WaterSOLV™ FS-1

CHEMTIGATION FLOW SWITCH

Installation and Operation Manual

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

Manufactured by:

HCT
SOLUTIONS TO WATER

Scottsdale, AZ
www.HCTLLC.com

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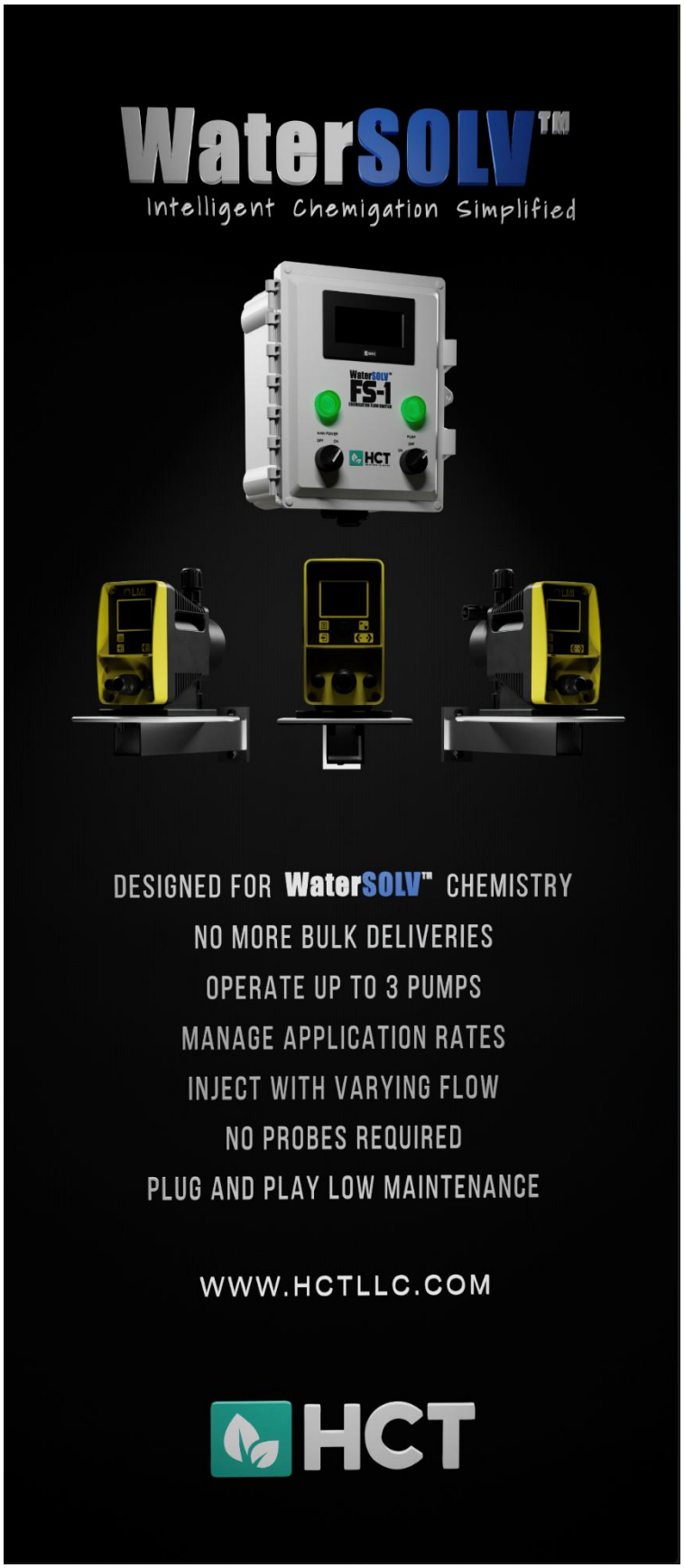
WaterSOLV™
Intelligent Chemigation Simplified
WaterSOLV FS-1
HCT
DESIGNED FOR WaterSOLV™ CHEMISTRY
NO MORE BULK DELIVERIES
OPERATE UP TO 3 PUMPS
MANAGE APPLICATION RATES
INJECT WITH VARYING FLOW
NO PROBES REQUIRED
PLUG AND PLAY LOW MAINTENANCE
WWW.HCTLLC.COM
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Before 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, and you need more chemical output than the pump capacity, 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 the FS-1 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, determined 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 – HORIZONTALLY AS EXHIBITED IN THE DRAWINGS.
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. You can also place the product into the top of a well, to help the well stay clean.
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 through the communication cord. The pump obtains its power from the FS-1, or it may be plugged into its own outlet. 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.
  - Nipplets 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 fumy. 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

Installation Technician

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 chemical 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 irrigation 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 nipplets, 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.

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, oversite, 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.

Getting Started Checklist

1. You acknowledge the system has to be de-pressurized to install the Curative Injection quill system.

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 mist 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 ¼ 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 n and out, tight fitting (fumes are corrosive like pool acid).

Pump setup videos and this current manual are available online at:
https://www.hctllc.com/chemigation

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

Contents

Warranty

LMI PD Pumps: Drive End: 2 years
Wet End: 12 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 are 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 warrantied 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.

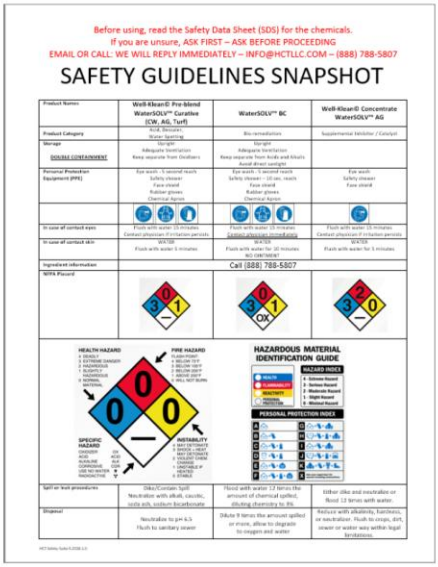
Given that the pumps run each day for 6-8 hours usually, but never if it rains, pumps wouldn't need to be rebuilt for 1 to 1.5 year. The rebuild kits includes the diaphragm, seals, and valves. It can all be done in the field and is easy to do.

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



Safety Station

Eye wash (Safety shower (adequate <u>water supply</u> and access less than 5 seconds))

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

Acid / Curative: Sodium bicarbonate to neutralizer an acid spill (baking soda 1 lb. per gl. of Curative)
BC – Water Dilution 9 fold.

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 gl. 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, reply on or depend on mechanical ventilation. Keep the container and ports for return lines tight. Minimize the release of fumes form 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 Connection 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/B08CMQHYLL/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

All connected:

1. 3 ea. 30 ft. Pump Communication Cables prewired for the pumps, labeled with a wire tie 1, 2, 3
2. 1 ea. 3-2540-1 Flow meter (if ordered, otherwise you'll wire the cable into your existing flow meter)
3. Male connector on the end of the cable, and the FS1 has a cable with female connector to mate with the flow meter (If you ordered a flow meter with the system)
4. 50 ft. of flow meter cable
5. All cables pre-wired, and connections keyed – simply mount the FS-1 and plug into power, power the pumps, connect the pump comm cable, and setup the panel for your pumps and outputs.

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 – extended life tubing (replace each 2 years)
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 Bleed to Bleed tubing adaptor
11. 3/4" MPT x 1/2" FPT PVC Schedule 80 bushing
12. 1/2" PVC/Viton True Union Ball Valve
13. Injection quill "Extension"
14. 2 inch ½ x ½ MPT schedule 80 pipe (quill to ball valve to quill extension)
15. Camlock Assembly if a tote is to 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 and do not utilize the injection quill extension

Thick Viscosity Pumps

Contact HCT or your dealer.

Mounting Options

1. Mounting Options
    a. Wall mount or pole mount
        i. One pole does up to three pump mounts
2. Wall Mount Kit

Mounting Packages

Wall Mount:

1. Pump Unistrut to Wall
    a. 2 ea. Unistrut Wall Mount Brackets
        i. 4 ea. bolts, lags, washers and lock washers

2. Board to Unistrut
    a. 2 ea. Pump/Unistrut Mounting Boards
    b. 4 ea. bolts and washers for Unistrut nut
    c. 4 ea. Unistrut nuts
    d. 2 ea. Unistrut end caps

3. Pump to Board
    a. 4 ea. bolts, nuts, 4 flat washers, 4 ea. lock washers

4. FS-1 to Unistrut
    a. Included in FS-1 - 4 ea. screws, flat & 4 ea. lock washers

5. FS-1 to Wall
    a. 2 ea. Unistrut's to mount FS-1 to wall
    b. 4 ea. bolts, lags, large flange washers, & lock washers

Pole Mount:

Same as above but includes different bolts and pole clamps.

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

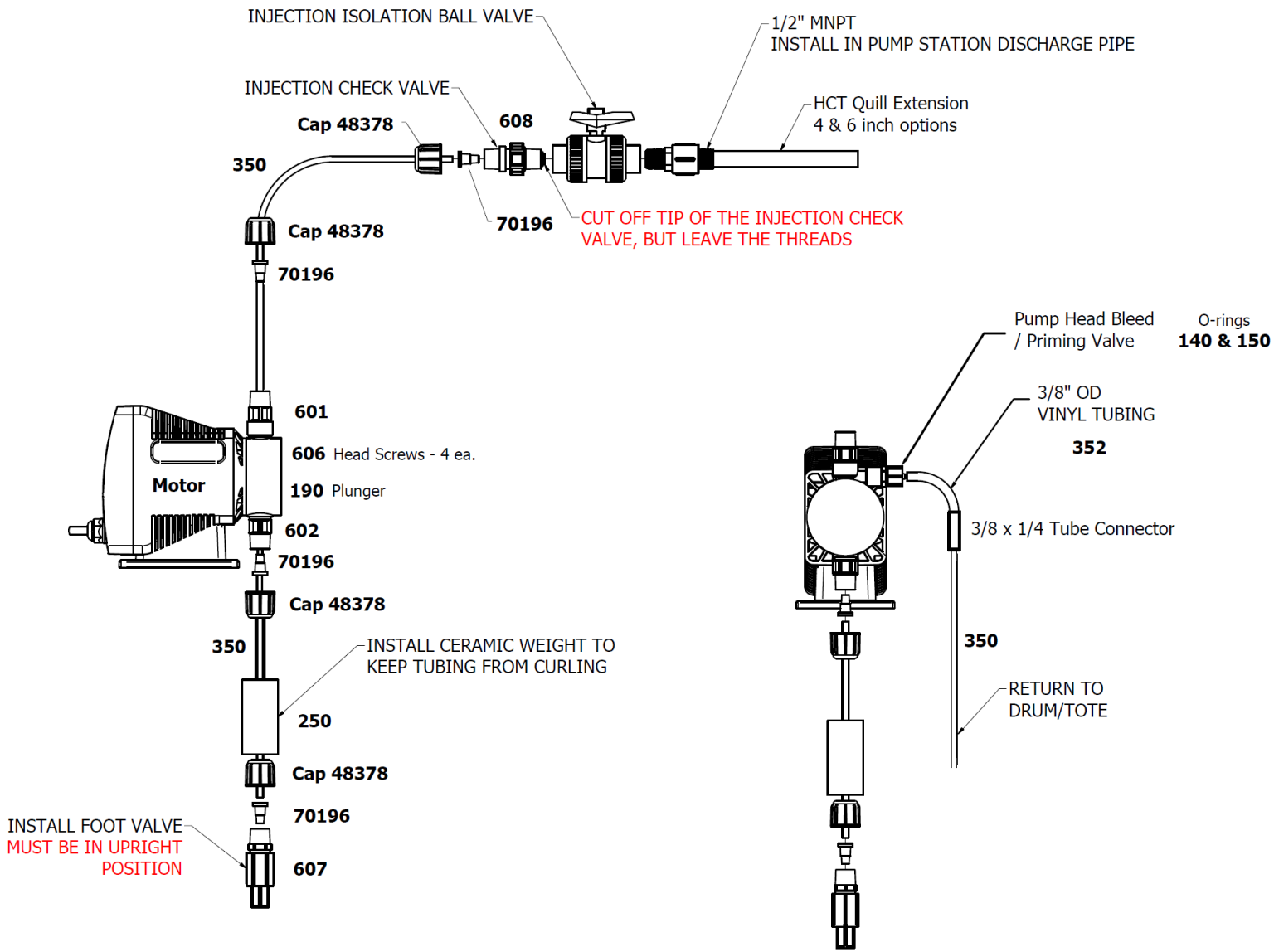
(All are available at retail hardware stores)

