plumb and level.

Step 4:



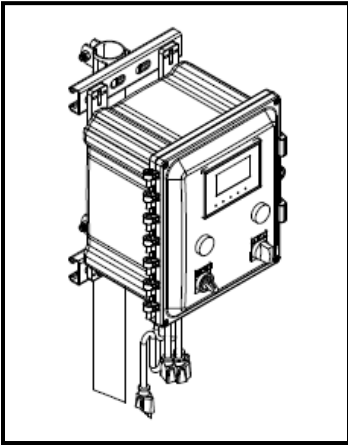
Once the concrete has set, install the strut pole clamp to the pole and strut.

Step 5:



Next install the second clamp and strut. Install the bottom assembly 10-1/4" from the top assembly

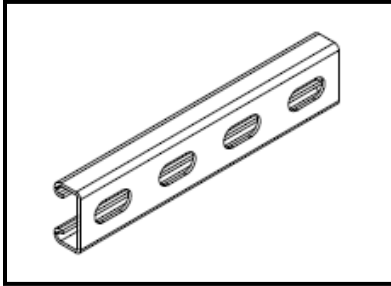
Step 6:



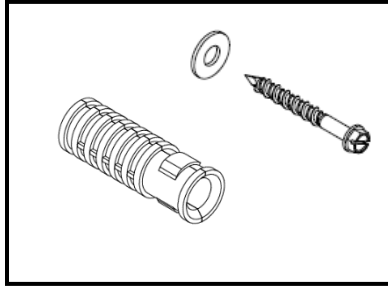
Finally, bolt the FS1 controller to the strut using the hardware supplied in the FS1.

FS-1 Wall Mount Kit

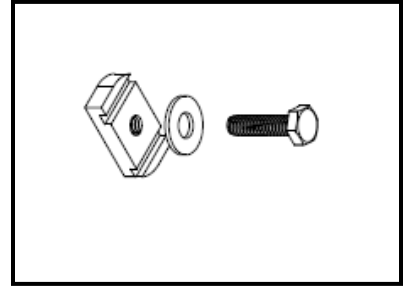
Items included in the kit:



Unistrut (12" Long) x 2

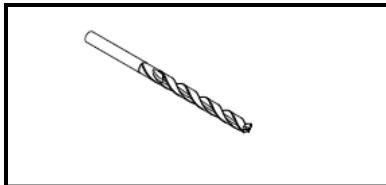


Concrete Anchors x 4

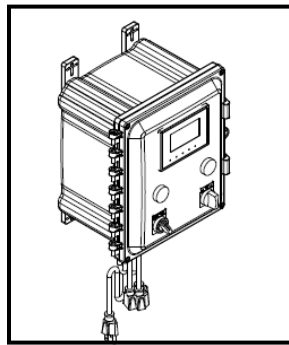


Controller Mounting
Hardware x 4

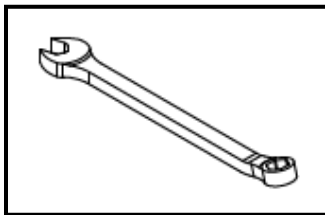
Items not included, but needed:



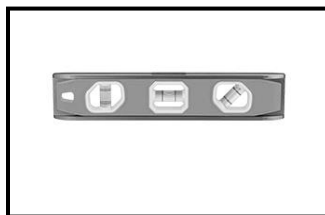
Drill Bit for Anchors



FS-1 Controller x 1



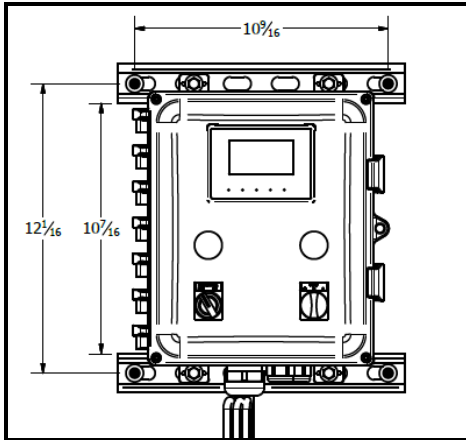
7/16" Wrench or Socket



Level

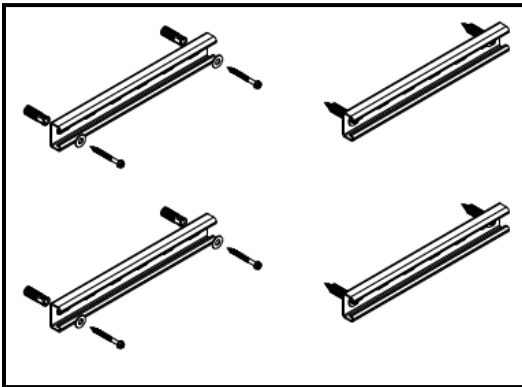
Phillips and Flat screwdriver

Step 1:



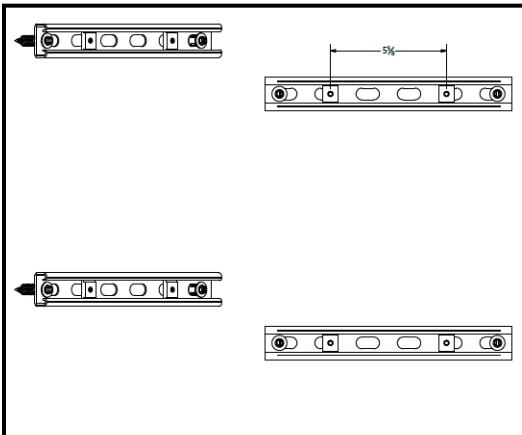
Before mounting the Unistrut to the wall, drill the holes for the anchors. The bolt pattern is 10-9/16" on horizontal centers and 12-1/16" on vertical centers. Use a 3/8" masonry bit to drill holes for the anchor.

Step 2:



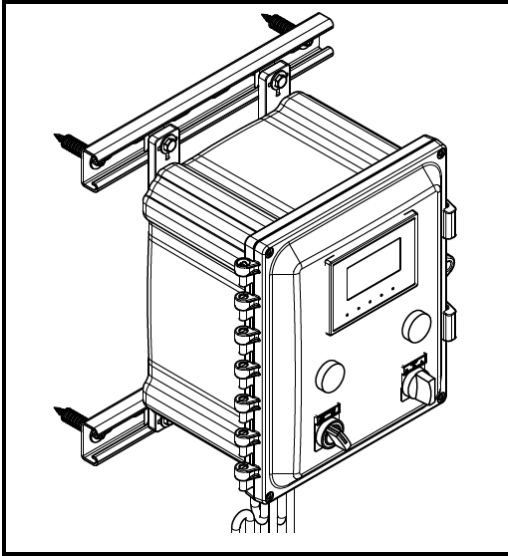
With the holes drilled, place the four (4) lag shields into the holes drilled, then mount the Unistrut with the washers and bolts.

Step 3:



Once the Unistrut is mounted to the wall, install the four (4) 1/4-20 strut nuts, two (2) onto each Unistrut. Installed the 5-5/8" on center from one another.

Step 4:



Once the strut nuts have been installed, mount the FS-1. Loosen the four (4) bolts on the back of the FS-1 and flip the feet 180 degrees to allow for easy mounting. Use the ¼-20 bolts and washer to secure the FS-1 to the Unistrut nuts.

Pump Display Panel














2. **Display:** The 2.4" Full Color Display will show the current operating mode, running status, stroke rate, estimated flow rate, percentage of maximum capacity, and alarm indication.
3. **Menu/Cancel Button:** The  **Menu Button** is used to enter the Settings Menu. The  **Menu Button** can also be used to exit the current Settings Menu or cancel an edit operation. The Menu can only be accessed while the pump is stopped.
4. **Enter Button:** The  **Enter Button** is used to select an option when in the Settings Menu. The  **Enter Button** can also be used to enter edit mode for a value in the
5. **Play/Stop Button:** The  **Play/Stop Button** is used to turn the pump ON or OFF. If the pump is not running, pressing the  **Play/Stop Button** will cause the pump to start running. If the pump is running, pressing the  **Play/Stop Button** will stop the pump. The  **Play/Stop Button** can also be held for 1.5 seconds to begin Prime Mode that will cause the pump to run at maximum speed for 60 seconds then return to the previous state.
6. **← → Increase and Decrease Buttons:** The  **Increase and Decrease Buttons** are used to increase or decrease the speed of the pump when in Manual Mode. These buttons can be pressed once to increment the capacity percentage by 0.5% or held to quickly change the value. The  **Increase and Decrease Buttons** can also be used to navigate the Settings Menu and adjust values while in edit mode. 



Figure 18: Pulse Pacing Mode Display



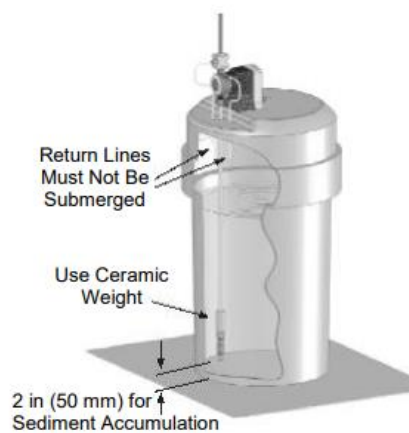
STAYPRIME™ Degassing Technology Enabled when in Menu and
StayPrime™ Degassing Technology active when on Homescreen

Suction Fittings & Visuals



INCORRECT

Foot Valve tilted sideways *WILL NOT PRIME*



CORRECT

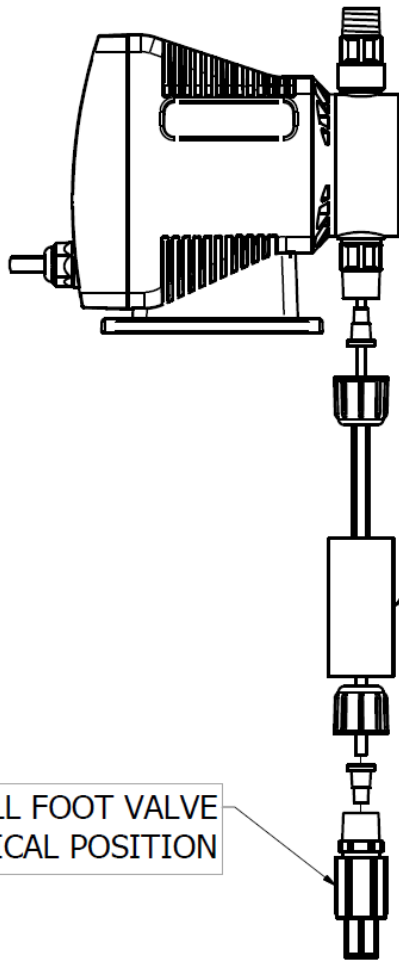
Foot Valve must remain vertical

Foot Valve



Must be upright in morrell. Has a check ball to keep chemistry in the line.
If sideways, the chemistry will leak down the line back to the container, and the pump will have to try to prime itself every start.

Foot Valve



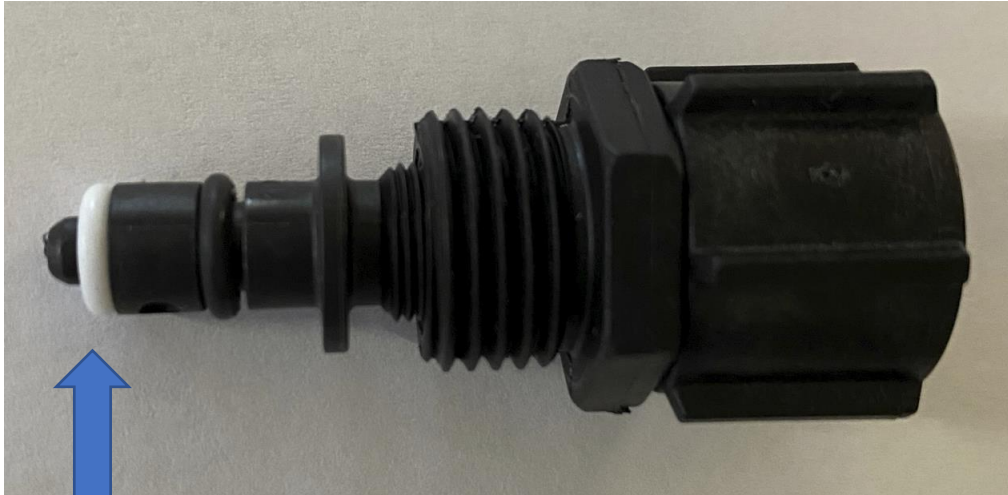
INSTALL CERAMIC WEIGHT TO
KEEP TUBING FROM CURLING

INSTALL FOOT VALVE
IN THE VERTICAL POSITION

Priming Valve & O-ring Configuration

This is the bypass valve on the Curative & Fertilizer pump. It is screwed into the side of the pump head by the main nut, then screwed on by the ridged tab to close. When priming the pump, the valve may be opened to release pressure, by turning the ridged tab counter clockwise. This operates similar to the three-way valve and can be use in pace of the three-way valve for supporting the priming of the pump head.

The white PVDF O-ring, if not attached, should be placed on the end of the assembly as illustrated.

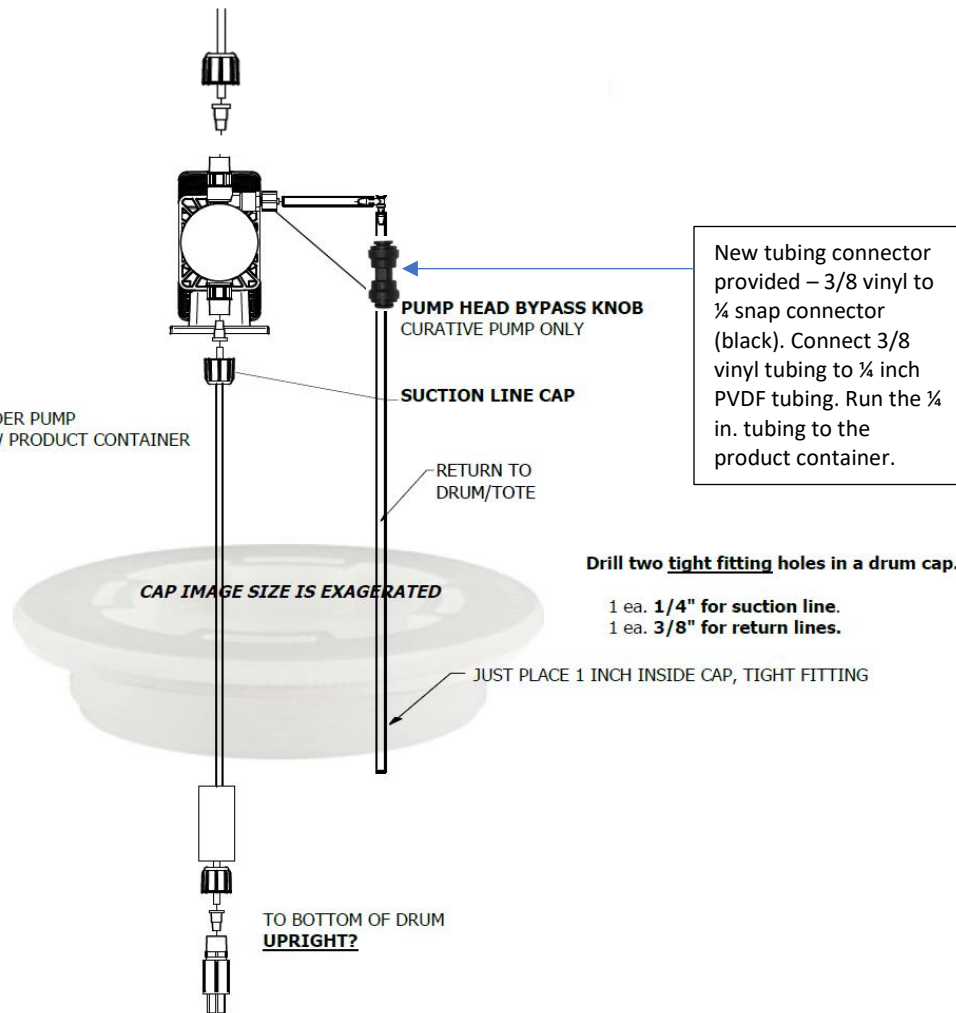


White PVDF O-ring

Drum Cap Modifications / Changing out Drums

CHANGE OUT DRUM

1. REMOVE **BYPASS LINE**
2. RELEASE DRUM CAP
3. REMOVE **SUCTION LINE CAP** FROM UNDER PUMP
4. PLACE SUCTION LINE AND CAP INTO NEW PRODUCT CONTAINER
5. PLACE CONTENR UNDER PUMP
6. ALIGN SUCTION LINE AND RECONNECT
7. REINSERT BYPASS LINE
8. OPEN THREEWAY KNOB (BLACK)
9. OPEN **PUMP HEAD BYPASS KNOB**
10. HOLD PRIME BUTTON FOR 3 SECONDS
ITEM 5 OF THE PUMP IMAGE BELOW
11. REPEAT ITEM 10 UNTIL YOU HEAR THE PUMP CATCH THE CHEMISTRY



New tubing connector provided – 3/8 vinyl to 1/4 snap connector (black). Connect 3/8 vinyl tubing to 1/4 inch PVDF tubing. Run the 1/4 in. tubing to the product container.