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

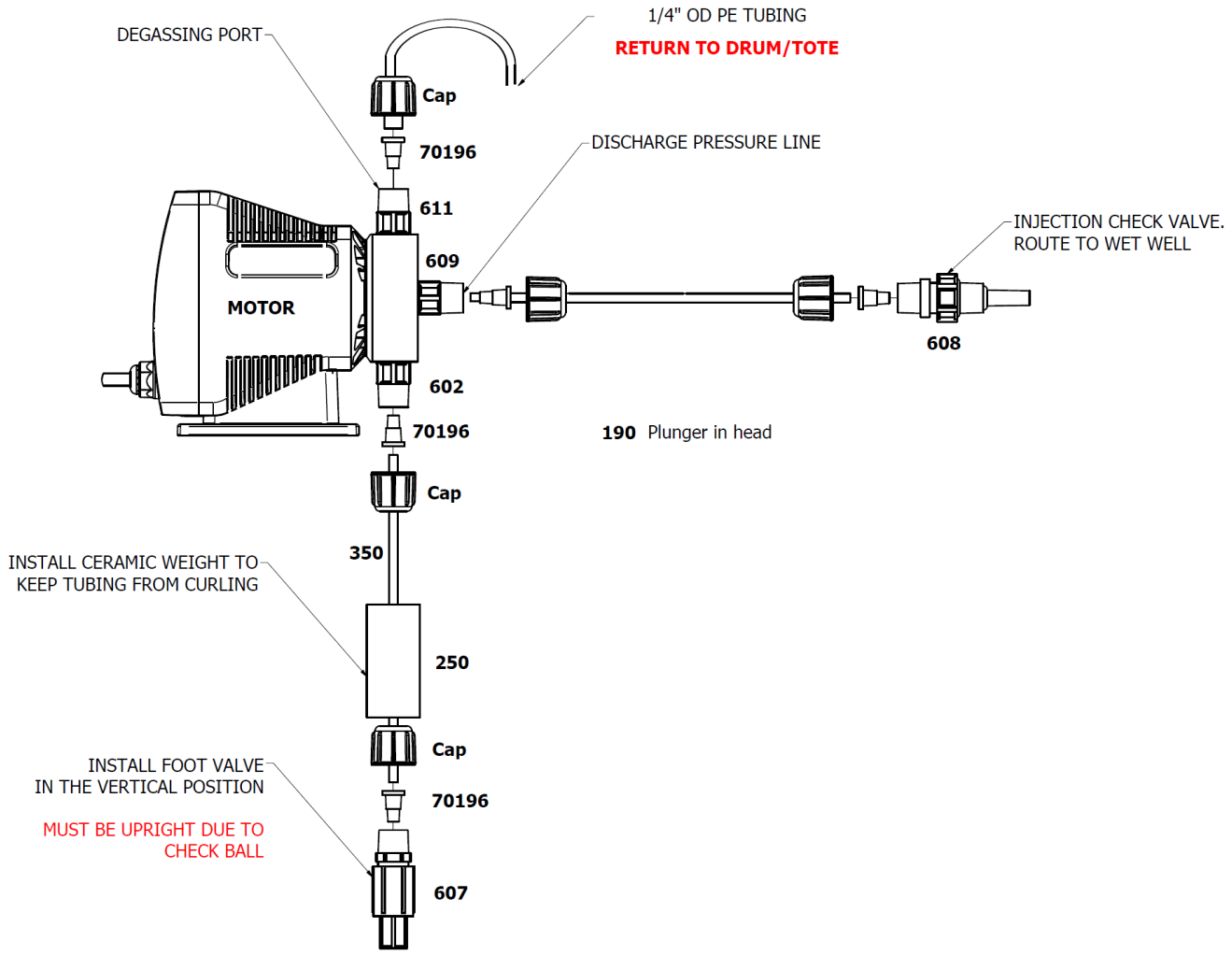
Pump, Fittings & Diagrams – Curative Pump



Pump, Fittings & Diagrams – BC Pump

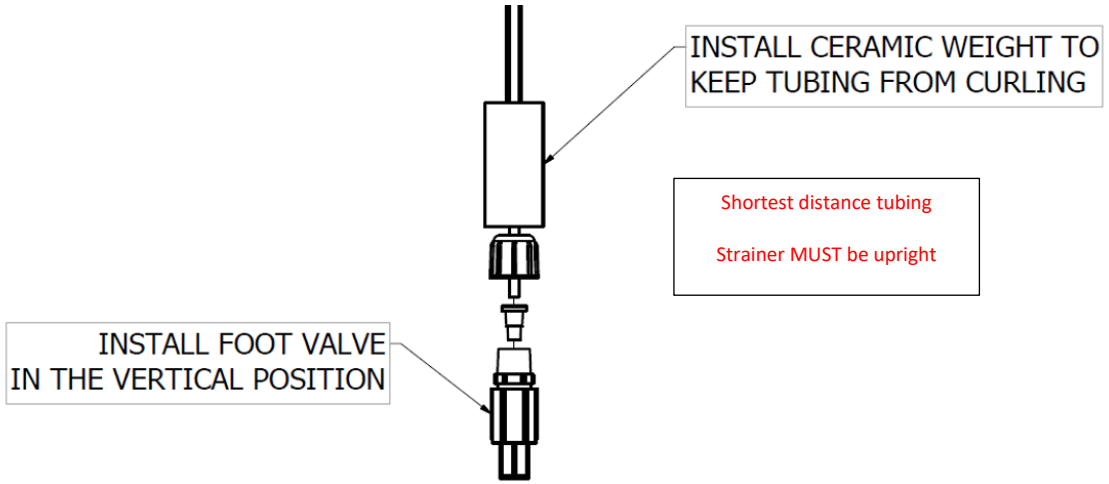
(Note Fittings differences. These are unique, they are unique compression fittings)

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



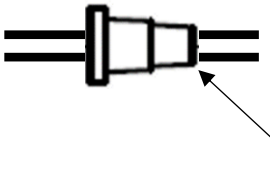
Fittings

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.



Cut here, if necessary, even a fraction of the Ferrell end.
Use a sharp razor instrument.

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
    1. Curative – baking soda and water
    2. BC - water
4. Consider performing annual maintenance
5. Move chemical containers indoors
    1. CAUTION – open containers of the WaterSOLV™ Curative, need to be sealed. The vapors of the chemistry are very corrosive, like pool acid. Close all lids securely.
        1. You can vent the Curative if desired, running pipe from the top ¾ fitting on the cap, though PVC, into water in a 5 gl pails. By putting some baking soda in the water pail, it will neutralize and of the acidic fumes. This container of water would be considered free lime and could be placed on calcareous soils and watered in diluted appropriately or perhaps used as a drain cleaner.

Periodic / Annual Maintenance

Item 1 – Hand check the line / quill fittings by hand to assure they stay snug

Annually: Replace the Curative Plunger and bolt
Replace the two o-rings in the bleed valve
Replace the clear bleed line tubing (Priming Valve)

Every Two (2) years: Replace the chemical discharge lines, all, including the lines that drain back to the containers.
Replace the plunger on the BC and Fertilizer Pump

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

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

Strainer & Quill Materials of Const. – Curative/PVF – BC/ PVC

Injection Check Valve

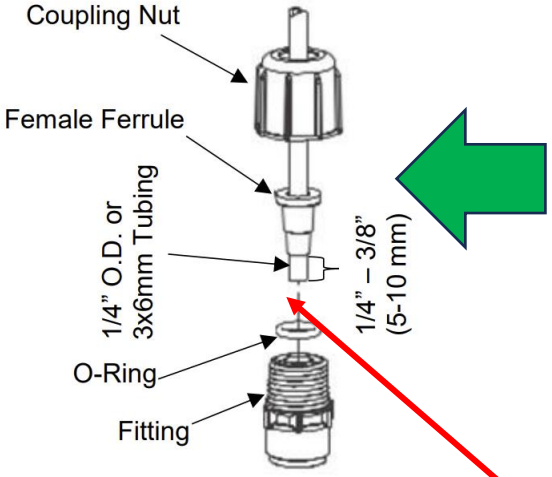


Figure 4: 1/4" OD Tubing Connections

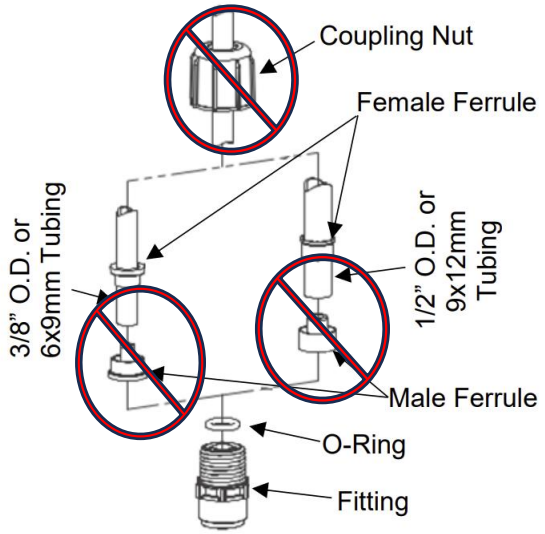
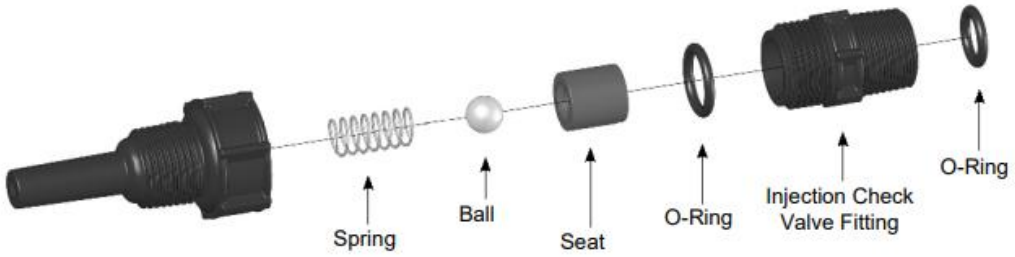


Figure 5: 3/8" or 1/2" OD Tubing Connection



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.