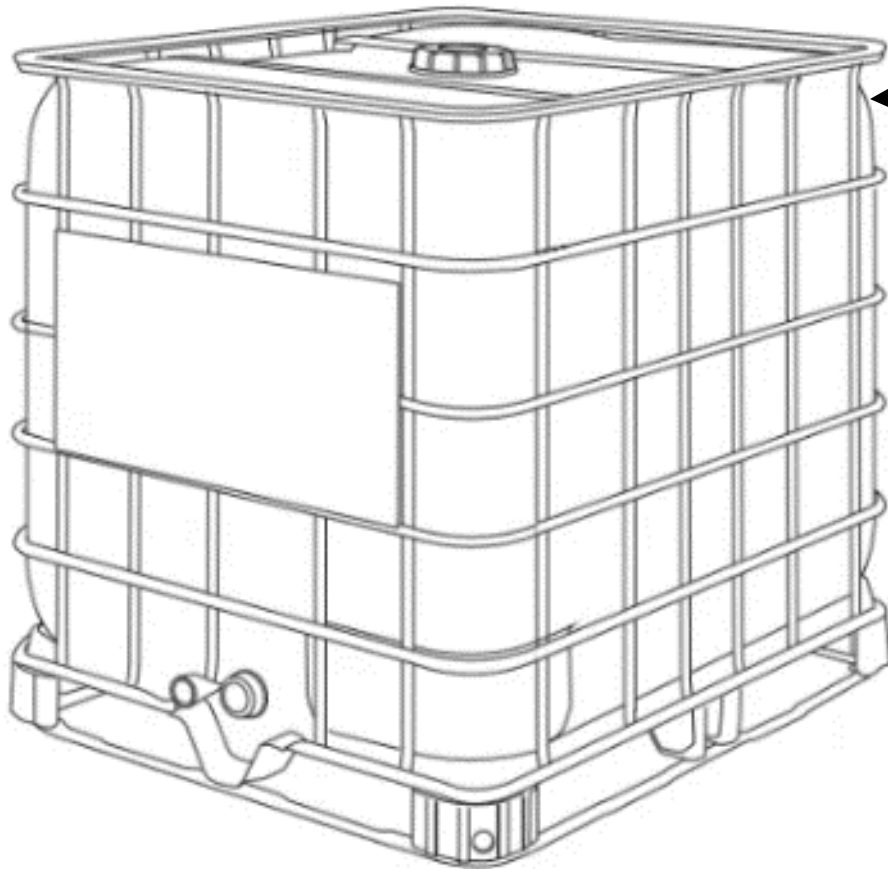
Venting Tote

Place a pinhole using a drill bit in this location.

Keep lid tight and secure

Modify lid to take bypass liquid, with a tight fitting

Reuse the same modified cap, if suitable

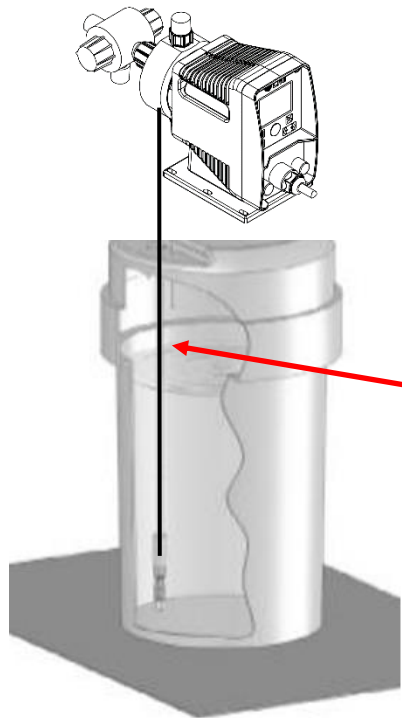


Drill "pinhole" here,
in this direction

Do NOT drill hole
from top down.

Container Connections

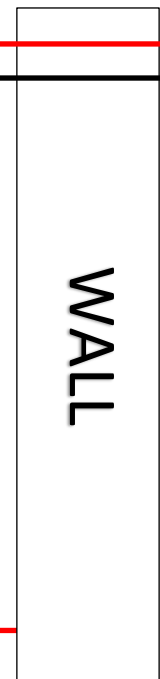
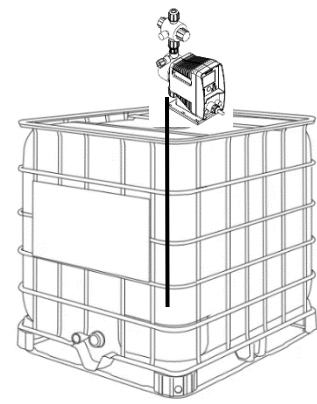
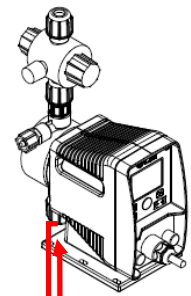
BC Pump



Suction Lines
Into/onto containers

Pumps are called pumps because they pump.
Suction is minimal. Chemical sucked, is then
held in place by a check ball in the suction strainer.

Curative Acid



YES

NO

YES

Cam Lock Assembly



1. ¼ inch tubing quick connect – UV Resistant, NPT Threaded Acid proof
2. Reducer Bushings
3. Male Camlock
(Tote has female camlock connection and valve)

1. 2 inch Camlock
2. Reducer bushing 2 to ¾ inch
3. Reducer bushing ¾ to 3/8
4. Cam Lock 3/8 to 1/2

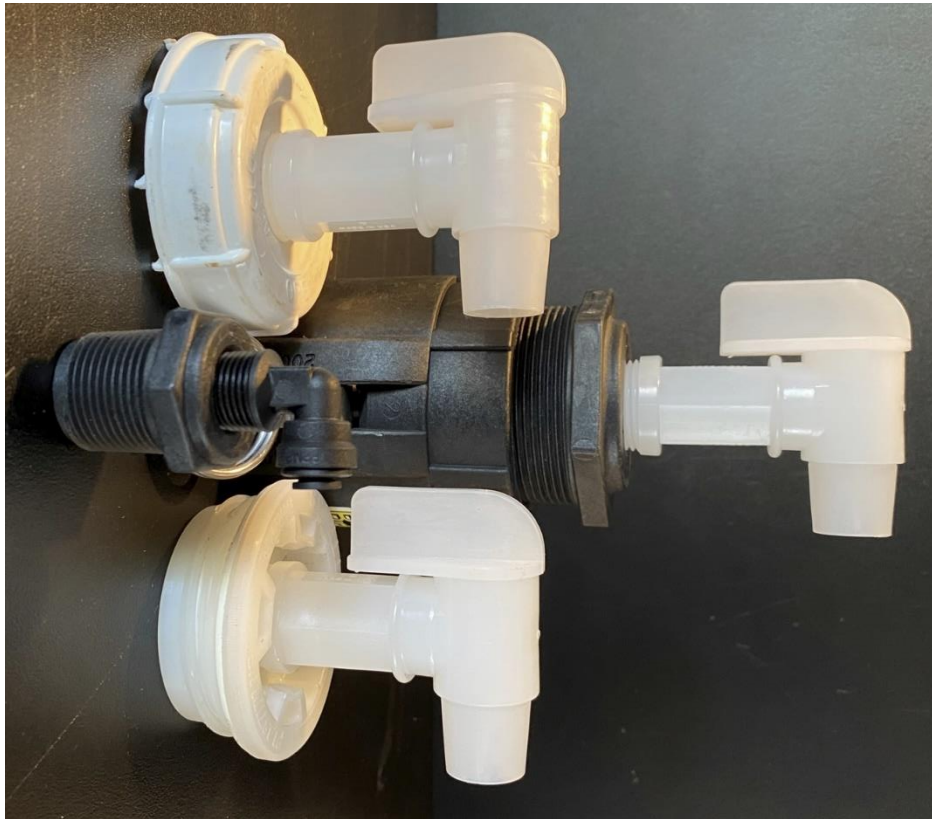
DO NOT USE A VISE, YOU CAN BREAK THEM IF YOU DO.

MUST BE DOUBLE TEFLON TAPED AND THREADED BY HAND WITH WRENCHES.

DO NOT USE A VISE, YOU CAN BREAK THEM IF YOU DO.

Bungs and Spigots

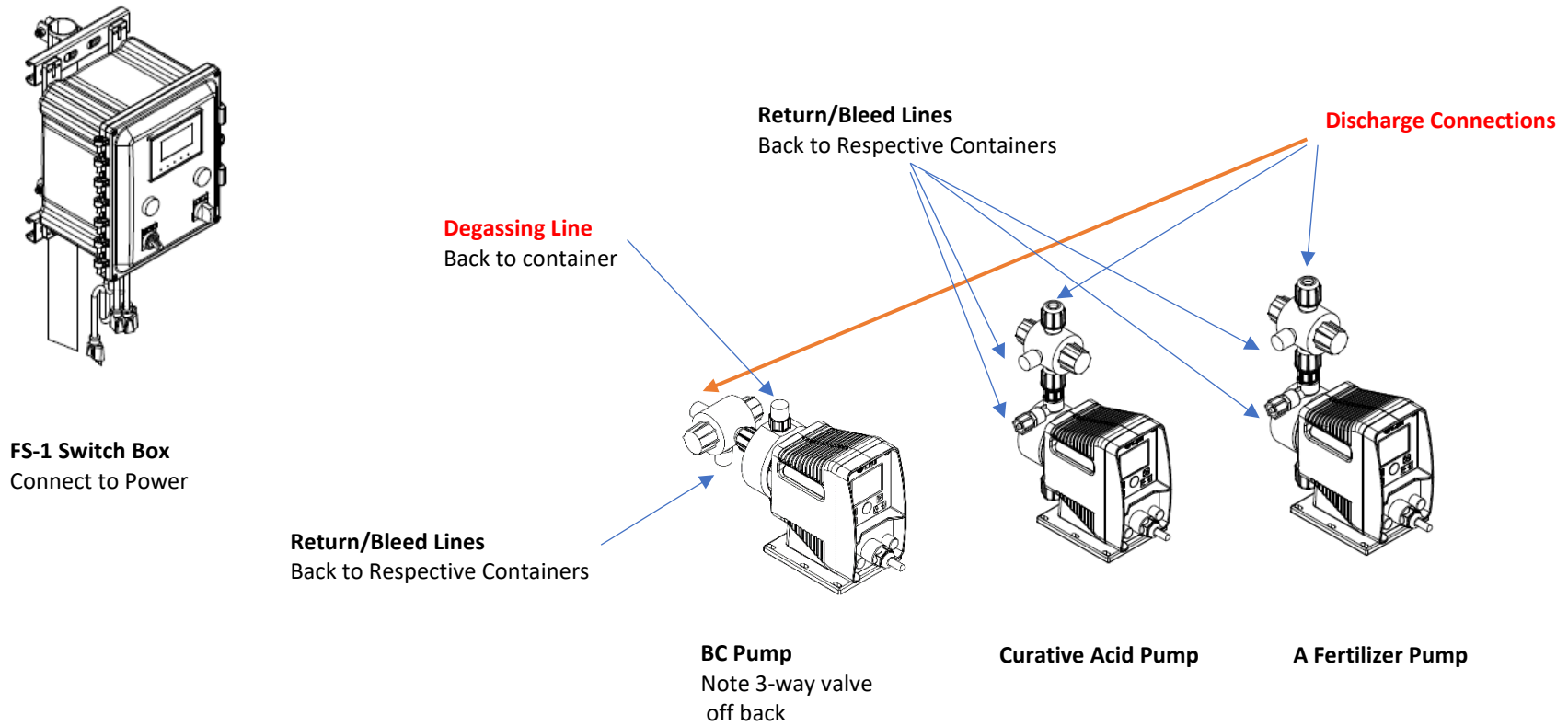
We thought a little uniformity would be beneficial, where a $\frac{3}{4}$ poly spigot can be used on any of the container lids. This can facilitate emptying remaining product from big containers into smaller containers.



Camlock
Drum
Carboy
5 gl. pail

All accept a $\frac{3}{4}$ NPT and a poly spigot

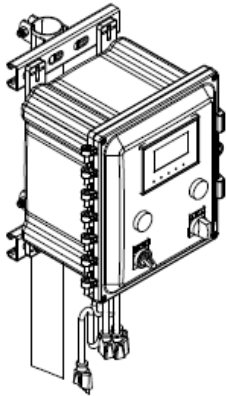
Pump Connections



Note: Pumps are set at 100% and to receive pulse volumes from the flow meter. The feed rate settings are made by managing the pulses based on the flow volume. All our application rates are set at the FS-1 control panel display, not at the pumps. The displayed multi-function valve is no longer used.

Pump Connection – Discharge Directions / Locations

NO OVERHEAD DISCHARGE LINES

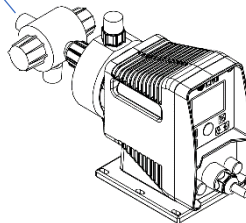


FS-1 Switch Box
Connect to Power

Each pump cable is identified with a wire tie. Pump 1, one wire tie, 2, two and 3, three.

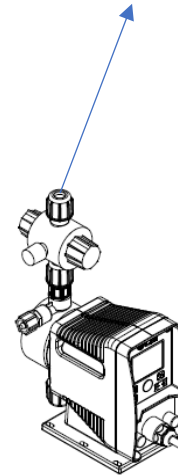
This then correlates to the PLC control panel