LMI Operations Manual Online: https://support.lmipumps.com/Document/LMIDOC-919377906-456

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.

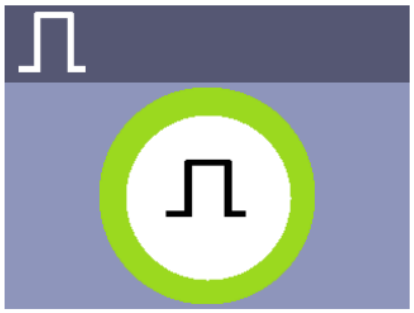
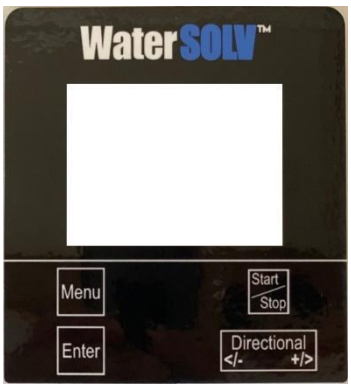


Figure 18: Pulse Pacing Mode Display

New Overlay Pump Label >>>

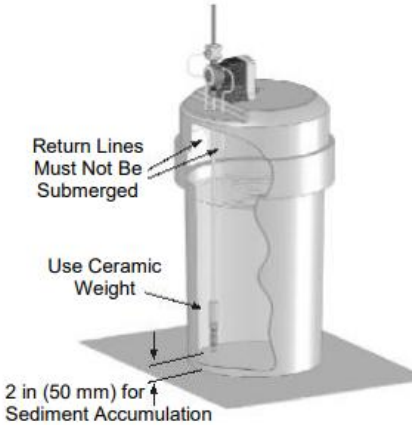


STAYPRIME™ Degassing Technology Enabled when in Menu and
StayPrime™ Degassing Technology active when on Homescreen

Suction Fittings & Visuals

INCORRECT

Foot Valve tilted sideways *WILL NOT PRIME*



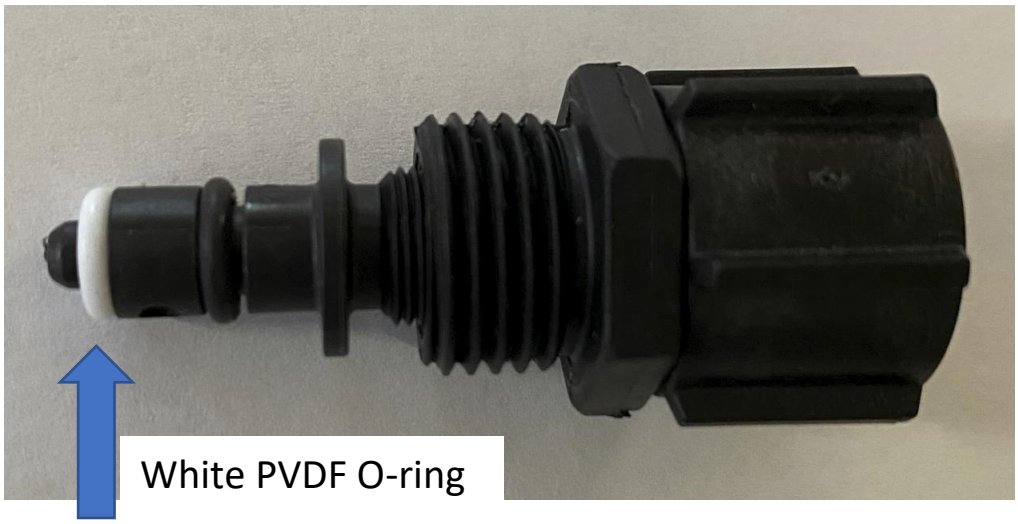
CORRECT

Foot Valve must remain vertical

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.



Look inside the pump head, to be sure you do not put two white o-rings in the head.

Bleed Valve Assembly

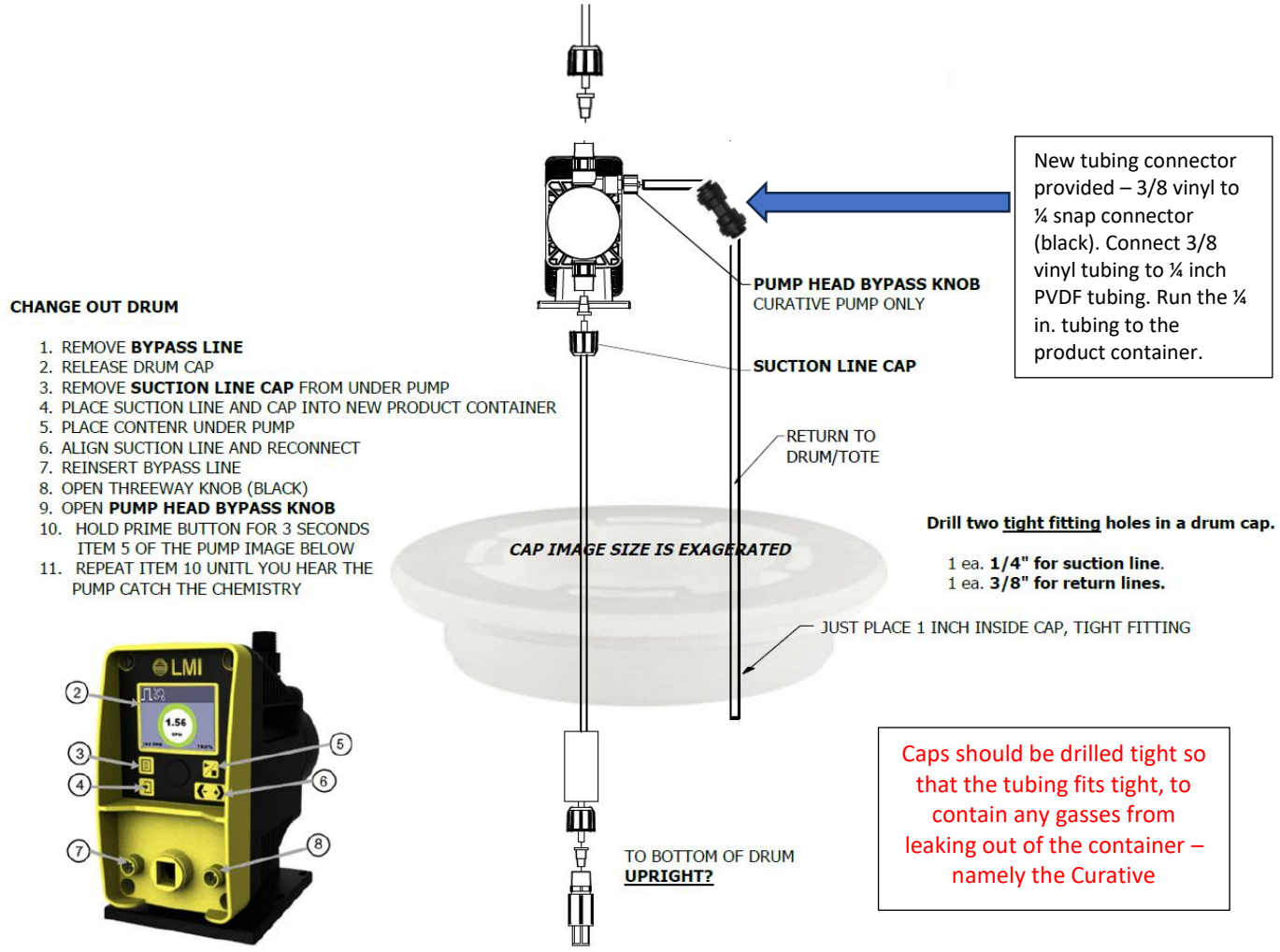
Image of valve open

Image of valve closed

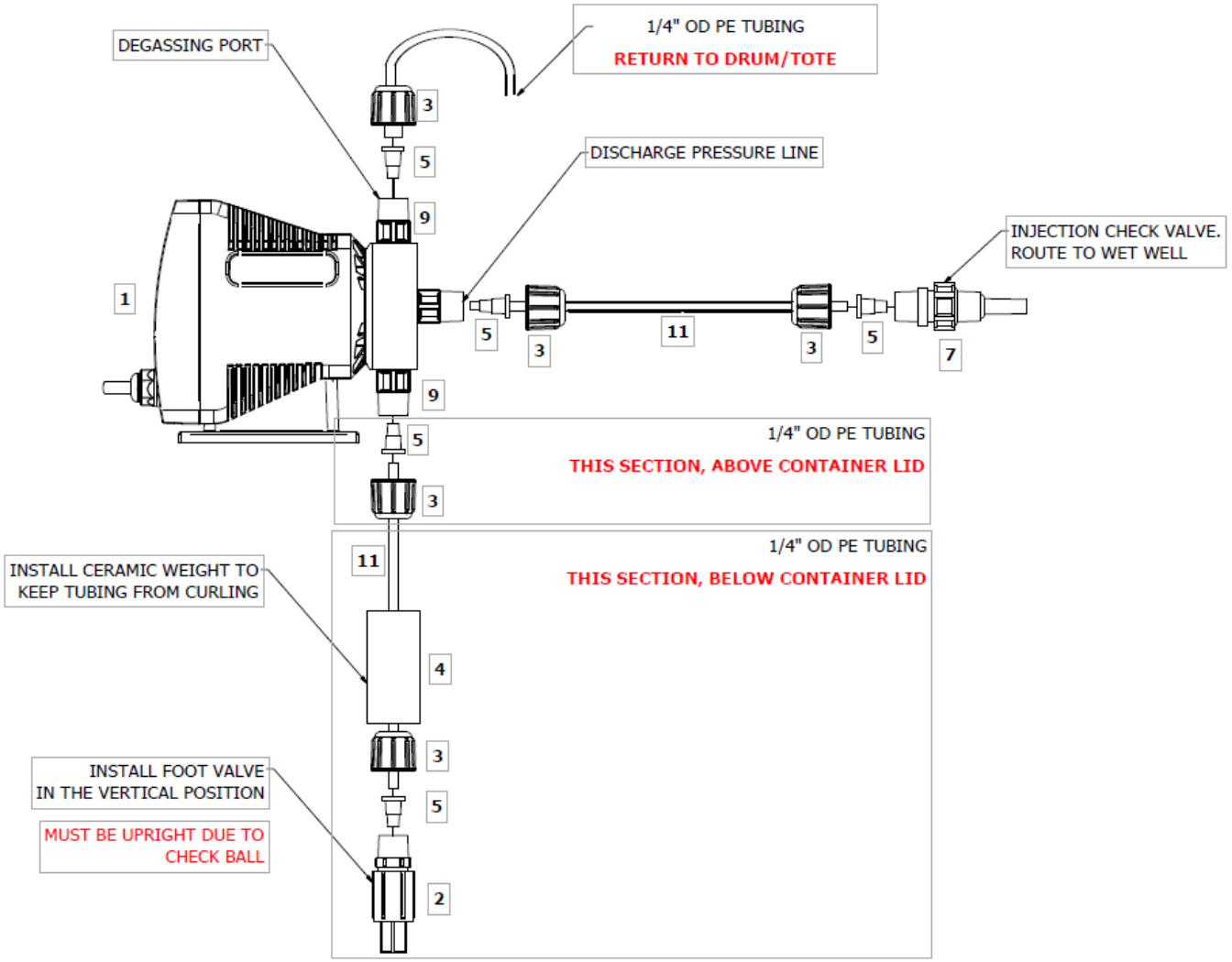
Everything from the hex head to the left is securely or should be securely mounted into the pump head.
Note, two o-rings. Both are critical. Look inside the head in case the end o-ring came off.
If it came off, placing the shaft back into the housing should be fine.
Only the ribbed cap should rotate in and out. In to close, out to open.