To Suction side of Pump Station Wet Well

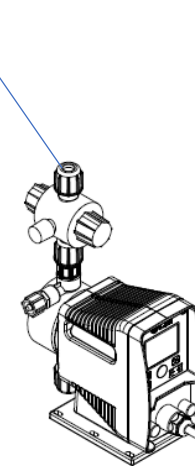


BC Pump
Note 3-way valve off back

To discharge side of pump station



Curative Acid Pump

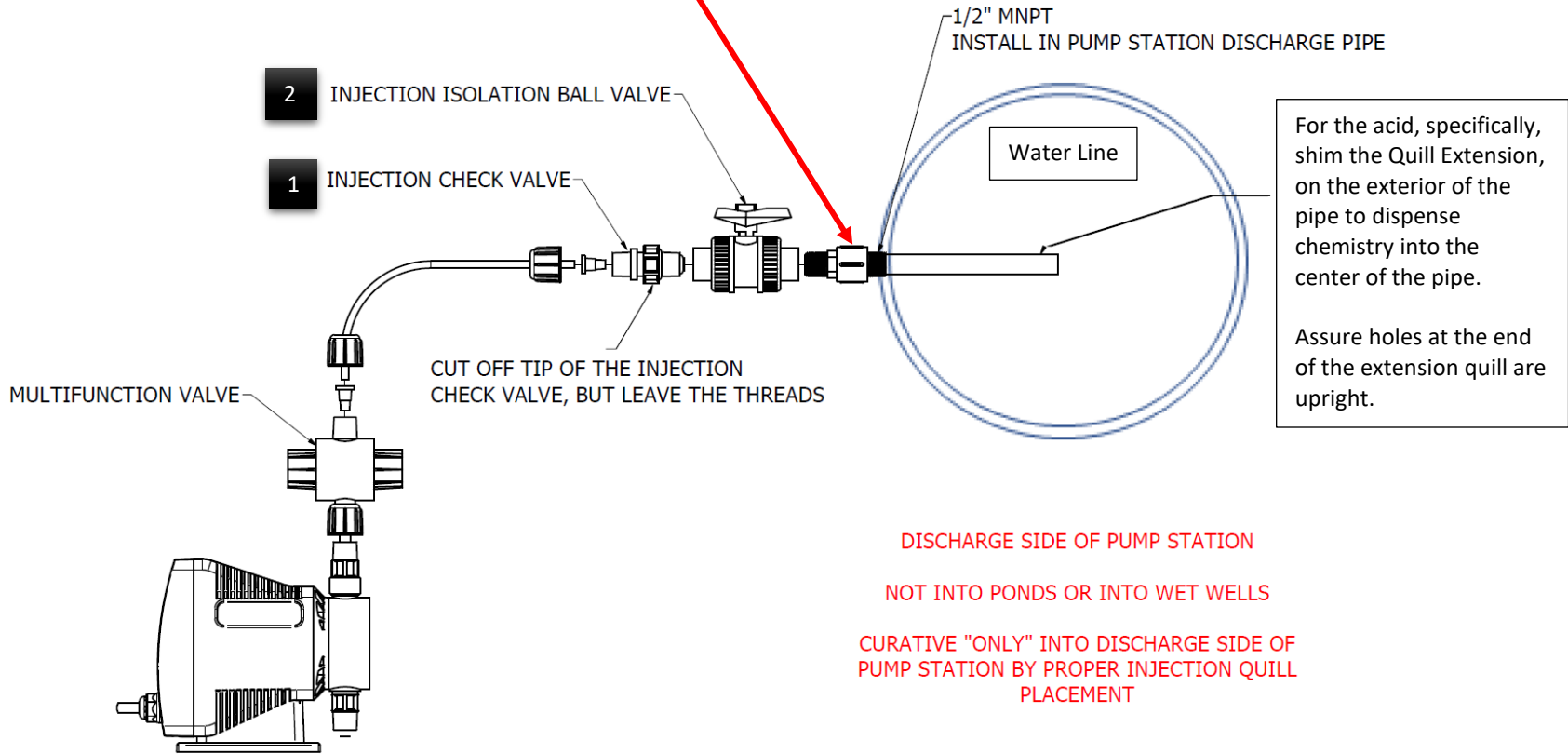


A Fertilizer Pump

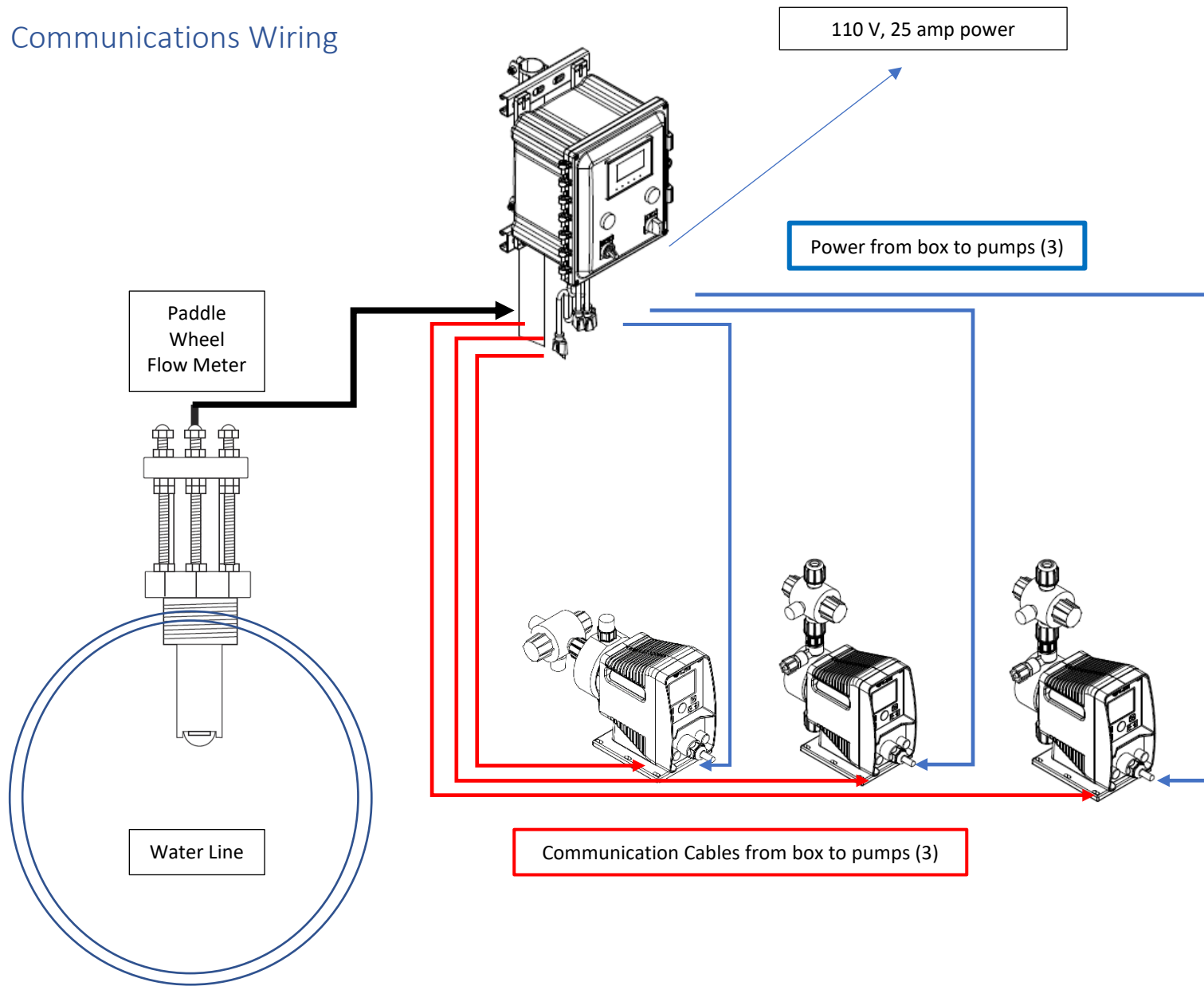
3 Injection Quill & Quill Extension Configuration

For WaterSOLV™ Curative

**DO NOT OVER TIGHTEN.
PLACEMENT AND CONFIGURATION SHOULD BE
CONSIDERED IN CASE OF BREAKAGE AND PURSUANT
WATER SPRAY.**

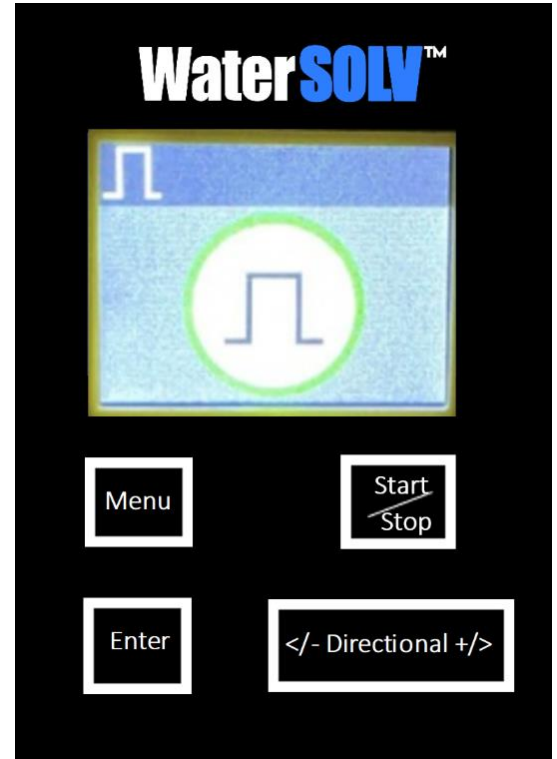
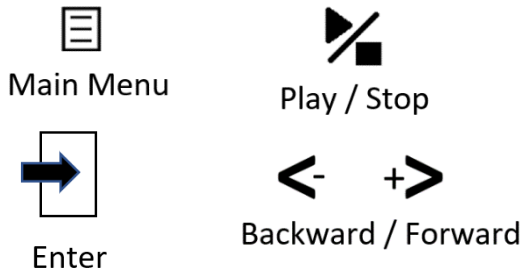


Communications Wiring



Pump Settings

Pump Screen Icons







FS-1 Pump Settings (Pre-set at factory)


Pump is set in External Pulse mode, to take signals from the FS-1, where the application rates are entered. You should not have to make pump settings. The application rates are all made for the FS-1 Panel.

Settings

1. With FS-1 Main Power On
2. With FS-1 Pump power in the on position

3. On the pump, Select Menu 


4. Arrow over   to 

5.  (black circle is off)
Enter

6. Assure all setting are as in this image. Arrow to the item, select enter, than use the - / + arrows to make the adjustment, then hit enter. When all changes are made, arrow to the Check Mark and hit enter.


7. A Black Circle means the pump is off. Press  Play / Stop to get a green circle which means pump is on standby Meter. The final screen should look like the above image.

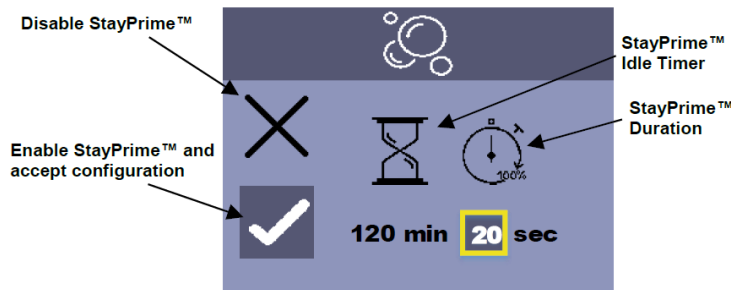
Priming On Feature

Hold down  for 3 seconds. Pump will run for 60 seconds then stop.

BC Pump Degassing Stay Prime Requirement


This feature will run the pump for a desired amount of time if it has not run, ensuring the pump stays primed. This function is useful for the WaterSolv BC because of the potential for off gassing and causing a vapor lock. This function should be enabled from the factory. If it isn't, to enable this function, from the Home Screen, press the Menu Button while the pump is


stopped. Then press the Left Button three times to select the StayPrime™ Degassing Technology Icon, . Press the Enter Button to view the StayPrime™ Degassing Technology Configuration, as shown in figure 18. StayPrime™. Once the StayPrime™ Idle Timer has been reached (no strokes have occurred in the specified time), the pump will run at 100% for the StayPrime™ duration and return to its set operating mode. Select an Idle Timer based on the amount of time in which the pump may lose prime due to off-gassing of chemical. Select a Duration based on the time required to clear the suction line.



Pump Multiplier

Some FS-1 were built to run two pumps. Newer FS-1's can run 3 pumps. However, FS-1's can run even more than the original 2 or 3 by piggy backing off on another pumps connection. For example, we want to add a pump for another product, perhaps a fertilizer. You can tie the pumps comm cord into an existing pumps comm cord connection to the FS-1. You can use the multiplier function on the new LMI pump to emulate the signal response, and yet adjust the new pump to multiply the signal.

This is accomplished by going to the pump main menu, selecting the Top Hat  then arrowing and selecting the Strokes. If the pump you are connected to is set at 1 ppm, and you adjust the the main pump, this secondary pump will do twice that. It is a multiplier, that can multiply as high as 999.9 times the set rate. However, it only has a total capacity of .68 gallons per hour, or 16.32 gallons per day (the Curative and Fertilizer pumps).

Remember, press enter  to make selections
Enter

Multiplied:

Play/stop to black circle – Menu – Top Hat – Enter – set strokes – Enter – Arrow over to check mark – Enter – Play Stop to Green Circle Top Hat.
Green Circle represents a “Pulse” from the flow meter.



Standard



Multiplied (range from 0 to 999.9)


















Pump Manual Operation

In manual operation, when the pump is powered, it will turn on and run, until the power is stopped. The pump will retain its settings.

To set he manual operation;

- 1) With the pump powered, press the menu button to assure the circle is black, not green.
- 2) Press the menu (top left button), and cursor over to the hand icon. Press enter (lower left icon).
- 3) Notice in the lower left, there is a percentage. Press the arrow keys to the desired percentage.
- 4) To determine the desired percentage, download HCT's mobile app, or use their Analytical log sheet. Feel welcome to contact HCT for assistance. Before calling, be sure to know the flow rate, gpm, of your system.

Pump Operation Icons

	Main Menu		StayPrime™ Degassing Technology Recurrence (Time between Priming Events)
	Calibration		StayPrime™ Degassing Technology Duration (Length of Priming Events)
	Play/Stop (Press the physical Play/Stop button to start/stop calibration. Screen icon highlights to show status)		System Information
	Minimum Pulse Width Setting		Reset (Used to return to factory calibration, restore software defaults, or clear User Totalizer)
	Confirm		Pump Stopped (Not Running)
	Units		Pump Running (In External Pulse Mode, the pump may be waiting for pulses.)
	Factory Totalizer (Cannot be reset)		Low Tank Alarm
	User Totalizer (Can be reset)		Empty Tank Alarm
	STAYPRIME™ Degassing Technology Enabled when in Menu and StayPrime™ Degassing Technology active when on Homescreen		

Pulse

FS-1 Programming

Descriptions

FS-1 Flow Switch Controller

1. Synchronizes chemical injection with flow, with the use of a flow switch or flow meter. Prevents the accidental application of chemistry without the presence of water flow. Provides accuracy in the chemical application for uniformity throughout the landscape.
2. Communicates flow (flow switch) or flow and amount (flow meter) to chemical feed pumps through signals (on/off – flow switch) or metered pulses (flow meter) to precisely inject chemistry.
3. LCD Panel
 - a. Pre-programmed with options to fit most all pump stations and pump selections.
 - b. Security accessibility with multiple levels (view / administer changes)
 - c. Chemical feed rates for each pump
 - d. Feed rates adjustable between chemistry / pumps and desired application rates (i.e. the initial soil remediation phase or changes in water quality which may be by source, or perhaps seasonal).
4. Operates up to three pumps (and can do more)
5. Tabulates water usage
6. Single 110 v, 20 amp service
7. Weather resistant (FS-1 and LMI Pumps – NEMA 4X Cabinets)
8. Complete – nothing else needed other than mounting hardware (floor mount or wall mount, see options)

Pumps

1. Curative pump designed for HCT's Curative acid
2. BC pump designed for HCT's BC biocide
3. Alternate pumps designed for fertilizers or other liquid products
 - Pumps are designed for
 - Chemical output volumes in line with the pump stations water flow volume
 - Chemical compatibility (& viscosity)
 - Dependability
 - Serviceability
 - Pumps include custom components
 - O-rings
 - Check Balls
 - Extended lengths of suction and discharge tubing
 - Extended lengths of communication cables (connecting ea. pump to FS-1)
 - Curative Pump
 - Extended injection quill and ball valve
 - BC pump is a degassing pump
 - Pump Components & Additional Inclusions
 - Camlock Connector
 - To connect the suction of a pump to a tote. Usually provided just for the acid pump, when using a tote of Curative. Not included when not using a tote.

More about Pumps:

While you might just connect the pumps to a timer, alleviating the need for the FS-1, this is both risky and potentially not viable.

Risky: pumping chemistry into the system when there is not flow. Then, when there is flow all the chemistry lands in concentration somewhere and hopefully not on the 18th green (though it would probably not cause damage but it would likely cause a growth surge).

Potentially not viable: when you have a pump station that has a variable flow rate, where water output, gpm, might vary in some magnitude.

The pumps have 2 separate options;

- A. Without FS-1 - Power on and pump at the rate they are set at (flow switch or timer)
- B. With FS-1 - Receive a pulse and pump based on the number of pulses (flow meter, pulses, strokes of pump per pulse based of FS-1 Application Rate Settings).

Flow Switches / Meters

As of 9/2022 the FS-1 is available with a flow meter. If the flow meter is not included, it was opted out at time of purchase, and where it was decided that you will attempt to utilize the existing flow meter on the existing pump station. We stopped using the existing flow meters due to too much disparity in connecting with these meters and mag meters.

NOTE: If using your own meter, and the FS-1 is sensing pulses (flashing light in FS-1), there is no need for an optical isolator. Most installs are a pulse flowmeter (analog). The pulse output from the flow meter, or pump station can go directly to the input on the FS-1. It can use a 4-20 mA without an isolator, but it must be wired in a loop. Some people prefer to isolate it just in case. Regardless if using pulses, an isolator is not needed unless you are using a Data Industrial / Badger Flow meter. See Page 5.

Please pre-arrange by appointment
Technical Support
Ontario, CA – PST Time Zone
Robert Bass – Developer Engineer - (480) 221-3128

Flowmeter Expectations:

For flow meter specific detailed wiring diagram options, see separate document.

1. Analog (4-20mA) Signal Conditioner

Some flow meters require signal conditioners which may be necessary. Here is the isolator that we suggest SC6-1102. It is powered from the HCT controller.

https://www.automationdirect.com/adc/shopping/catalog/process_control_-_a_measurement/signal_conditioners/high_density_signal_conditioners/sc6-1102

To connect the Signal Conditioner to the Flow Switch Controller, do the following;

- a. Connect Terminal # 7 of the Flow Switch Controller to Terminal # 5 of the SC6-1102 Signal Isolator.
- b. Connect Terminal # 10 of the Flow Switch Controller to Terminal # 6 of the SC6-1102 Signal Isolator.