When closed, no fluid should come out the tube From the ribbed cap.

Drum Cap Modifications / Curative - Changing out Drums

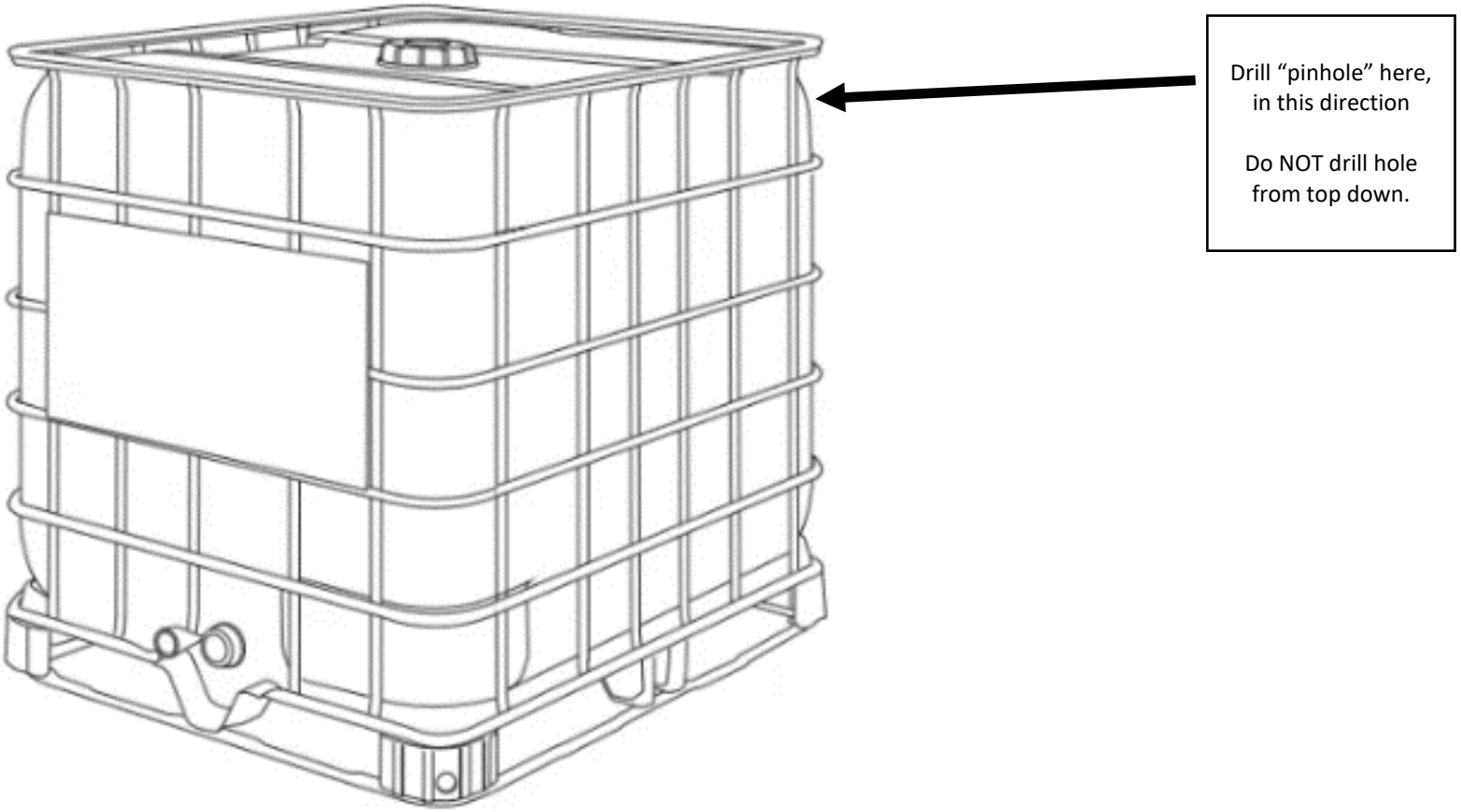


Drum Cap Modifications / BC - Changing out Drums

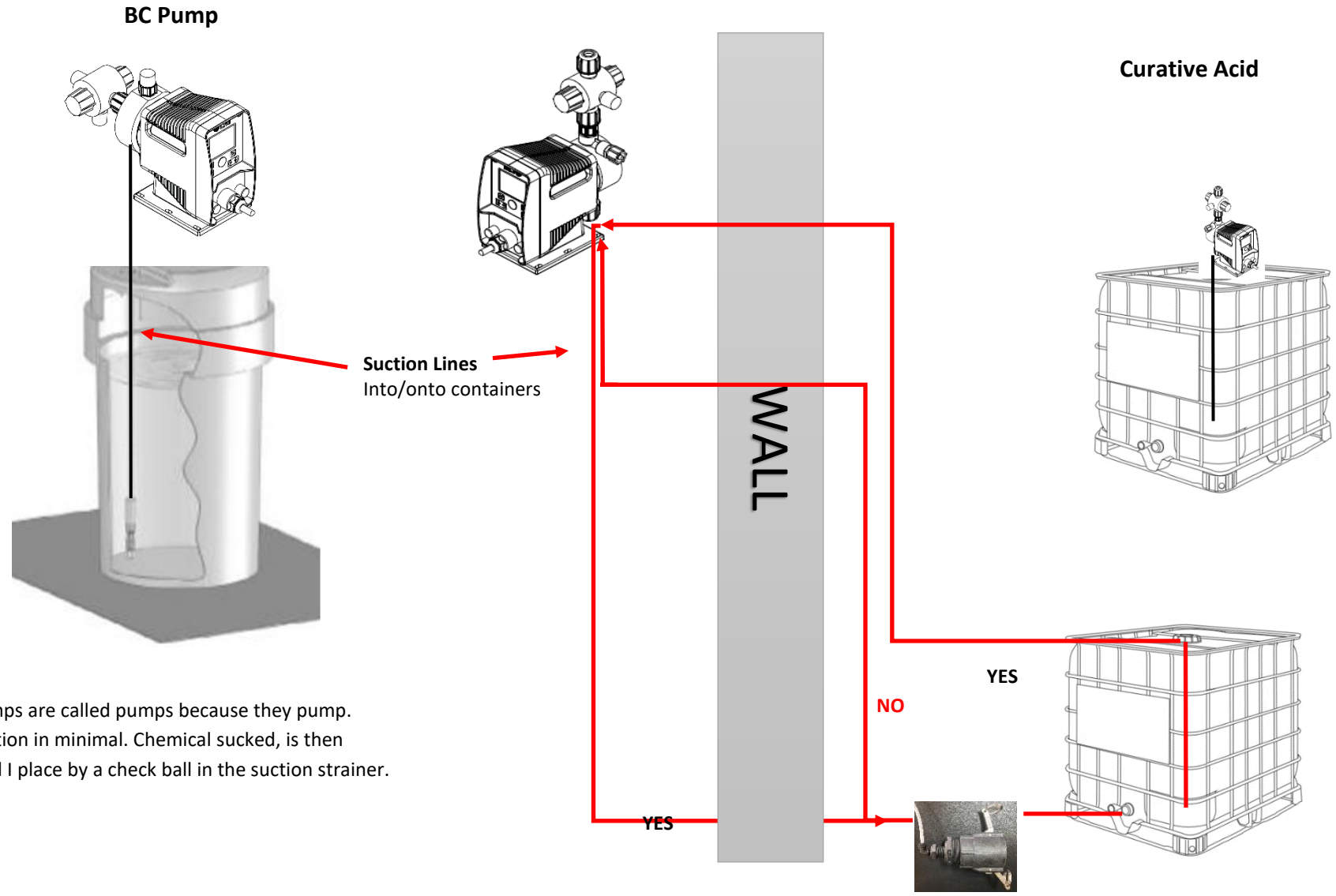


Venting Curative Tote

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



Container Suction Connections



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

Cam Lock Assembly

1. 2 inch Camlock
2. Reducer bushing 2 to ¾ inch
3. Reducer bushing ¾ to 3/8
4. Compression Lock, 3/8 to ¼ tubing