- c. Connect the +4-20mA Output from the Pump Station to Terminal # 3 of the SC6-1102 Signal Isolator.
- d. Connect the -4-20mA Output from the Pump Station to Terminal # 4 of the SC6-1102 Signal Isolator.

2. Data Industrial/Badger Flow Meter

If your pump station is using the Data Industrial/Badger flow meter and this isolator is not installed in the Pump House control panel, you will need to acquire and install one. Data Industrial Optical Isolator Model A 1018-4026. Alternatively, a 2k Ω current limiting resistor may be used. To use the supplied 2k Ω current limiting resistor, do the following:

- a. Connect one end of the resistor to Terminal # 7 of the Flow Switch Controller.
- b. Connect the Black and Shield wire from the flow meter to Terminal # 8 of the Flow Switch Controller.
- c. Connect the Red wire from the flow meter and the other end of the resistor to Terminal # 9 of the Flow Switch Controller.

3. GF Signet Flow Meter – Pulse Paddle Wheel Flow Meter

Factory Unit

If you are using the GF Signet 3-2540-1 paddlewheel flow meter, a 2k Ω pullup resistor must be used. To use the supplied 2k Ω pullup resistor, do the following:

- a. Connect the Black Wire one end of the resistor to Terminal # 7 of the Flow Switch Controller.
- b. Connect the Shield/Silver wire from the flow meter to Terminal # 8 of the Flow Switch Controller.
- c. Connect the Red wire from the flow meter and the other end of the resistor to Terminal # 9 of the Flow Switch Controller.

The wiring colors may vary from what is noted. Noted is the meter wiring. Wiring extension and coupler, for pre-wired units, Black to terminal 8, Brown to terminal 7 and White to terminal 9.

The GF Signet 3-2540-1 paddlewheel flow meter is suitable for piping 1½ to 24 in. diameter.

[FS-1 LCD Setup:](#)

THE INITIAL LOGIN

When the FS-1 is first powered up, the default screen is the splash screen, as shown in figure 1.



Figure 1. Splash Screen

By default, the ViewOnly mode is activated.

In ViewOnly, the user can only view what selections have been made. They cannot make any changes.

To be able to make changes,

1. Press the **LOGIN** button, and this will open a new screen

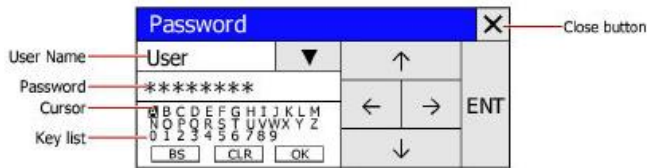


Figure 2. Password Screen

2. Click on the **down arrow** next to the username
3. Select "**Maint**"
4. Use the **Arrow keys** to enter the **password, 5549**
5. **Arrow down** to select "**OK**"
6. Press **ENT**
7. Press **HOME**

After 2 minutes of inactivity, the system will log out of the Maint user and revert to the ViewOnly.

After 5 minutes of inactivity, the screen will go to sleep. To wake the screen up, simply press anywhere on the screen.

After the initial login - if it is needed to log back in and **make changes**;

- A. press the **Menu** button and go to the second menu page.

- B. Once on the second page, click the **LOGIN** button, as shown in figure 3
- C. Login the same way as described above.

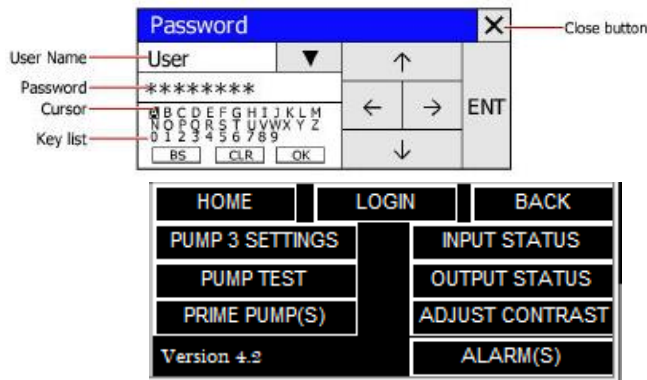


Figure 3. Splash Screen

Reset the Flow Totalizer

Must be **logged** in as the **Maint**, and the **Press and hold reset button a minimum of 3 seconds.**

For Use with a **Pulse** Flow Meter:

Factory Unit

See page 67 for diagram - Wiring Diagram #1.

(If using a Data Industrial Flow Meter without an Isolator, flow the instructions on page 3. For a three (3) wire flow meter, see Wiring Diagram #3.)

- Plug each of the metering pumps into the receptacles provided by the controller.
- Plug the power cord of the controller into a 120VAC GFIC outlet.
- Turn the Main Power switch to the On position.

The metering pump(s) should have been set to external mode from the factory, if not they will need to be set to external mode.

From the home screen press the Menu Button, as shown in figure 4. Next press the Flow Meter Selection button, as shown in figure 5. Please note that some options shown in figure 5 are only for available depending on what settings have been made. On the Flow Meter Selection screen, the Pulse Flow Meter will need to be selected. Do this by simply pressing it. Press the Next button, as shown in figure 9, to be taken to the Flow Meter Settings screen. From the Flow Meter Settings screen and then select which type of meter it is, as shown in figure 10. If a Data Industrial or Badger flow meter is being used, select that by pressing the button. Once the button is pressed, the display will show two boxes that need information, as shown in figure 11. The K-Value and Offset can be found in the manual for the flow meter. These values are dependent on the pipe size and schedule. To enter these value, press the respective box, and a keypad will pop-up, as shown in figure 12. Enter the number by pressing the buttons, then press ENT. The CLR button will clear the value and the CAN will exit the screen and any value entered will be lost.

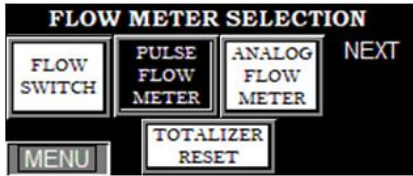


Figure 9. Flow Meter Selection Screen

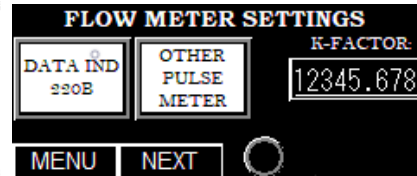


Figure 10. Flow Meter Settings Screen

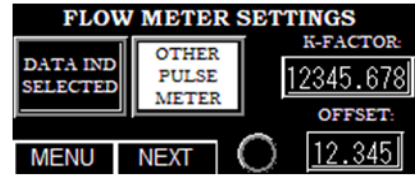


Figure 11. Badger Flow Meter Settings Screen

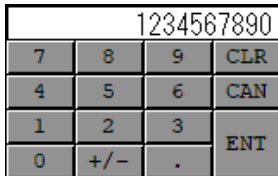


Figure 12. Numerical Keypad Selection Screen

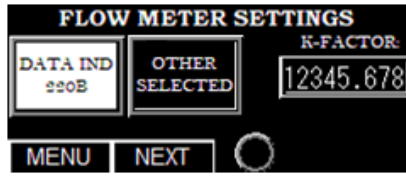
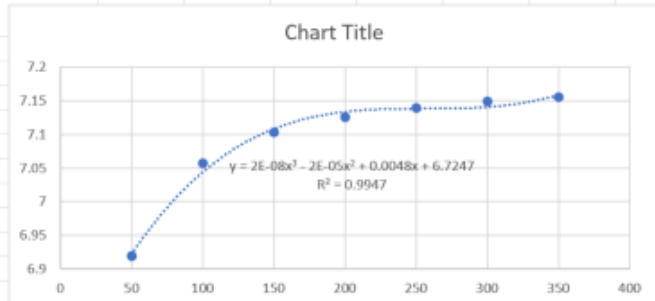


Figure 13. Other Flow Meter Settings Screen

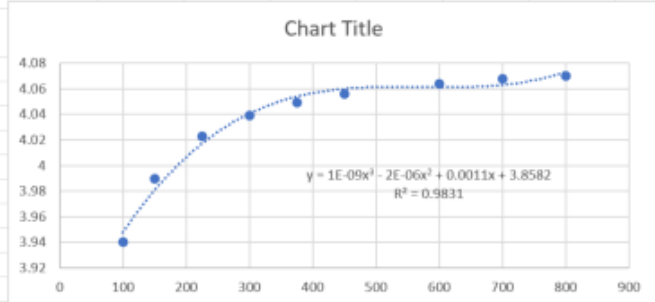
If a different brand flow meter is being used, select Other by pressing the button, as shown in figure 13. Once the button is pressed, the display will show one box that need information, as shown in figure 10. The K-Factor can be found in the manual for the flow meter and is dependent on the pipe size and schedule.

K Factor Tables

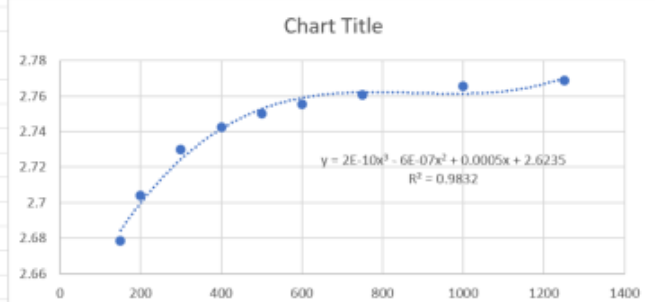
4" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
50	8.34	0.229	5.766203837	6.919444604
50	8.34	0.229	5.766203837	6.919444604
100	8.34	0.229	11.76140767	7.056844604
150	8.34	0.229	17.75661151	7.102644604
200	8.34	0.229	23.75181535	7.125544604
250	8.34	0.229	29.74701918	7.139284604
300	8.34	0.229	35.74222302	7.148444604
350	8.34	0.229	41.73742686	7.154987461
400	8.34	0.229	47.7326307	7.159894604
				7.126806441
				7.080726033



5" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
100	14.674	0.248	6.566774431	3.940064659
150	14.674	0.248	9.974161646	3.989664659
225	14.674	0.248	15.08524247	4.022731325
300	14.674	0.248	20.19632329	4.039264659
375	14.674	0.248	25.30740412	4.049184659
450	14.674	0.248	30.41848494	4.055797992
600	14.674	0.248	40.64064659	4.064064659
700	14.674	0.248	47.45542102	4.067607516
800	14.674	0.248	54.27019545	4.070264659
				4.044822516



6" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
150	21.574	0.257	6.695813572	2.678325429
200	21.574	0.257	9.013418096	2.704025429
300	21.574	0.257	13.64862714	2.729725429
400	21.574	0.257	18.28383619	2.742575429
500	21.574	0.257	22.91904524	2.750285429
600	21.574	0.257	27.55425429	2.755425429
750	21.574	0.257	34.50706786	2.760565429
1000	21.574	0.257	46.09509048	2.765705429
1250	21.574	0.257	57.6831131	2.768789429
				2.747137179



8" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
150	40.086	0.281	3.460954797	1.384381919
200	40.086	0.281	4.708273063	1.412481919
300	40.086	0.281	7.202909594	1.440581919
400	40.086	0.281	9.697546126	1.454631919
500	40.086	0.281	12.19218266	1.463061919
750	40.086	0.281	18.42877399	1.474301919
1000	40.086	0.281	24.66536531	1.479921919
1250	40.086	0.281	30.90195664	1.483293919
1500	40.086	0.281	37.13854797	1.485541919
1750	40.086	0.281	43.3751393	1.487147633
2000	40.086	0.281	49.61173063	1.488351919
2250	40.086	0.281	55.84832196	1.489288586
				1.468964135
10" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
200	64.532	0.314	2.785237588	0.835571276
250	64.532	0.314	3.560046984	0.854411276
500	64.532	0.314	7.434093969	0.892091276
750	64.532	0.314	11.30814095	0.904651276
1000	64.532	0.314	15.18218794	0.910931276
1250	64.532	0.314	19.05623492	0.914699276
1500	64.532	0.314	22.93028191	0.917211276
2000	64.532	0.314	30.67837588	0.920351276
2500	64.532	0.314	38.42646984	0.922235276
3000	64.532	0.314	46.17456381	0.923491276
3500	64.532	0.314	53.92265778	0.924388419
				0.908446191
12" Sch 40 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
250	97.576	0.358	2.204105436	0.528985305
500	97.576	0.358	4.766210872	0.571945305
750	97.576	0.358	7.328316307	0.586265305
1000	97.576	0.358	9.890421743	0.593425305
1500	97.576	0.358	15.01463261	0.600585305
2000	97.576	0.358	20.13884349	0.604165305
2500	97.576	0.358	25.26305436	0.606313305
3000	97.576	0.358	30.38726523	0.607745305
3500	97.576	0.358	35.5114761	0.608768162
4000	97.576	0.358	40.63568697	0.609535305
4500	97.576	0.358	45.75989784	0.610131971
				0.599888057
12" Sch 160 Pipe				
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor
250	93.152	0.352	2.331785641	0.559628554
500	93.152	0.352	5.015571281	0.601868554
750	93.152	0.352	7.699356922	0.615948554
1000	93.152	0.352	10.38314256	0.622988554
1500	93.152	0.352	15.75071384	0.630028554
2000	93.152	0.352	21.11828513	0.633548554
2500	93.152	0.352	26.48585641	0.635660554
3000	93.152	0.352	31.85342769	0.637068554
3500	93.152	0.352	37.22099897	0.638074268
4000	93.152	0.352	42.58857025	0.638828554
4500	93.152	0.352	47.95614153	0.63941522
				0.629342992

3" Sch 40 Pipe					
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor	
12	4.362	0.063	2.688031637	13.44015818	
24	4.362	0.063	5.439063274	13.59765818	
50	4.362	0.063	11.39963182	13.67955818	
150	4.362	0.063	34.32489546	13.72995818	
200	4.362	0.063	45.78752728	13.73625818	
250	4.362	0.063	57.2501591	13.74003818	
300	4.362	0.063	68.71279092	13.74255818	
350	4.362	0.063	80.17542274	13.74435818	
400	4.362	0.063	91.63805456	13.74570818	
				13.73120533	
15" Sch 40 Pipe					
Flow Rate (GPM)	K-Value	Offset	Calc Freq (pulse/sec)	Calc K-Factor	Average K-Factor
200	116.096	0.382	1.340712238	0.402213671	
400	116.096	0.382	3.063424476	0.459513671	
800	116.096	0.382	6.508848953	0.488163671	
1000	116.096	0.382	8.231561191	0.493893671	
1500	116.096	0.382	12.53834179	0.501533671	
2000	116.096	0.382	16.84512238	0.505353671	0.503520071
2500	116.096	0.382	21.15190298	0.507645671	
3000	116.096	0.382	25.45868357	0.509173671	
3500	116.096	0.382	29.76546417	0.5102651	
4000	116.096	0.382	34.07224476	0.511083671	
4500	116.096	0.382	38.37902536	0.511720338	
				0.499834681	

Once the Flow Meter Settings have been set, press the Next button to be taking to the Chemical Feed Selection, as shown in figure 7. If the pump will be pumping at a fixed speed when flow is detected, press the Fixed Speed button on the Chemical Feed Selection, as shown in figure 8, then press the menu button and navigate back to the home screen. With the pump switch in the Auto (A) position, the pumps will only run when flow is detected.

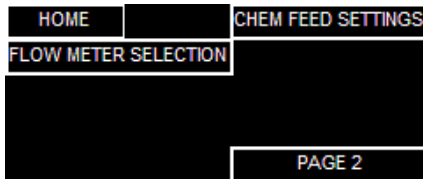


Figure 7. Menu Screen

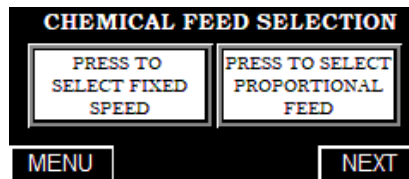


Figure 8. Chemical Feed Screen

If the pump will be pumping proportional to the flow rate, press the Proportional button on the Chemical Feed Selection, as shown in figure 14. Press the Next button to be navigated to the Pump Settings screen. Select the number of pumps that will be used, as shown in figure 15. Once the pump quantity has been selected, press the Next button to go to the Pump 1 Settings screen. On this screen you will select the brand pump being used, as shown in figure 16. If LMI is selected then press the Model Selection button to select the model being used, as shown in figure 17. Select the model pump being used and press the Exit button. Depending on the model selected, the Pump's Max Output might auto fill. If it didn't, this information as well as the desired PPM will need to be entered. If the Walchem is selected, the Pump Max Output and Desired PPM will need to be entered. If Other is selected, the pump's maximum speed (stroked per minute) will need to be entered, as shown in figure 18.

Pump Identifications

PD741-A28HI (PTFE)	WaterSOLV™ BC	7.2 GPD (adjusted for 150 psi)
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PD741-823SI (PTFE)	Curative	13.92 GPD (adjusted for 150 psi)
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LMI AD, B and C are other versions of LMI pumps, pre-loaded into the PLC.

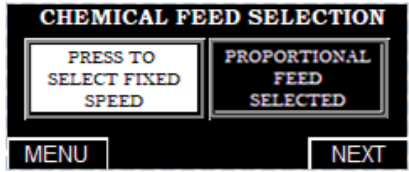


Figure 14. Chemical Feed Screen

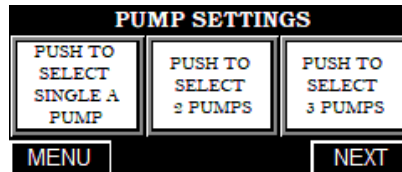


Figure 15. Pump Settings Screen

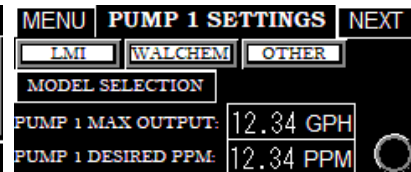


Figure 16. Pump 1 Settings Screen

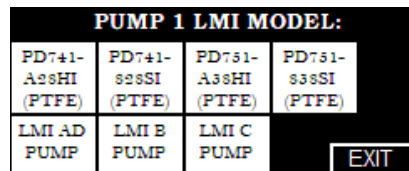


Figure 17. LMI Pump Settings Screen

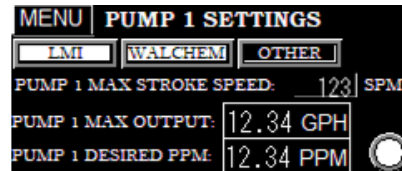


Figure 18. Other Pump Selection Screen

LMI BC Pump Mdl. A28HI
LMI Curative Pump Mdl 823SI

If a second pump is being used, a NEXT button will be displayed in the top right corner. Press the next button to go to the next screen and repeat the above steps for the second and third pump, if applicable.

Pump Values

The label on the pumps are its max output at 50 psi. The values used in the FS-1 controller are at 150psi since that is generally where the systems are operating that utilize the FS-1 Controller. The BC pump is usually going against the pressure of the injection check valve alone, not the systems discharge pressure, but BC chemistry is a bit compressible so it is left at the 150 psi value.

Application	Logic	Output, gph	Pressure, psi	Products	SKU
Sprinklered	Logic / Pulse	.30	250	BC	PD741-A28HI
		.52	250	Curative/Fertilizer	PD741-823SI
	Manual Setting	.30	250	BC	PD041-A28HI
		.52	250	Curative/Fertilizer	PD041-823SI
Agriculture, Irrigation, Nursery	Logic / Pulse	.7	150	BC	PD751-A38HI
		1.0	150	Curative/Fertilizer	PD751-833SI
	Manual Setting	.7	150	BC	PD051-A38HI
		1.0	150	Curative/Fertilizer	PD051-833SI

For Use with Flow Switch:

On/Off pump activation
 -See Wiring Diagram #1.

- Plug each of the metering pumps into the receptacles provided by the controller.
- Plug the power cord of the controller into a 120VAC GFIC outlet.
- Turn the Main Power switch to the On position.

From the home screen press the Menu Button, as shown in figure 4. Next press the Flow Meter Selection button, as shown in figure 5. Please note that some options shown in figure 5 are only for available depending on what settings have been made. The Flow Switch will need to be selected by pressing the Flow Switch Button, as shown in figure 6. Next press the Menu button again and select the Chem Feed Settings, as shown in figure 7. On the Chemical Feed Selection, press the Fixed Speed button, as shown in figure 8, then press the menu button and navigate back to the home screen. If the Pump switch is turned to the ON position, the pumps will turn on and run manually. With the pump switch in the Auto (A) position, the pumps will only run when flow is detected.

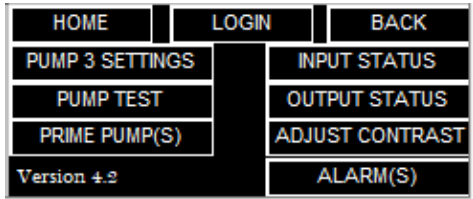


Figure 3. Splash Screen

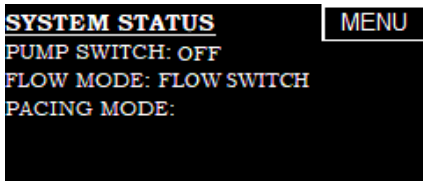


Figure 4. Home Screen

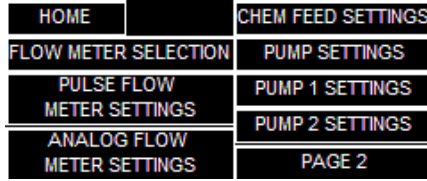


Figure 5. Menu Screen

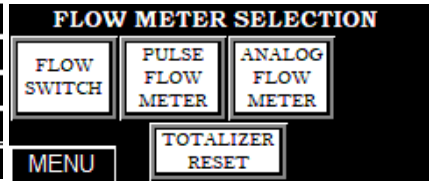


Figure 6. Flow Meter Selection Screen

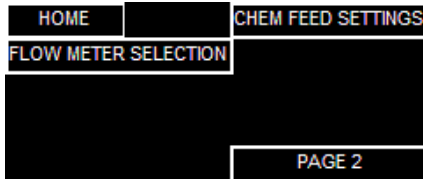


Figure 7. Menu Screen



Figure 8. Chemical Feed Screen

For Use with an Analog Flow Meter:

For an analog loop powered flow meter

-see Wiring Diagram #3.

-Plug each of the metering pumps into the receptacles provided by the controller.

-Plug the power cord of the controller into a 120VAC GFIC outlet.

-Turn the Main Power switch to the On position.

From the home screen press the Menu Button, as shown in figure 4. Next press the Flow Meter Selection button, as shown in figure 5. Please note that some options shown in figure 5 are only for available depending on what settings have been made. On the Flow Meter Selection screen, the Analog Flow Meter will need to be selected. Do this by simply pressing it, then press the Next button to be taken to the Flow Meter Settings screen. If using a loop powered flow meter, that is a flow meter that is powered by the FS-1, select the ANALOG POWERED BY FS1. If the analog flow meter is powered by the pump station, or an external unit, select the EXTERNAL POWERED ANALOG. Enter the maximum value for the flow meter for the given size pipe it is installed in. Often this can be located in the manual for the flow meter. To enter the maximum flow rate, click on the box with the flow rate and a numerical keypad will appear, as shown in figure 12. Once the value is entered, press the enter ENT button. CAN is cancel and will bring you back to the previous screen and clear any value that was entered and CLR is clear and will clear the value.

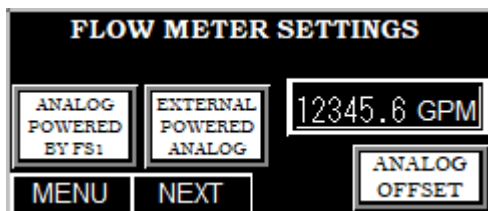


Figure 19. Flow Meter Selection Screen

Once the maximum flow rate has been set, press the Analog Offset button, but make sure there is no flow in the pipe. This is used in the event that the analog signal from the flow meter at 0 GPM is not truly at 4.0mA. Once the Analog Offset button is pressed, press the Next button to be taking to the Chemical Feed Selection, as shown in figure 7. If the pump will be pumping at a fixed speed when flow is detected, press the Fixed Speed button on the Chemical Feed Selection, as shown in figure 8, then press the menu button and navigate back to the home screen. If the Pump switch is turned to the ON position, the pumps will turn on and run manually. With the pump switch in the Auto position, the pumps will only run when flow is detected, as shown in figure 9.

If the pump will be pumping proportional to the flow rate, press the Proportional button on the Chemical Feed Selection, as shown in figure 13. Press the Next button to be navigated to the Pump Settings screen. Select the number of pumps that will be used, as shown in figure 15. Once the pump quantity has been selected, press the Next button to go to the Pump 1 Settings screen. On this screen you will select the brand pump being used, as shown in figure 16. If LMI is selected then press the Model Selection button to select the model being used, as shown in figure 17. Select the model pump being used and press the Exit button. Depending on the model selected, the Pump's Max Output might auto fill. If it didn't, this information as well as the desired PPM will need to be entered. If the Walchem is selected, the Pump Max Output and Desired PPM will need to be entered. If Other is selected, the pump's maximum speed (stroked per minute) will need to be entered, as shown in figure 18.

If a second pump is being used, a NEXT button will be displayed in the top right corner. Press the next button to go to the next screen and repeat the above steps for the second and third pump, if applicable.

The metering pump(s) should have been set to external mode from the factory, if not they will need to be set to external mode.

Pump Testing:

Once the FS-1 has been fully programmed and proportional feed is being used, the pumps can be tested to verify that they are properly wired and receiving pulses. The pump switch must be in the AUTO position. From any screen press the Menu button, then press the page 2 button to be directed to the second page of the menu, as shown in figure 20. Press the Pump Test button to be taken the that respective screen, as shown in figure 21. Press the button for the pump that is to be tested. The test will send pulses to the selected pump for 1 minute. The light below the respective pumps button will also flash when the pulse is sent.

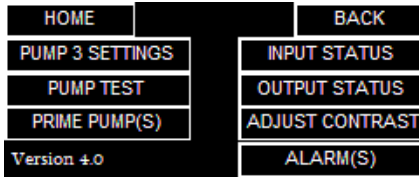


Figure 20. Menu Second Page

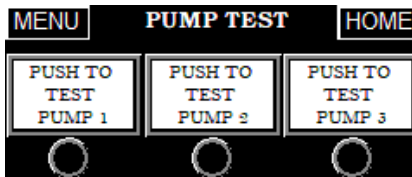


Figure 21. Pump Test Screen

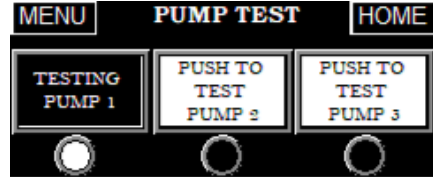


Figure 22. Pump Test Screen

Priming The Pump(s):

Once the pumps have been properly and completely installed and FS-1 has been fully programmed and proportional feed is being used, the pumps can be tested to verify that they are properly wired and receiving pulses. The pump switch must be in the AUTO position. From any screen press the Menu button, then press the page 2 button to be directed to the second page of the menu, as shown in figure 20. Press the Prime Pump(s) button to be taken the that respective screen, as shown in figure 20. Press the button for the pump that is to be primed. This will send pulses to the selected pump for 5 minutes at a pulse rate of 100 pulses per minute (100 strokes per minute). The light below the respective pumps button will also flash when the pulse is sent.

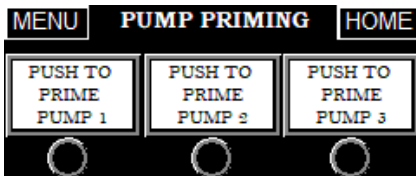


Figure 23. Pump Priming Screen

Diagnostics & Alarms:

The FS-1 has two screens for monitoring the inputs and outputs. From the second menu the Input or Output Status screens can be selected. To monitor the status of the inputs, press the Input Status button. You will now be taken to the status screen, as shown in figure 24. The light next to the Input's name will be on, if the input is active. If a flow meter is being used, that light will blink with the pulses that are being received. If an analog flow meter is being used, the 4-20mA value will be displayed in the Analog Input.

To monitor the status of the outputs, from the Input Status screen, press the Outputs button to be taken to the Output Status screen. From the Menu's second page, simply press the Output Status button. The light next to the Output's name will be on, if the output is active. The light(s) for the pump(s) will blink when a pulse is sent to that pump.

Additionally, the respective status lights can be viewed on each pump setting screen, as well as the flow meter screen. Be advised that the lights for a pulse input or output can flash very fast and can be overlooked.

The FS-1 also can monitor the status of the analog signal, if an analog flow meter is being used. It is actively monitoring to detect if the flow meter has been disconnected or if there is an over current event. When either of these situations is detected, a warning symbol will blink on the Home screen. Press the menu button, navigate to the second screen of the menu and select the Alarm(s) button. The alarm screen will display the relevant alarm. If the analog input drops below 3mA, it will trigger the Flow Meter Disconnected alarm. This can be caused by a wire coming loose, disconnected, or something happening to the meter. If the unit detects the signal to be greater than 21mA, it will trigger the Over Current alarm. This can be error output from the flow meter set by the flow meter manufacturer or there could be an issue with the meter. The manual for the flow meter should help troubleshoot the over current situation.

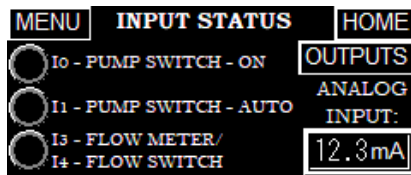


Figure 24. Input Status Screen

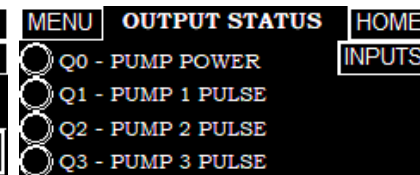


Figure 25. Output Status Screen

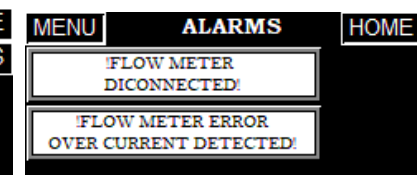
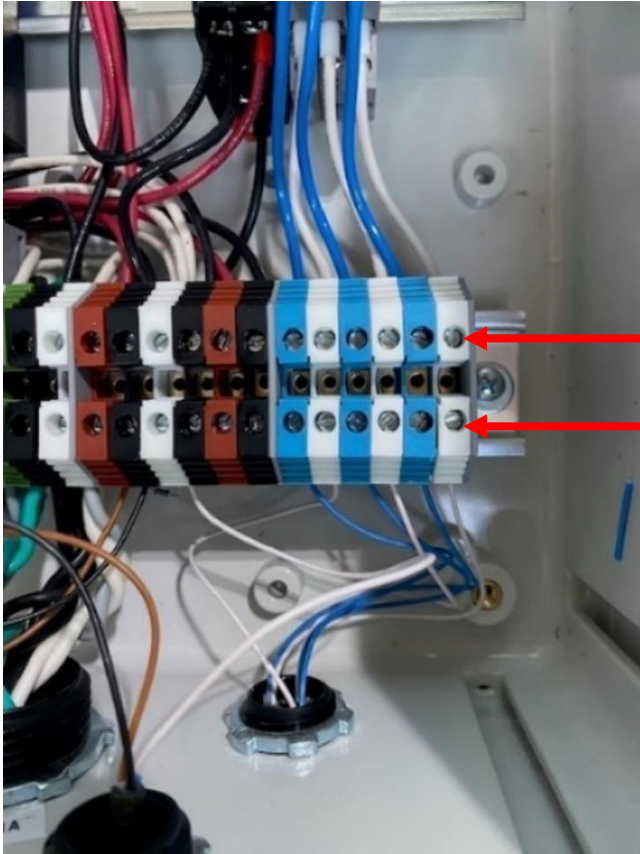


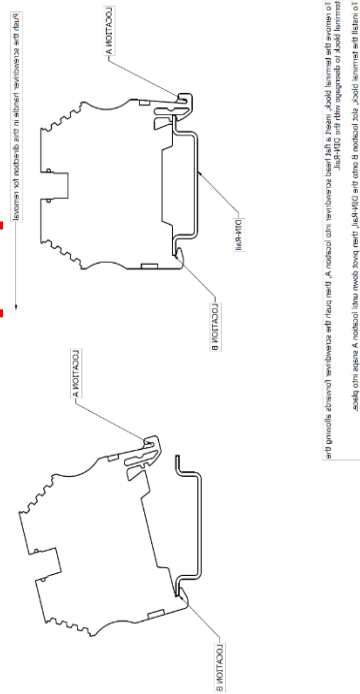
Figure 26. Output Status Screen

Manual Pump Activation:

With FS-1 Power on and pump Switch set to on/manual, Bridge the screw with a solid wire on a blue or white terminal block to activate the pump each time you touch the two terminals together.