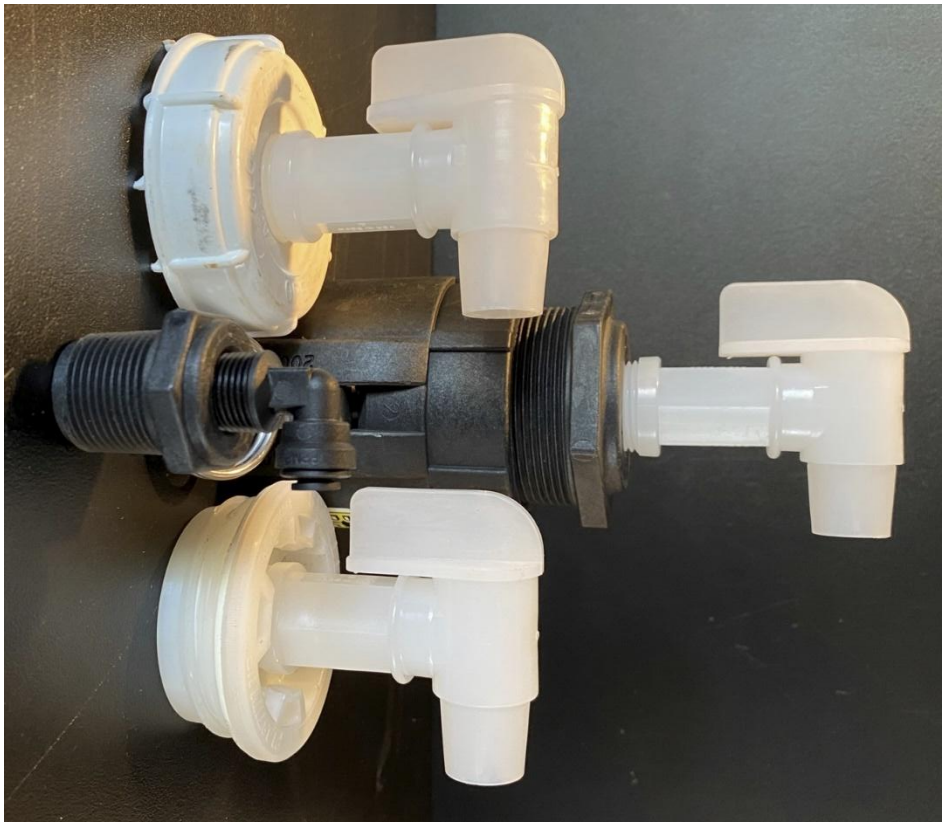
MUST BE DOUBLE TEFLON TAPED AND THREADED BY HAND WITH WRENCHES.

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

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)
   You must thread this with dual Teflon tape, and outside of using a vice, wrenches okay, get these threads secure. See our video online

Bungs and Spigots

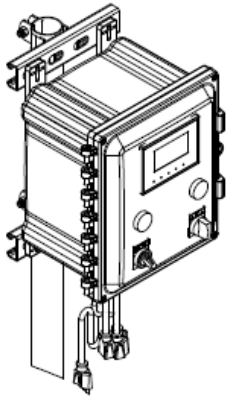
We thought a little uniformity would be beneficial, where a ¾ poly spigot can be used on any of the container lids. This can facilitate emptying remaining product from big containers into smaller containers.



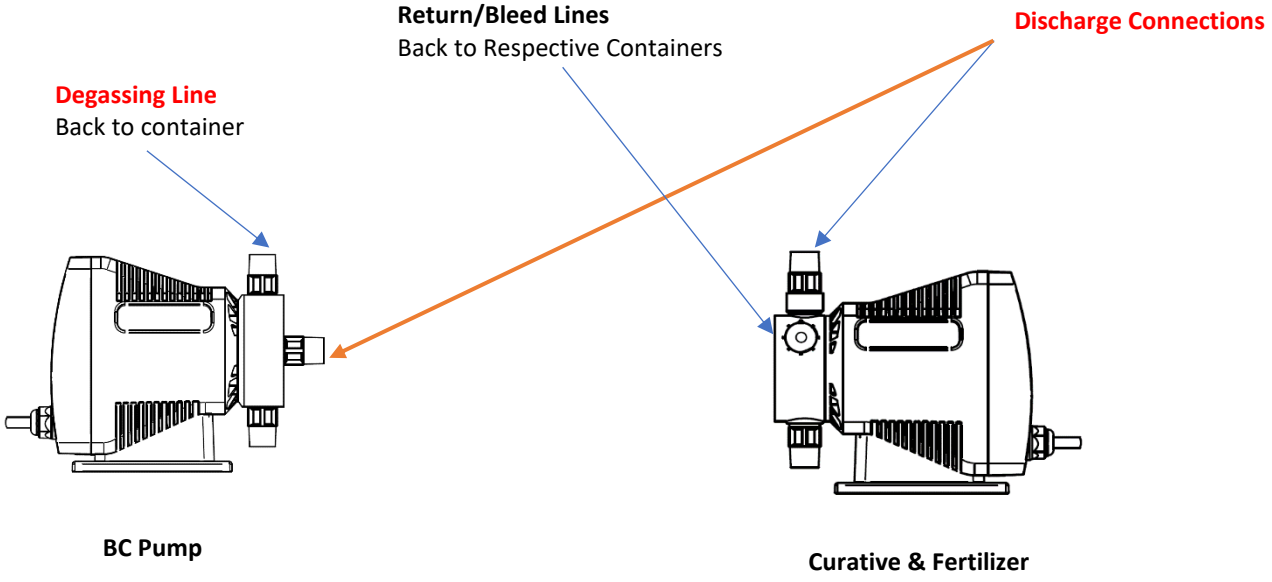
Camlock
Drum
Carboy
5 gl. pail

All accept a ¾ NPT and a poly spigot

Pump Connections



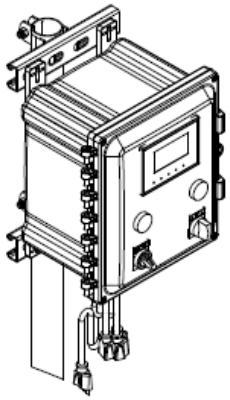
FS-1 Switch Box
Connect to Power



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



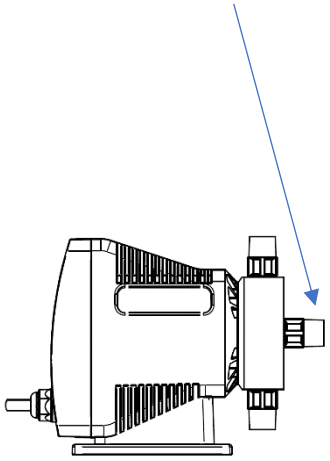
FS-1 Switch Box
Connect to Power

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

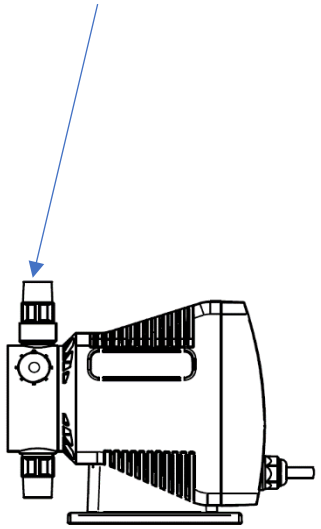
BC Pump

To Suction side of Pump Station Wet Well



BC Pump

To discharge side of pump station

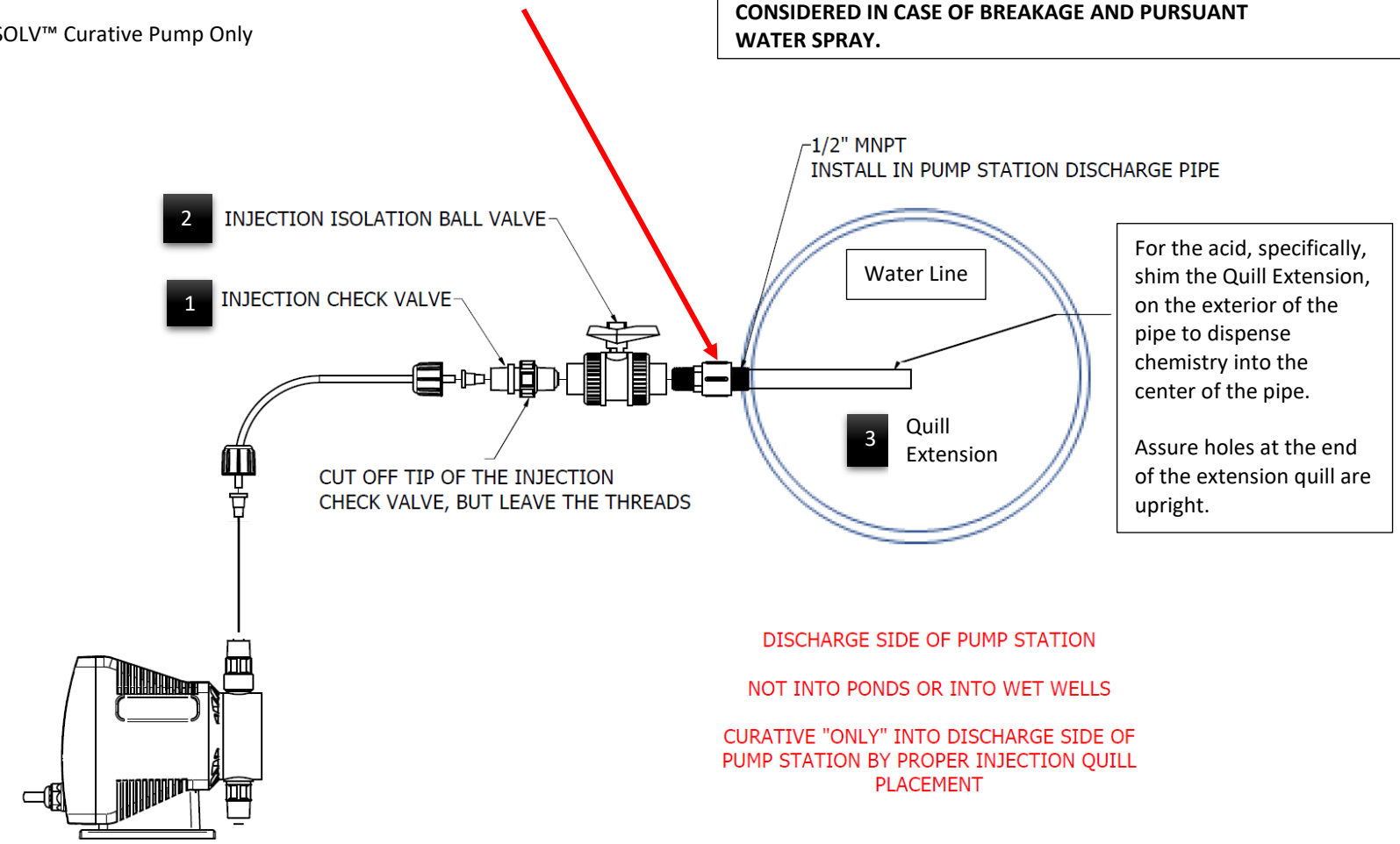


Curative & Fertilizer

Injection Quill & Quill Extension Configuration

For WaterSOLV™ Curative Pump Only

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



For the acid, specifically, shim the Quill Extension, on the exterior of the pipe to dispense chemistry into the center of the pipe.

Assure holes at the end of the extension quill are upright.