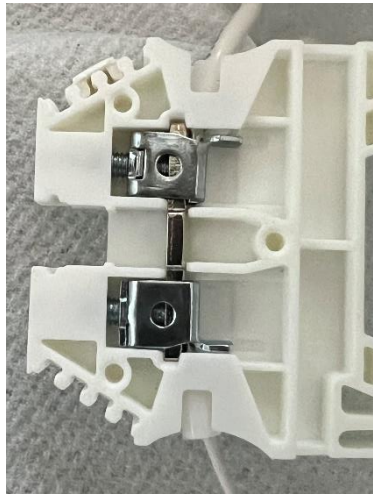


Removal of terminal Block (screwdriver, pry and lift)



Wiring from Pump to FS-1
 Blue = Pin 3
 White = Pin 2

Internal view of Terminal block >>>>>>>>>>



Flow Meter Signal



Green light – each flash is a signal from the flow meter

To Pumps
11-12 to pump 1
13-14 to pump 2
15-16 to pump 3

K-Factor Calibration:

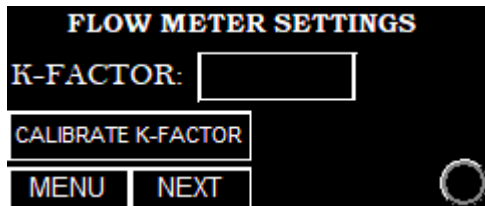
K-Factor Calibration for Pulse Flow Meters:

When a pulse flow meter has been selected and the K-Factor (pulses per gallon) is not know, there are two ways to calibrate this. It can be calibrated by flow rate or by volume.

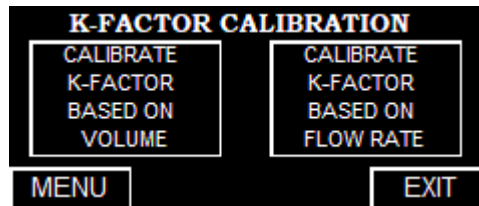
K-Factor Calibration by Flow Rate:

In order to do this calibration, the pump station **must be** running and displaying a flow rate.

From the Flow Meter Settings screen, press the Calibrate K-Factor button. This will bring you to the K-Factor Calibration Screen. On this screen press the Calibrate K-Factor Based on Flow Rate to be taken to that screen to perform the calibration.

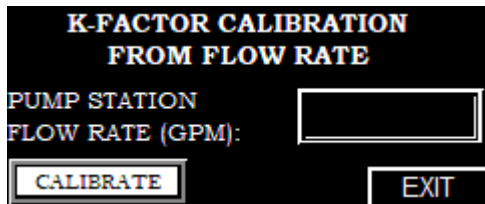


Flow Meter Settings Screen

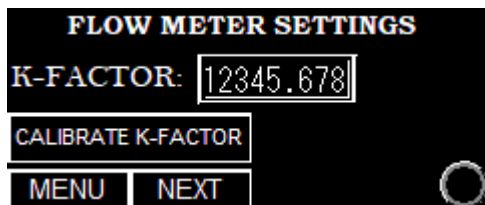
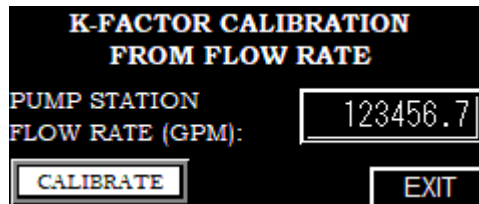


K-Factor Calibration Screen

With the pump station running, enter the flow rate in the empty box. Once the flow rate has been entered, press the Calibrate button. Once the button has been pressed, the system has calibrated the K-Factor, and the Exit button can be pressed. This will take you back to the Flow Meter Settings screen. At this point the calibrated K-Factor should be displayed in the K-Factor box.



Flow Rate K-Factor Calibration Screen

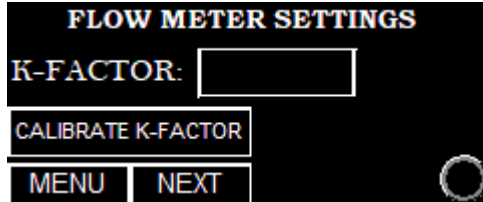


Calibrated K-Factor

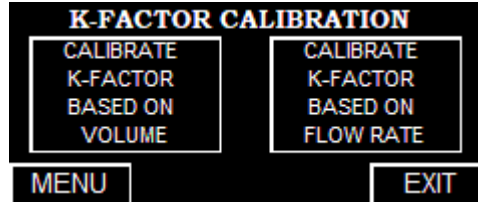
K-Factor Calibration by Volume:

In order to do this calibration, the pump station **must NOT be** running and displaying a flow rate.

From the Flow Meter Settings screen, enter 1 for the K-Factor. At this point write down what the pump stations totalizer is reading in gallons. That night water as usual. The following day go to the Flow Meter Settings screen and press the Calibrate K-Factor button. This will bring you to the K-Factor Calibration Screen. On this screen press the Calibrate K-Factor Based on Volume to be taken to that screen to perform the calibration.

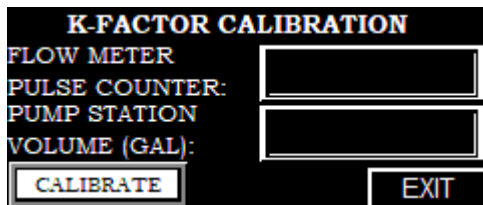


Flow Meter Settings Screen

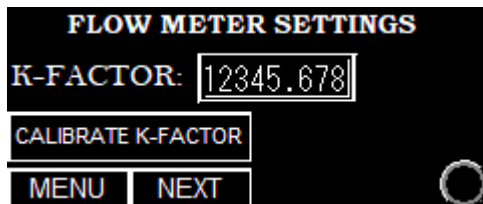
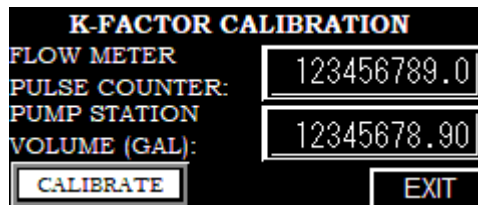


K-Factor Calibration Screen

The FS1 will have counted the pulses and will display this value in the Flow Meter Pulse Counter box. Take the Pump Station's new totalizer volume and subtract the previous days volume before watering to get the amount watered.. Enter this amount in the Pump Station Volume box. Once the volume has been entered, press the Calibrate button. Once the button has been pressed, the system has calibrated the K-Factor, and the Exit button can be pressed. This will take you back to the Flow Meter Settings screen. At this point the calibrated K-Factor should be displayed in the K-Factor box.



Flow Rate K-Factor Calibration Screen



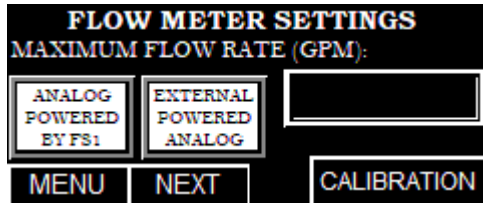
Calibrated K-Factor

When using an analog flow meter, the FS1 needs to know what the maximum flow rate is in order to scale the analog input (4-20mA) and display the correct flow rate. If the flow meters 20mA value is not known, it can be calibrated as follows.

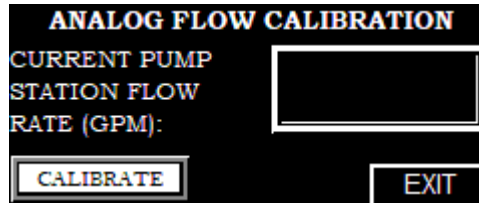
Calibrating the Analog Max Flow Rate

In order to do this calibration, the pump station must be running and displaying a flow rate.

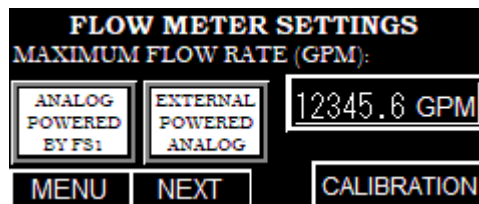
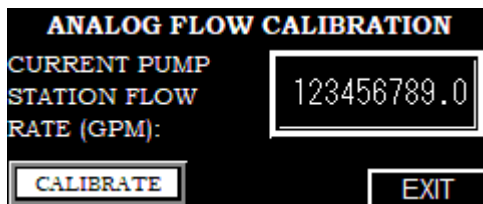
From the Flow Meter Settings screen, press the Calibration button. This will bring you to the Analog Flow Calibration Screen.



Flow Meter Settings Screen



Analog Flow Calibration Screen

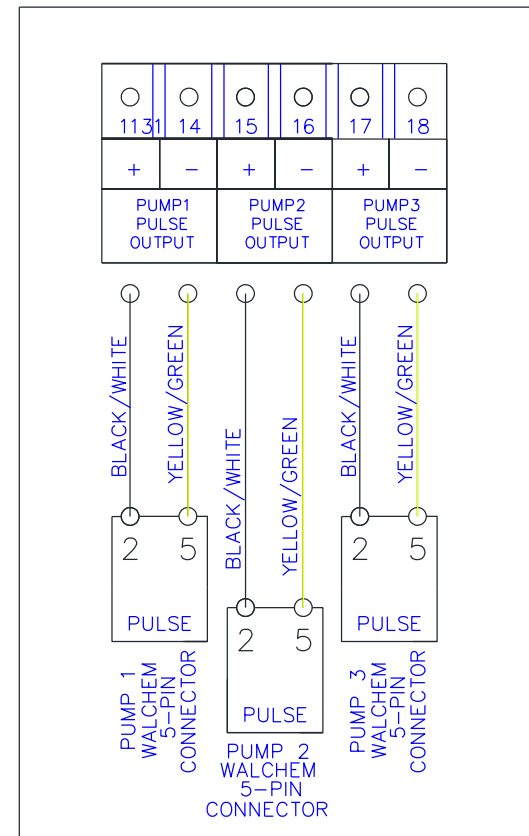
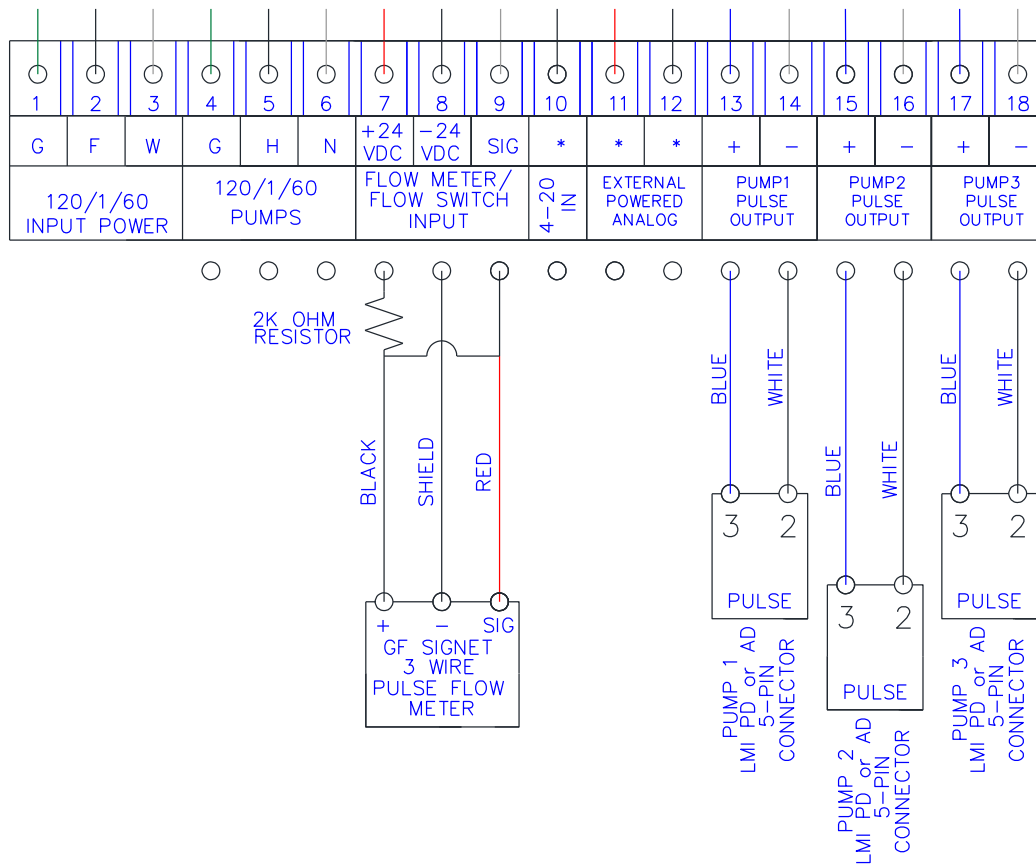


With the pump station running, enter the flow rate in the empty box. Once the flow rate has been entered, press the Calibrate button. Once the button has been pressed, the system has calibrated the 20mA flow rate, and the Exit button can be pressed. This will take you back to the Flow Meter Settings screen. At this point the calibrated maximum flow rate should be displayed in its respective box.

Wiring Diagrams

Pulse Flowmeter (GF Signet 3-2540-1)

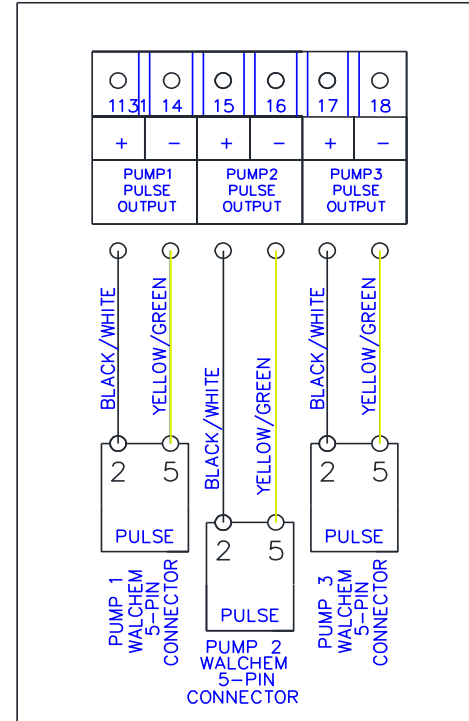
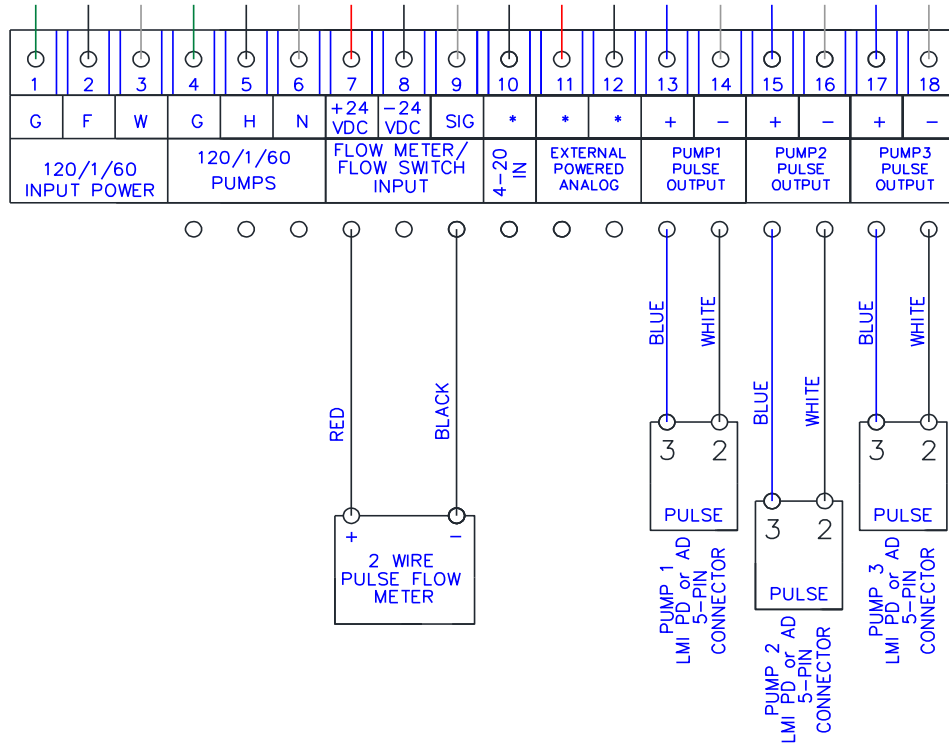
Factory Unit