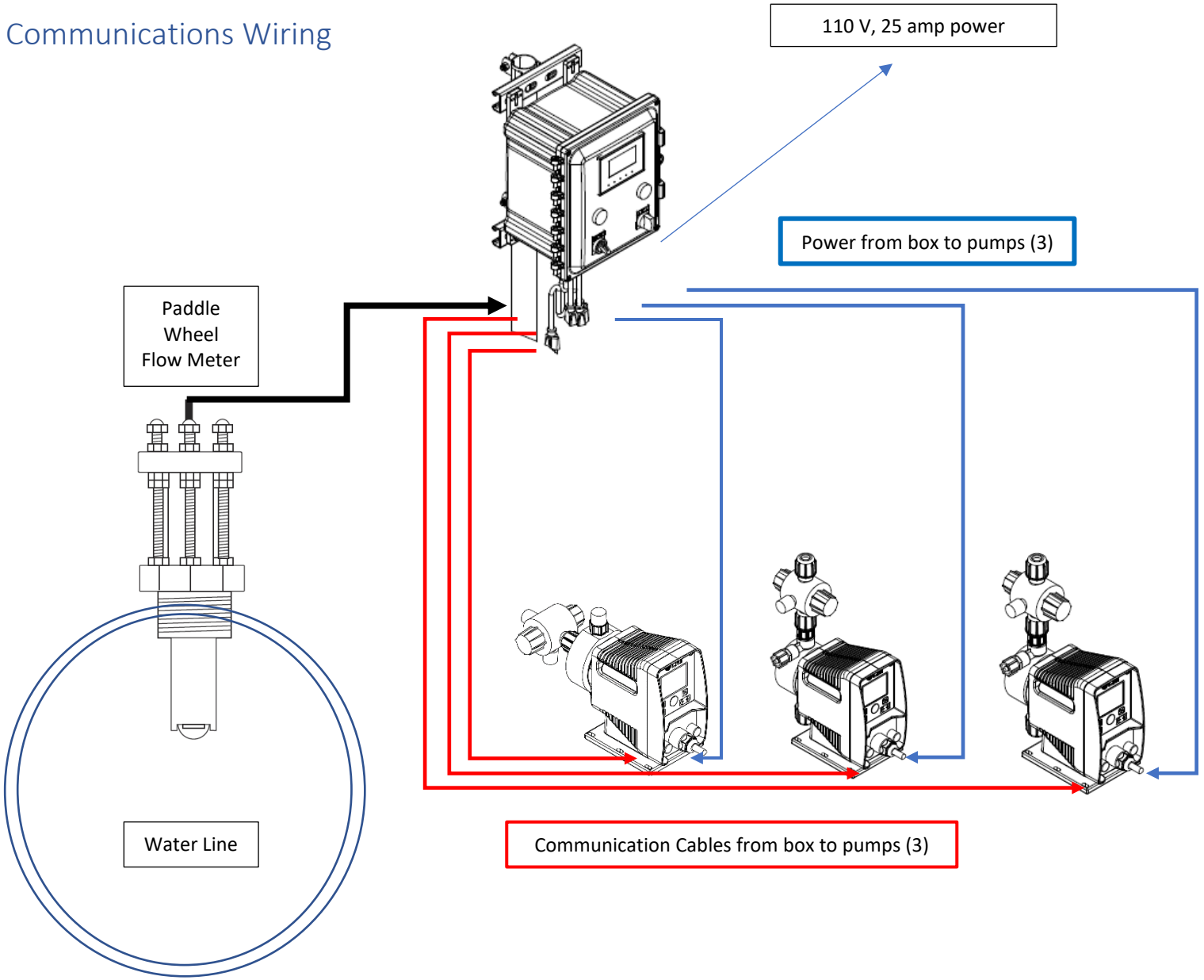
DISCHARGE SIDE OF PUMP STATION

NOT INTO PONDS OR INTO WET WELLS

CURATIVE "ONLY" INTO DISCHARGE SIDE OF PUMP STATION BY PROPER INJECTION QUILL PLACEMENT

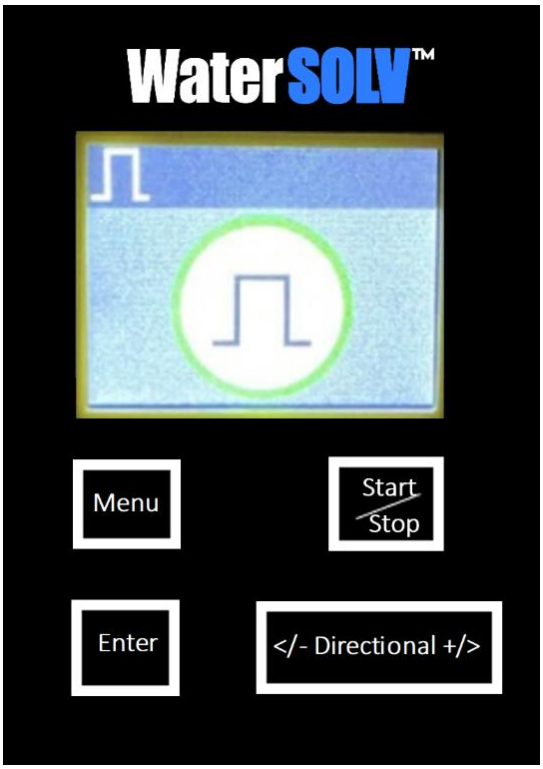
PLACEMENT OF THE QUILL IN ANY OTHER ANGLE THAN HORIZONTAL OR ON THE UPPER ½ OF THE PIPE POINTING DOWN, WHATSOEVER, IS NOT ALLOWABLE.

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. DIRECTIONAL to

5. ENTER

(black circle is off – GREEN CIRCLE IS ON STANDBY WAITING FOR PULSES

6. Assure all setting are as in this image. Arrow to the item, select enter, then 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 Start/Stop to get a green circle which means pump is on standby awaiting pulses from the FS-1 and the Flow Meter. The final screen should look like the above image. The "Top Hat sign, could be open on the top.

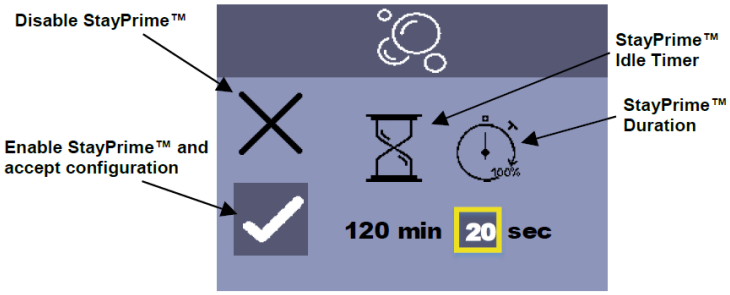
Priming On Feature

Hold down the Start/Stop 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 Strokes to 2, then for each 1 ppm of 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

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

Calibration

Play/Stop (Press the physical Play/Stop button to start/stop calibration. Screen icon highlights to show status)

Minimum Pulse Width Setting | Pulse

Confirm

Units

Factory Totalizer (Cannot be reset)

User Totalizer (Can be reset)

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

StayPrime™ Degassing Technology Recurrence (Time between Priming Events)

StayPrime™ Degassing Technology Duration (Length of Priming Events)

System Information

Reset (Used to return to factory calibration, restore software defaults, or clear User Totalizer)

1.80 GPH — Pump Stopped (Not Running)

1.80 GPH — Pump Running (In External Pulse Mode, the pump may be waiting for pulses.)

1.80 GPH — Low Tank Alarm

1.80 GPH — Empty Tank Alarm

Screen Settings

WaterSOLV™ BC

Main Menu

Manual Mode > Auto Mode > Calibration > Pump Stats
Degassing > Display Measures > Firmware

Auto Mode
Top Hat Icon – (waiting for flow meter pulse)
Plunger Stroke Settings (Factory Settings – 100%, flow meter pulses control amount)

Top Hat + Bubble Icon
Auto Mode & Degassing activated

Pump Off (black circle)

Top Hat + Bubble Icon
Auto Mode & Degassing activated

Pump On Standby (Green circle, waiting for pulses)

(Top Hat Screen)

Hand
Pump in Manual Mode & Degassing on
Strokes per minute & % of pump capacity displayed

When powered, will pump % of pumps capacity

Pump Off - (Black circle)

(Status Screen)

When setup as manual, must calculate pump capacity to flow rate to treatment rate, and adjust

Auto Degassing Screen

Check Box Checked
Factory Recommendations:
Every 360 minutes
Run auto degas for 5 seconds

May need to adjust for circumstances

Sequences

Menu:	Black Circle (start/stop) > Menu
Auto Pump Settings:	Black Circle (start/stop) > Menu +/- to Top Hat > Enter + /- to each cell > enter to make a change > +/- to change > enter to accept change When done with all cells - press Menu
Auto Degassing:	Black Circle (start/stop) > Menu +/- to Bubbles > Enter + /- to each cell > enter to make a change > +/- to change > enter to accept change When done with all cells - press Menu
Auto Degassing Off:	Black Circle (start/stop) > Menu +/- to Bubbles > Enter +/- to X for off – checkmark for on > Enter
Auto Mode:	Assure Top Hat – not hand – is displayed Press +/- to display Top Hat Screen or Status Screen
Auto Mode to Manual Mode:	Black Circle (start/stop) > Menu +/- to Hand > Enter > +/- to “reduce” only, the percentage
Manual to Auto:	Black Circle (start/stop) > Menu +/- to Top Hat > Enter > Enter

IN AUTO MODE, ALWAYS RETURN PUMP TO GREEN CIRCLE USING THE START STOP BUTTON
BLACK CIRCLE MEANS THE PUMP IS TURNED OFF

WaterSOLV™ Curative

Same as BC – just exclude the degassing, leave it off.

Auto Degassing Off:	Black Circle (start/stop) > Menu +/- to Bubbles > Enter +/- to X for off – checkmark for on > Enter

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 2kΩ current limiting resistor may be used. To use the supplied 2kΩ 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 2kΩ pullup resistor must be used. To use the supplied 2kΩ pullup resistor, do the following:

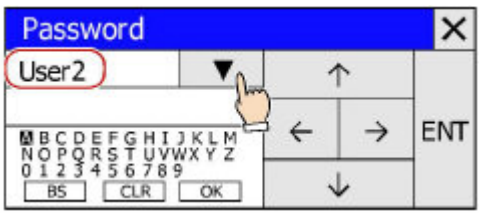
a. Connect the Black Wire one end of the resistor to Terminal # 7 of the Flow Switch Controller.
b. Connect the Shield/Silver wire from the flow meter to Terminal # 8 of the Flow Switch Controller.
c. Connect the Red wire from the flow meter and the other end of the resistor to Terminal # 9 of the Flow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

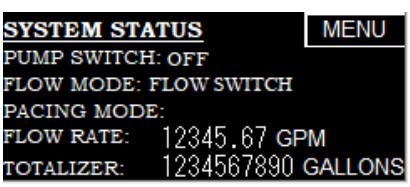
The GF Signet 3-2540-1 paddlewheel flow meter is suitable for piping 1½ to 24 in. diameter.

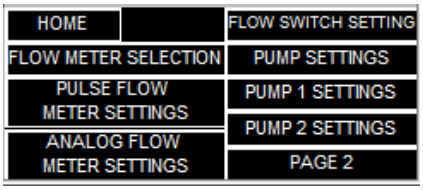
FS-1 LCD Setup:

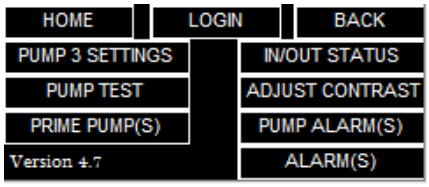
Logging In:
Before any settings can be changed, you must login first. This can be done from the screen displayed on power-up or from the Home Screen. Front the start-up screen, press the LOGIN button. Once taken to the password screen, change the User to “MAINT” and enter the password 5549, then select OK.



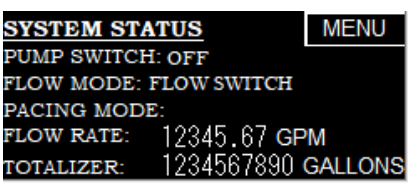
To login from the Home Screen, press the Menu button. From the Menu, press the Page 2 button. Finally on page 2 in the top center is the Login button. Press the button and login using the same user and password as described above.

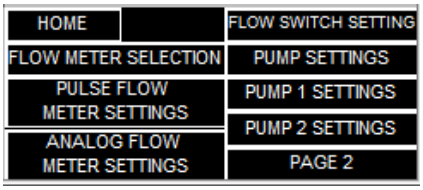


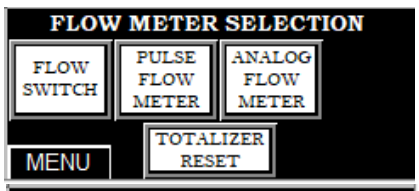


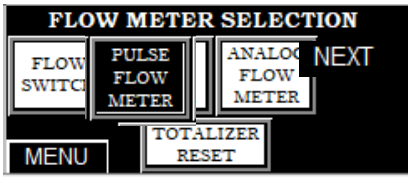


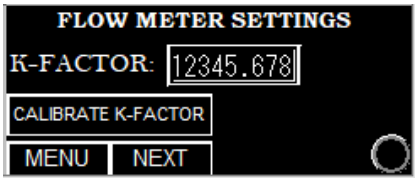
Setup for Pulse Flow Meter:
From the Home screen, press the menu button. From the Menu, press the Flow Meter Selection button and select Pulse Flow Meter. Once the selection has been made, press “Next” to be taken to the Pulse Flow Meter Settings. Once at the screen for Pulse Flow Meter Settings, enter the k-factor for the flow meter. The k-factor is how many pulses per gallon the flow meter sends. If the k-factor is unknow, it can be calibrated and is covered in a later section of the manual. After the k-factor has been entered, press the Next button to go to the Minimum Flow Settings. If you do not want the system to inject below a certain flow rate, enter that flow rate.

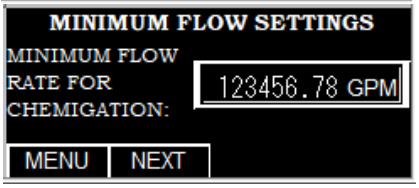




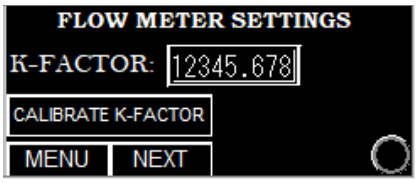


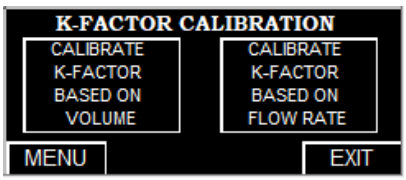




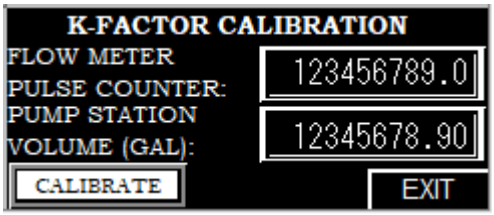


K-Factor Calibration:
If the k-factor of the flow meter is not known, press the “CALIBRATE K-FACTOR” button to be taken to the calibration screen. There are two methods of calibration. The k-factor can be calibrated based on volume or flow rate.

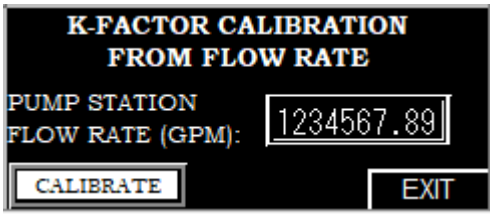




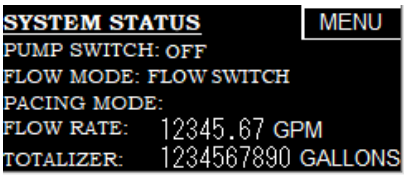
Calibration Based on Volume:
To calibrate the k-factor based on volume, you need to run the pump station. After running the pump station, enter that volume of water the pump station states it had pumped in the "Pump Station Volume (GAL)" field. After this value has been entered press the Calibrate button then exit.

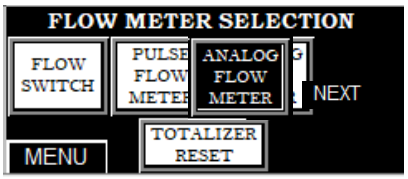


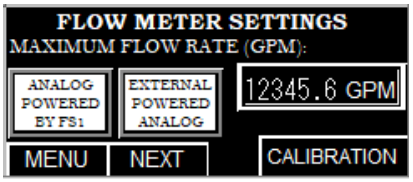
Calibration Based on Flow Rate:
To calibrate the k-factor based on flow rate, you need to run the pump station. While the pump station is running and the flow is steady, enter the flow rate into the "Pump Station Flow Rate (GPM)" field. After this value has been entered press the Calibrate button then exit.

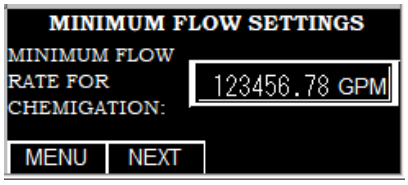


Setup for Analog Flow Meter:
From the Home screen, press the menu button. From the Menu, press the Flow Meter Selection button and select Analog Flow Meter. Once the selection has been made, press "Next" to be taken to the Analog Flow Meter Settings. Once at the screen for Analog Flow Meter Settings, select if the flow meter is powered by the FS1, or if it is externally powered. Next enter the maximum flow rate for the flow meter. The maximum flow rate of the flow meter is how the FS1 can scale the incoming signal to what the actual flow rate is. If the maximum flow rate is unknow, it can be calibrated and is covered in a later section of the manual. After the maximum flow rate has been entered, press the Next button to go to the Minimum Flow Settings. If you do not want the system to inject below a certain flow rate, enter that flow rate.

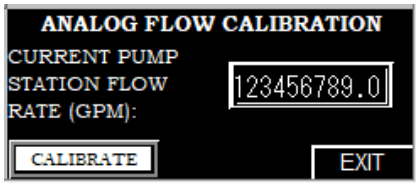




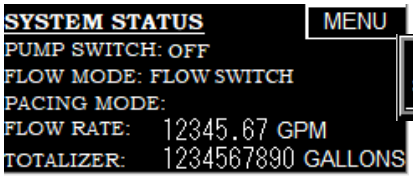


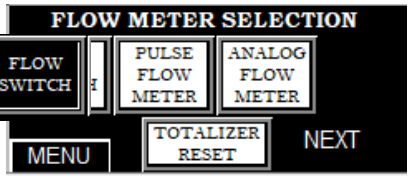


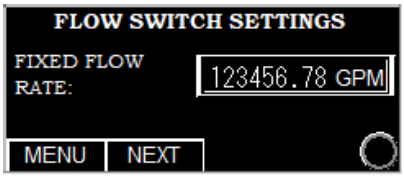
Analog Flow Calibration:
If the maximum flow rate of the flow meter is not known, press the "CALIBRATION" button to be taken to the Analog Flow Calibration screen. To calibrate the FS1, you need to run the pump station. While the pump station is running and the flow is steady, enter the flow rate into the "Current Pump Station Flow Rate (GPM)" field. After this value has been entered press the Calibrate button then exit.



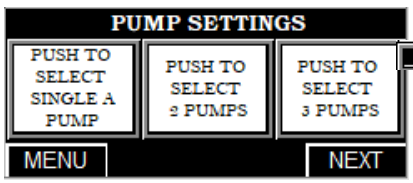
Flow Switch Settings:
From the Home screen, press the menu button. From the Menu, press the Flow Meter Selection button and select Analog Flow Meter. Once the selection has been made, press "Next" to be taken to the Flow Switch. Once at the screen for Flow Switch Settings, enter the average flow rate for the pump station. If this is not known, take the average amount of water pumped per night, divide by the amount of time watering to get Gallons per Hour. Next divide that by 60 to get the average flow rate in Gallons per Minute.

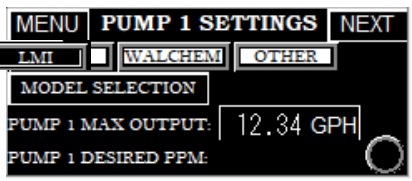


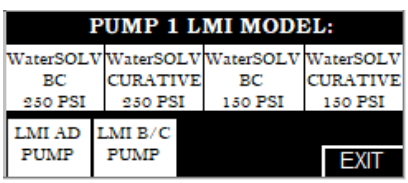


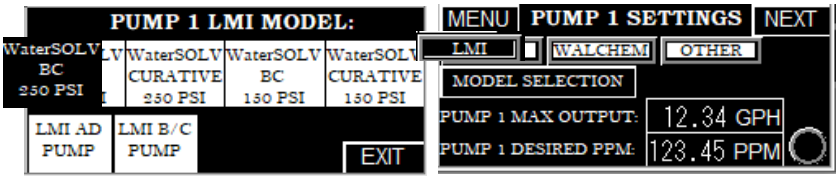


Pump Settings:
After the Flow Meter Settings have been entered and the Next button has been pressed, you will be taken to the Pump Settings screen. On the main Pump Settings screen, select the amount of pumps that will be used. After the quantity has been selected, press the Next button to be taken to the settings page. On the Pump [ ] Settings page select the brand of pump being used. Most common is the LMI pump. Once LMI has been selected, press the Model Selection button to select the LMI pump being used. When the model is selected, press exit, and the Pump [ ] Max Output will be automatically input. After the model had been selected, the box for the desired PPM will be displayed. Press the box to enter the desired PPM for that pump. If there is another pump, press the Next button until all pumps have been setup. If there is only 1 pump, the settings are now complete. If a Walchem pump, or other pump has been selected, the Pump [ ] Max Output will need to be entered. Additionally, if the Other pump is selected, that pumps maximum stroke rate (pulses per minute) will need to be entered.