WHEN USING WALCHEM PUMP

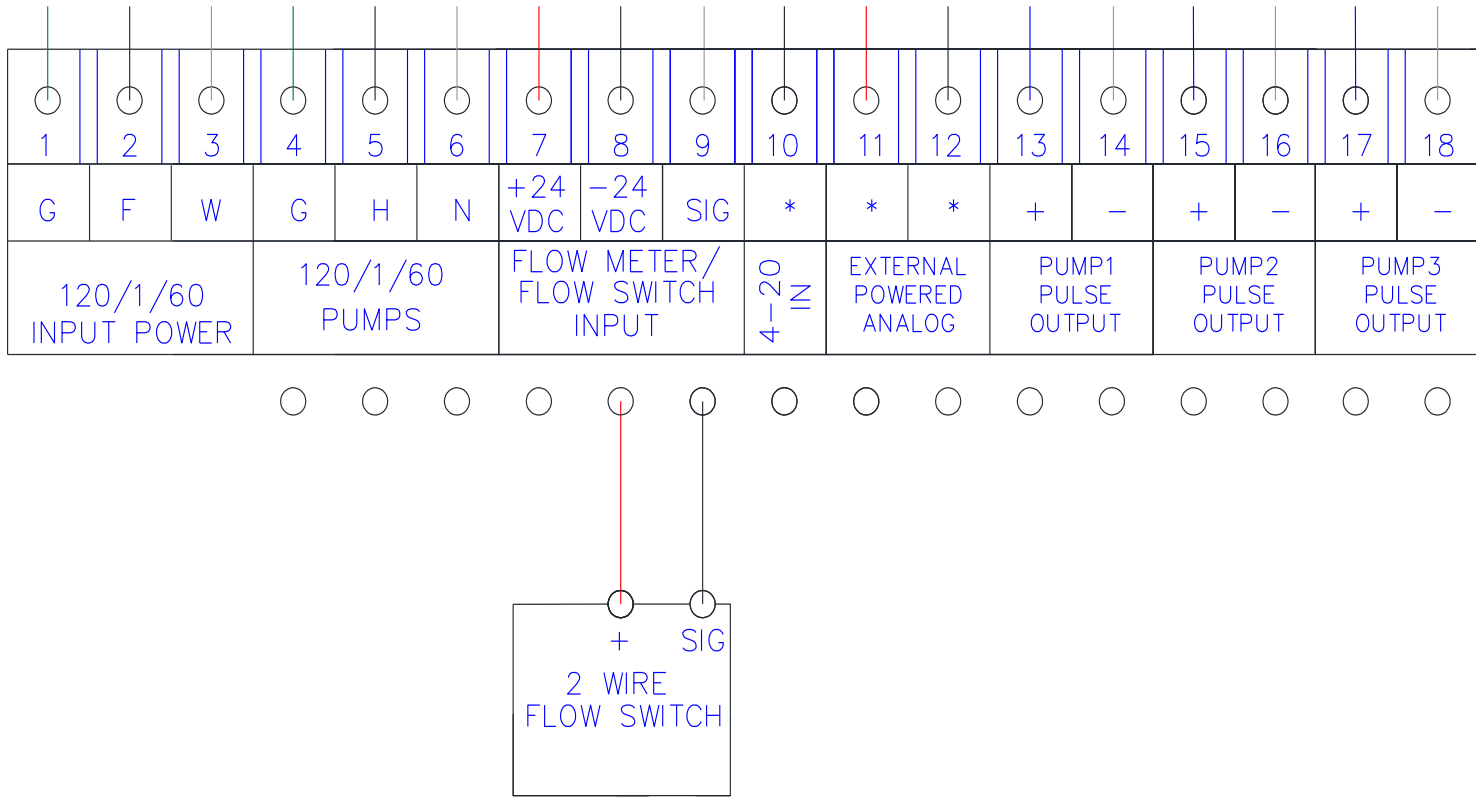
9/2022 - Pump 1, 2 and 3 are pre-wired. The flow sensor is also pre-wired.

Pulse Flowmeter (2-wire)



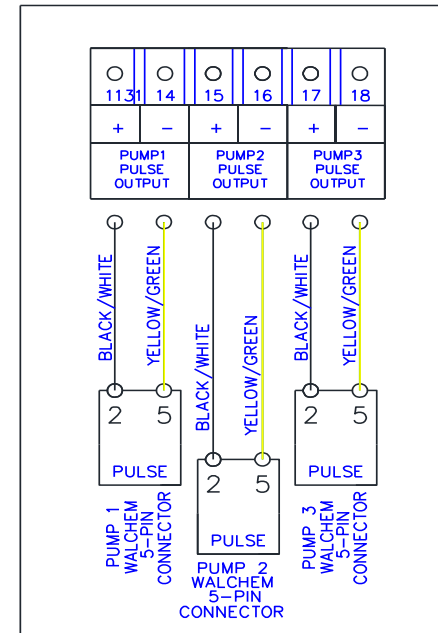
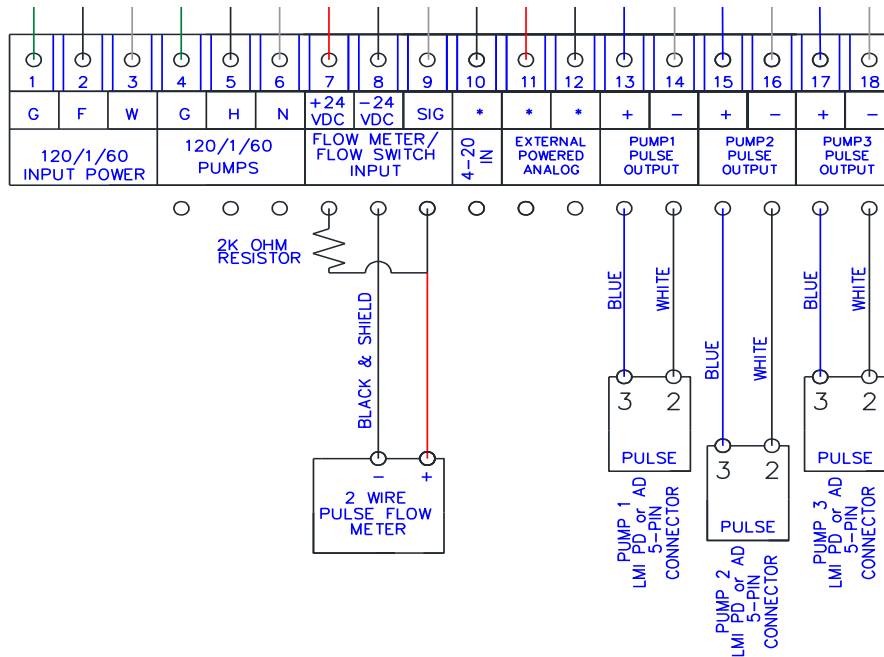
WHEN USING WALCHEM PUMP

Flow Switch



9/2022 - Pump 1, 2 and 3 are pre-wired.

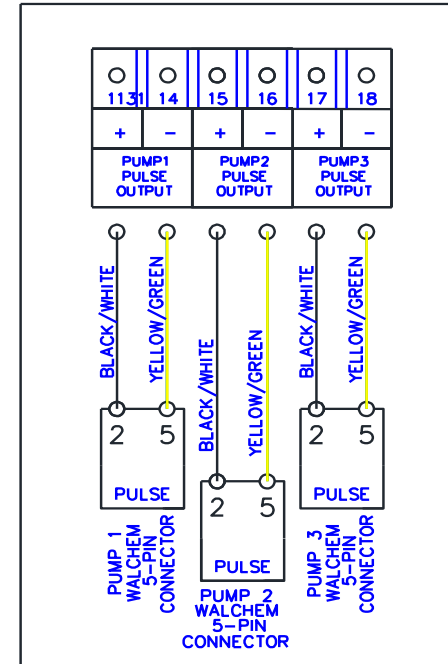
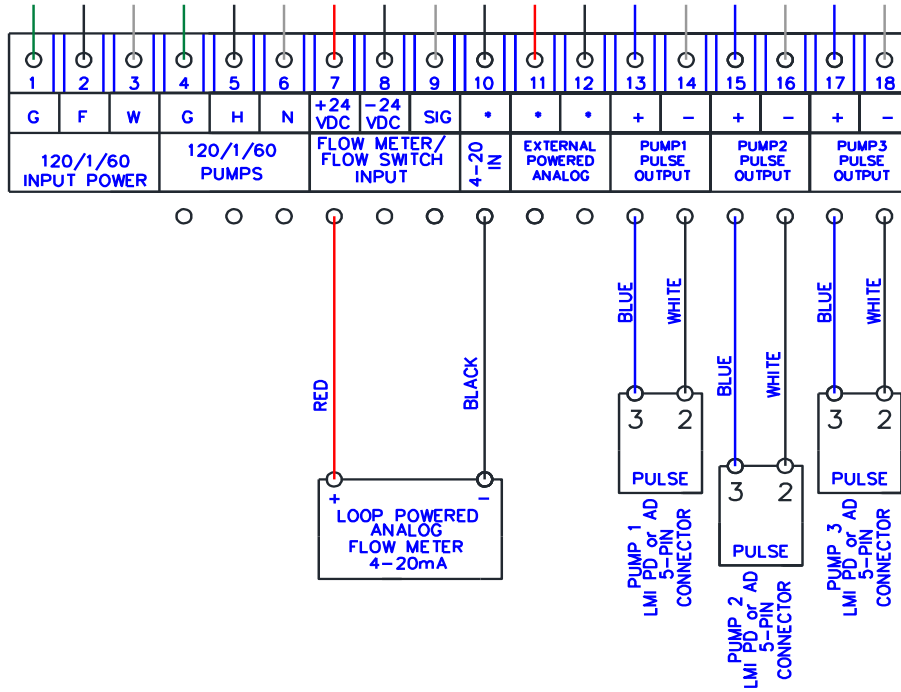
Pulse Flowmeter (Data Industrial without Isolator)



WHEN USING WALCHEM PUMP

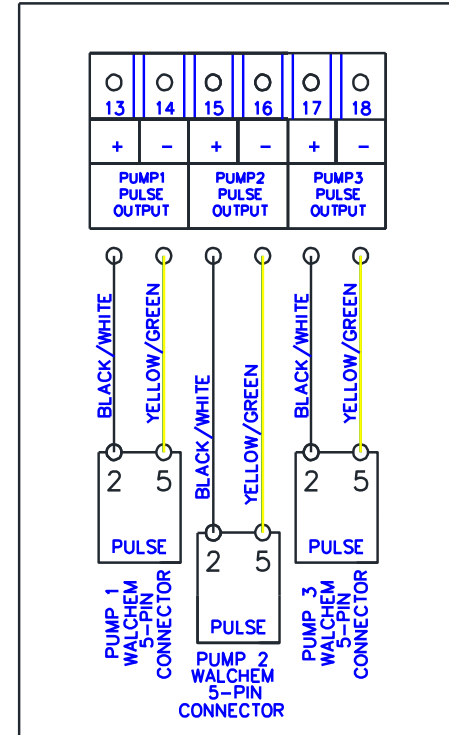
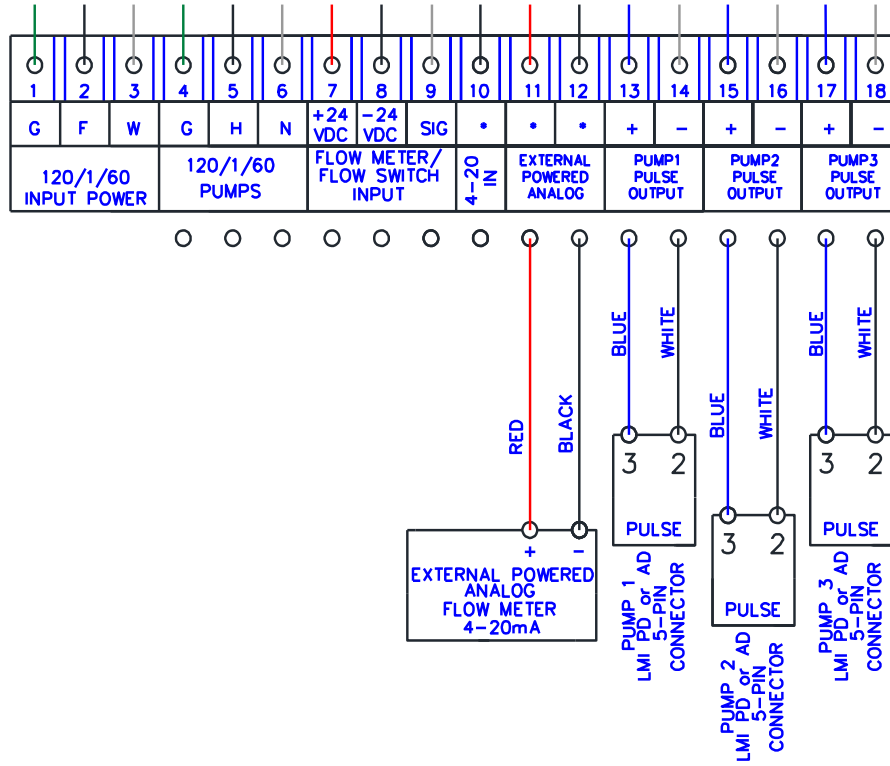
9/2022 - Pump 1, 2 and 3 are pre-wired.

Loop Powered Analog Flowmeter



WHEN USING WALCHEM PUMP

External Powered Analog Flowmeter



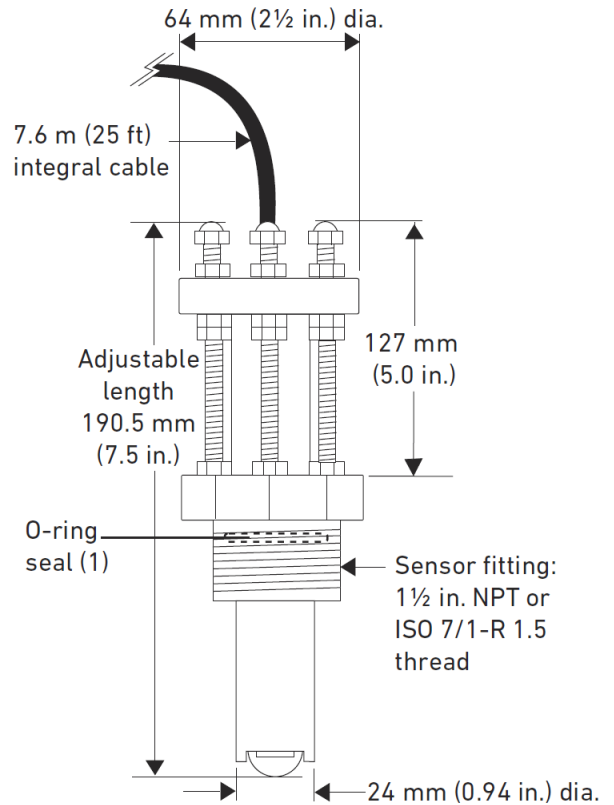
WHEN USING WALCHEM PUMP

The Signet 3-2540 Pulse Flow Meter

Offers field replaceable electronics and transient voltage suppression (TVS) to provide greater immunity to large voltage disturbances (i.e. lightning) sometimes encountered in field wiring. Sensors can be installed in DN40 to DN600 (1½ to 24 inch) pipes using the 1½ inch or ISO 7/1-R 1.5 threaded process connection.

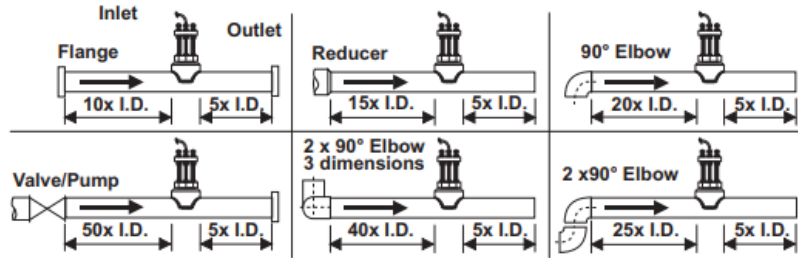
Dimensions

2540 High Performance Flow Sensor for 1½ to 24 in. pipes



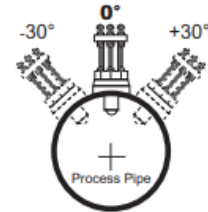
1. Location of Fitting

Recommended sensor upstream/downstream mounting requirements.



2. Sensor Mounting Position

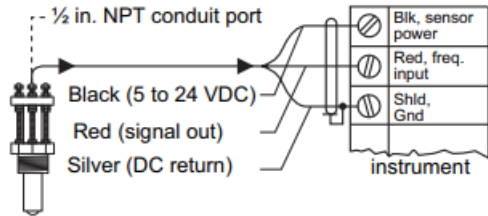
Vertical mounting is recommended for best overall performance. Mount at a maximum of 30° when air bubbles are present. **DO NOT** mount on the bottom of the pipe when sediments are present.



Note: Three options

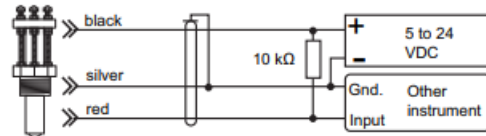
3. Sensor Wiring

Signet Instruments



- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.)
- Maintain cable shield through splice.

Other Brands



- pull-up resistor required (10 kΩ recommended).
- Use 2-conductor shielded cable for cable extensions up to 300m (1000 ft.)
- Maintain cable shield through splice.


If using Extended Wiring Harness with end connector - pre-wired as:

- Black to Terminal 8
- Brown to Terminal 7
- White to Terminal 9

Flow Meter Wire to Connector to FS-1 Cable:

- Black to No. 1
- Red to No. 2
- Shield to No. 4

INSTALLATION CHECKLIST

No.	Action	Status
1.	What flow meter is used, is it the existing or the one supplied?	
2.	What signal is the flow meter sending to the FS-1, box, type and signal – pulse or analog?	
3.	WaterSOLV™ BC container is shaded, out of exposure to sunlight	
4.	Qualifying provision for eye wash – 3 second access	
5.	Qualifying provisions for water in case of spill or contact, including volume and gpm	
6.	Acid Neutralizer (baking soda, 1 lb/gl. of Curative)	
7.	Provision to keep Curative and Concentrate from leaking into each other	
8.	Pump discharge lines – one continuous line, no couples or connectors	
9.	Safety Signage	
10.	All tubes from pumps, back into container, are tight fitting to alleviate fumes	
	2 lines from Curative	
	1 line from TOP of BC Pump (degassing) – Page 16	
11.	All fittings are not leaking	
12.	Suction lines from tanks to bottom of pumps, are upright, not sideways in the bottom of the container	
13.	Manually priming the pump, you observe the suction line drawing chemical	
	Hold down the  on each the pump for 3 seconds. Watch the pump draw chemistry up from the container, into the pump head, and out to the discharge line.	
	Observe the discharge lines pulsing	
14.	Each pump face displays a green circle and a Top Hat.	
	NOT a black circle, that means the pump is off and not on standby for a signal	
	Sometimes it might display x.xx – gpm. If so, revisit pump setup. Easy adjustment.	
15.	No pump discharge lines are overhead	
16.	Pump discharge lines are void of traffic damage (covered with electrical vinyl conduit	
17.	WaterSOLV™ Curative is injected into the discharge side of the system	
18.	WaterSOLV™ Curative is injected through an EXTENDED quill, centered in the pipe	
19.	Between waterings, you have observed the chemical levels in the containers drop.	
	Remember – each ppm is gallons per million gallons of water.	
	If you put out 1 million gallons of water, and are set at 2 ppm, the container should be 2 gallons less.	

Both parties signoff hereto that the above items are completed and in good operating order. It is mutually understood that return visits are fee based.

Installation Site:

Contact:

Pump Station ID:

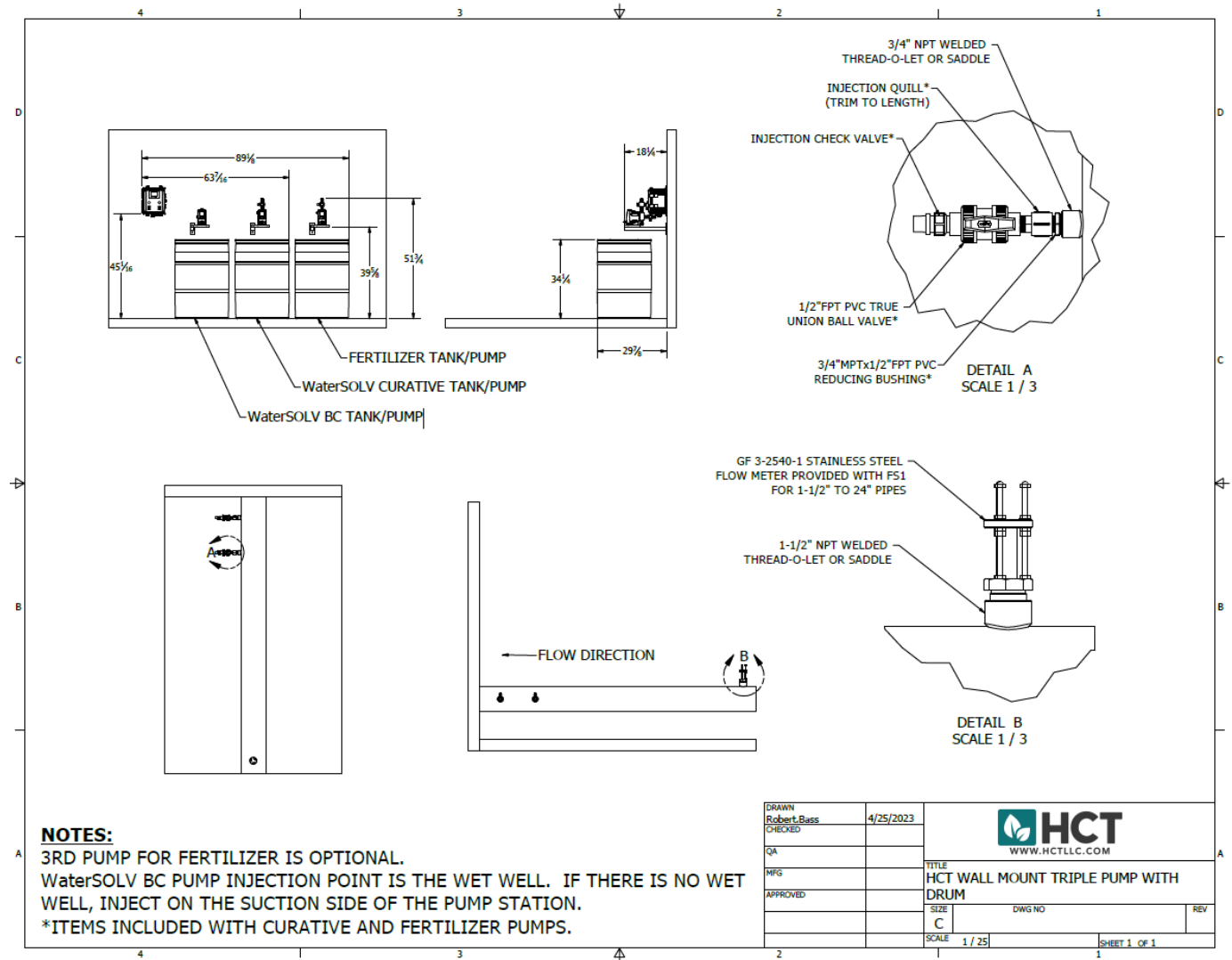
Installation Company:

Technician:

Date:


Installation Company: Please send to HCT – info@HCTLLC.com | (480) 650-6955

Floor Diagrams



NOTES:

3RD PUMP FOR FERTILIZER IS OPTIONAL.
 WaterSOLV BC PUMP INJECTION POINT IS THE WET WELL. IF THERE IS NO WET WELL, INJECT ON THE SUCTION SIDE OF THE PUMP STATION.
 *ITEMS INCLUDED WITH CURATIVE AND FERTILIZER PUMPS.

DRAWN Robert Bass	4/25/2023	 WWW.HCTLLC.COM
CHECKED		
QA		TITLE HCT WALL MOUNT TRIPLE PUMP WITH DRUM
MFG		SIZE C
APPROVED		DWG NO
		REV
		SCALE 1 / 25
		SHEET 1 OF 1

PRINT THE FOLLOWING PAGES
AND MAINTAIN A COPY
INSIDE THE FS-1 SWITCH BOX

Water Treatment Log

Site Name:



Product Targets	PPM = Gallons of product per million gallons of water	Curative (acid), ppm
		BC (Biocide & Oxygen), ppm

(Water Gallons Used / 1,000,000 x gl, product used = ppm)

	Date	Water Meter Reading	Water Gallons Used	Gl. of Curative Used	Gl. of BC used	ppm Curative	ppm BC
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
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23							
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28							
29							
30							
31							

Contact us: www.hctllc.com - (888) 788-5807 - info@hctllc.com

Download the excel form from our website for auto calculations and record keeping



Pump is on and awaiting signals from the flow meter and FS-1 Switch Box.

IMAGE – ON STANDBY, AWAITING PULSES

Black Circle – Pump is turned off.
Should always be in the green circle mode with top hat.
Top Hat = Menu > Top Hat > Enter > ✓ > Enter

Chemical Feed Rates:

If using HCT's FS-1 Switch Box, feed rates are made through the FS-1 Control Panel, and communicated to the pumps.

If using the pumps alone, rates are determined as a percentage of the pumps output capacity and to your systems flow rate. Contact HCT

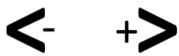


START STOP

Also - Hold 3 seconds to initiate 60 second run sequence (for aid in priming)



MENU



DIRECTION, MOVE – INCREASE/DECREASE



SELECT / ENTER

Enter



Degassing feature activated (BC Pump only)

Common Settings

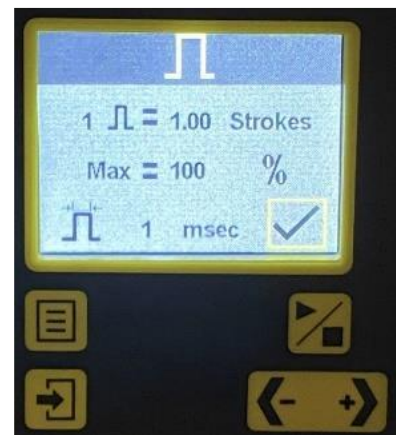


Note: Pump Menu heading.

Arrow over to the Top Hat.

Press Enter.

Assure next screen is at these settings.



MAINTAIN SETTINGS: Best practices, leave the FS-1 power switch on, and the FS-1 pump switch to

Container Volumes per inch

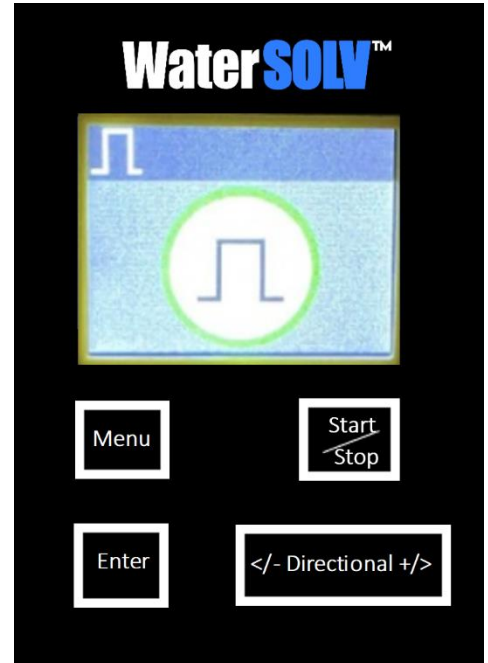
Place near log sheet.

You should have a black marker to mark container level and date

A Measuring tape

A pencil to write readings on the Water Treatment Log

Container	Size	Position		Gallons per inch	per quarter inch	per 1/8th inch
Carboy		30 gl.	Upright	1.19	0.30	0.15
Drum		55 gl.	Upright	1.6	0.40	0.20
			Sideways	2.3	0.58	0.29
Tote		275 gl	Upright	6.1	1.53	0.76
		330 gl	Upright	7.5	1.88	0.94



Maintenance

Pumps and Tubing:

1. Inspect weekly.
2. Keep all fittings tight.
3. Assure there is no leakage.
 - a. If there is leakage, fix immediately.
 - b. Rinse contacted areas thoroughly with baking soda & water (soda water) immediately and once repaired.
4. Tighten pump head screws quarterly (requires a hex head 4 mm metric Allen Wrench)

FAQ's

Overcurrent: I have a question, just had a company install the WaterSOLV FS-1 and it's flashing Overcurrent. What should I do?

This means that they are using the analog input and the device is sending more than 21mA to the FS-1. There might be an error on the flow meter, or they might have wired something wrong.

K-Factor: Adjust to meet the readings of the pump station.

Adjusting Treatment Application Rates

Flow is not required, Power is required. Doc. 4.26.23

Powered FS-1

Both Switches On

Touch Screen if black

➤ Login



➤ Maint.
(do not hit enter)

Arrow down the cursor to the numbers

Enter Password 5549

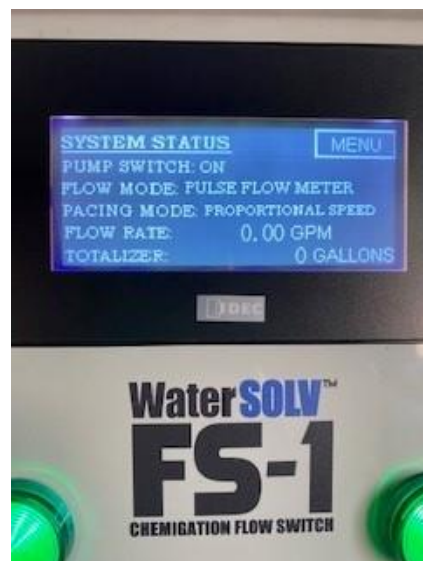
➤ 5 enter, 5 enter, 4 enter, 9 enter



Arrow down & over to

➤ OK
➤ Enter

➤ Menu



➤ Pump Settings



➤ No. of Pumps 1, 2 or 3

➤ Next



Set Rates

Note: ppm = gallons per million gallons of water

➤ Next Next Next

➤ HOME

2 minute timer will log you out to the main login.

To return to main login screen immediately, turn unit Off, then on.



Priming Pump

WaterSOLV™ Curative

- 1) Be sure the three-way valve knobs are closed
- 2) Assure the black caps on the pump head discharge, suction line and three-way valve are tight
- 3) Assure the pump head is not leaking
- 4) Assure lines are not broken or cracked
- 5) Be sure the Foot Valve in the drum is not laying on its side. It has to be somewhat upright
 - i) Not applicable to tote connections
- 6) Be sure the black knob on the side of the pump head is closed, turned in clockwise
- 7) Hold this button down to start 60 second annual pumping.
- 8) Observe changes
 - 1) Chemistry coming up the suction tube
 - 2) Pump sounds changes definitively
 - 3) Discharge line begins to pulsate



If it used to pump, and now it isn't;

- 9) Assure the black knob on the side of the pump has a hose running back to the container
 - i) Open the knob, counter clockwise a couple turns, which relieves air and eventually chemical should come out.
 - ii) When chemical comes out, close the black knob.
 - iii) If still having issues, we need to get water into the pump head.
 - (1) See Tables of Contents: Pump, Fittings & Diagrams – Curative Pump Item 7, or Pump, Fittings & Diagrams – BC Pump Item No. 9
 - 10) Mark and date the container and water use to check later to make sure chemical is dispensing
- If still having issues
- 11) Remove the three-way valve and repeat steps 1 through 8
 - 12) Still problems:
 - i) Remove the Cap and Ferrell from the discharge line of the pump.
 - ii) Assure all knobs are closed.
 - iii) Press and hold the Play/Stop Button. Watch for air bubbles to clear and chemical to begin coming out.
 - iv) Press the Play/Stop button to stop the pumping. Relace the Ferrell and cap. Press the Play/Stop. Observe pulsation. Assure pump is set with green circle and Top Hat.

WaterSOLV™ BC

- 1) Be sure the three-way valve knobs are closed
- 2) Assure the black caps on the pump head gassing discharge, suction line and three-way valve (2) are tight
- 3) Assure the pump head is not leaking
- 4) Assure lines are not broken or cracked
- 5) Be sure the Foot Valve in the drum is not laying on its side. It has to be somewhat upright
- 6) Hold this button down to start 60 second annual pumping.
- 7) Observe changes
 - i) Chemistry coming up the suction tube
 - ii) Pump sounds changes definitively
 - iii) Discharge line begins to pulsate
 - iv) If still having issues, we need to get water into the pump head.
 - (1) See Tables of Comments: Pump, Fittings & Diagrams – Curative Pump Item 7, or Pump, Fittings & Diagrams – BC Pump Item No. 9



- 8) Mark and date the container and water use to check later to make sure chemical is dispensing
- If it used to pump, and now it isn't;
- 9) Remove the three-way valve and repeat steps 1 through 7

Parts

Curative &
Fertilizer