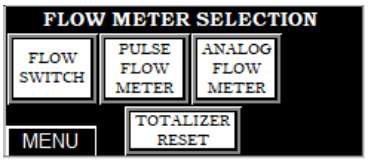




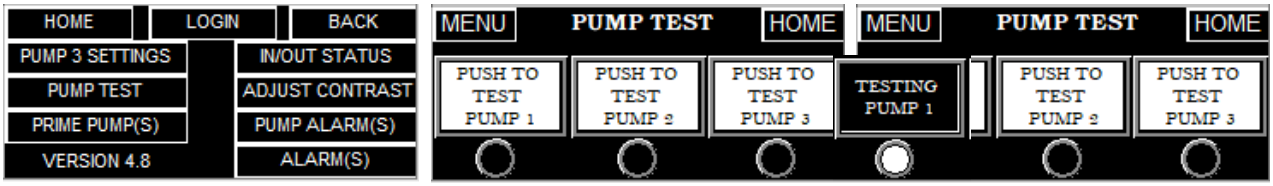




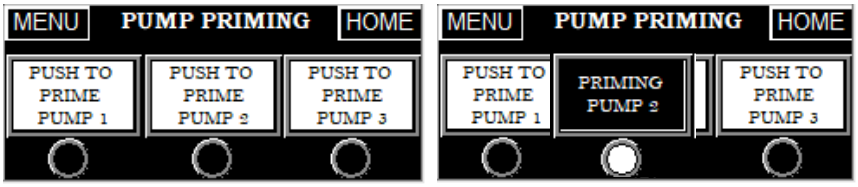
Totalizer Reset:
To reset the totalizer, press the Menu button and then select Flow Meter Selection button. Next press and hold the Totalizer Reset button for 5 seconds. You must be logged in as Maint to perform this.



Testing, Priming, Diagnosing, and Alarms:
Pump Test:
Once all settings have been you can verify that the given pump is connected to the specified pump. From any screen, press the Menu button, then select Page 2. On page 2 of the Menu, press the Pump Test button. Press the button for the pump that you want to test. NOTE: The FS1 Pump switch must be in the auto position. The FS1 will then send pulses to the pump selected for 30 seconds. The circle below the respective pump test button will flash each time a pulse is sent to that pump. If the pump is not pulsing, ensure that the pump is on and in external or auto mode. If a different pump pulses, then pump cables will need to be corrected.

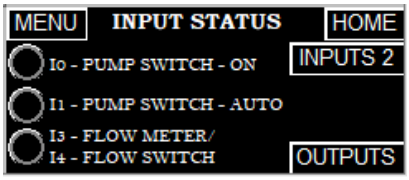


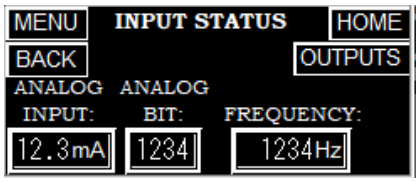
Pump Priming:
Once all settings have been you can verify that the given pump is connected to the specified pump. From any screen, press the Menu button, then select Page 2. On page 2 of the Menu, press the Prime Pump(S) button. Press the button for the pump that you want to prime. NOTE: The FS1 Pump switch must be in the auto position. The FS1 will then send pulses to the pump selected for 5 minutes. The circle below the respective pump test button will flash each time a pulse is sent to that pump.

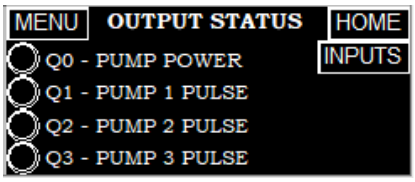


Input & Output Status:
From the second page of the menu, select the In/Out Status button. The Input Status screen will indicate what input is active. When using a flow meter, the indicator will flash as the pulses from the flow meter are received. Pressing the Inputs 2 button will take you to the second Input Status screen. When using the pulse flow meter, the frequency of the flow meter is measured an displayed. This with the flow rate can be used to calculate a k-factor, or with a k-factor and the frequency the flow rate can be calculated to verify what is being displayed. When using an Analog flow meter, the Analog Input and Analog Bit value can be used to calculate the Maximum flow rate for creating the slope that is

used to calculate the flow rate. The Output Status indicates when a pulse is sent to a pump or if the power should be on.

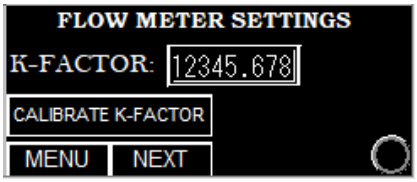


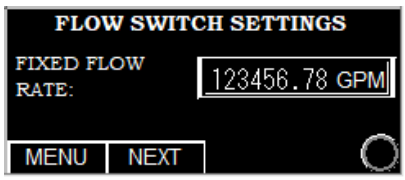


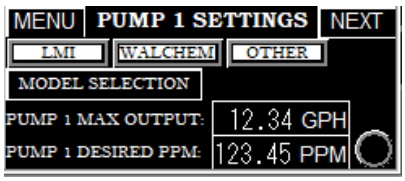


To calculate the flow rate:
Flow Rate (GPM)=[Frequency (Pulses/Second)*60 (second/minute)]/K-Factor (Pulses/Gallon)

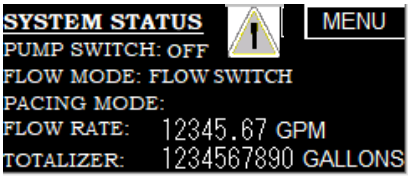
To calculate the K-Factor:
K-Factor (Pulses/Gallon)=[Frequency (Pulses/Second)*60 (second/minute)]/ Flow Rate (GPM)
On all settings screen, they have an indicator the shows if a pulse has come in or a pulse is going out for that respective setting/screen.

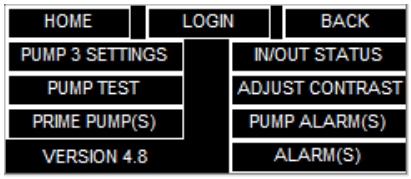




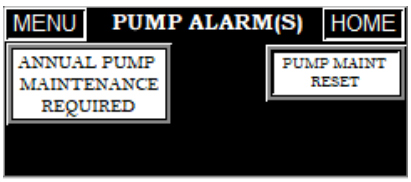


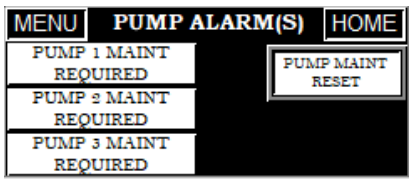
Alarms:
If there is an alarm, the Home screen will display and exclamation/warning next to the menu button. To view the alarm, go to the second Menu page and if it is a Pump Alarm, the Pump Alarm button will be displayed, and if it is a different alarm, the Alarm(s) button will be display. Click on the appropriate alarm button that was displayed.



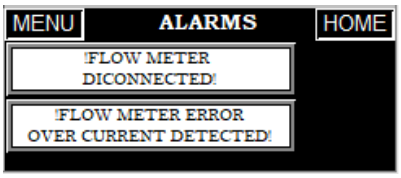


Pump Alarms:
The Pump alarms are based on maintenance. The pump manufacturers recommend annual maintenance. They also recommend maintenance based on the amount the pump has pulsed. Once the system detects flow and sends pulses to the pump, it starts a run timer begins for the annual maintenance. Once 1 year has elapsed, the Alarm indicator will be triggered, and the Annual Pump Maintenance Required will be displayed. Once the maintenance is preformed, press and hold the Reset button for 3 seconds to reset the annual maintenance timer. If the pump has pulsed more 15 million times before the annual maintenance, the Alarm indicator will be triggered and the respective pump maintenance indicator will be displayed. Once the maintenance has been performed, press and hold the Reset button for 3 seconds to reset the alarm.

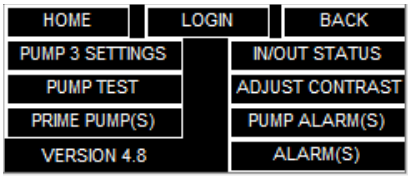




Alarm(s):
The Alarm(s), or general alarm, is an alarm for the analog input when using an analog flow meter. If the analog flow meter has been selected and the FS1 does not sense that it is connected, the FS1 will trigger the Alarm indicator. If the flow meter signal is above 22mA, the Over Current alarm will be triggered indicating that wiring is incorrect, or there is an issue with the flow meter.



Factory Reset:
If settings were input and changed and altered and you are not sure what was done and the FS1 is not operating correctly, all values and settings can be reset. To reset the FS1, you must login as the Admin using 2995 as the password. Once logged in, go to the second page of the Menu and press the screen where it displays the version of software. This will only work on Version 4.8 and greater.



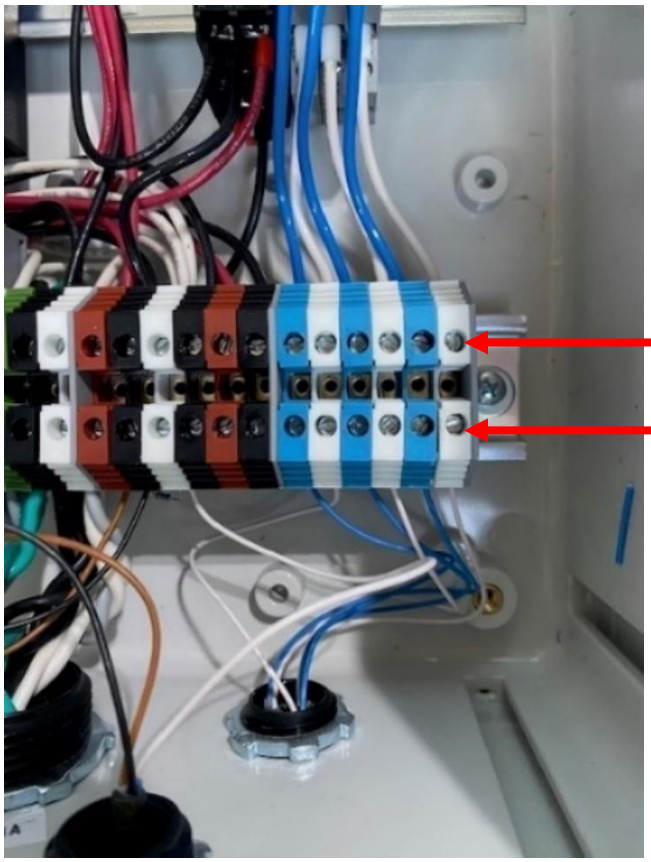
Pump Values

The label on the pumps are its max output at 50 psi. The values used in the FS-1 controller are at 150 psi 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.

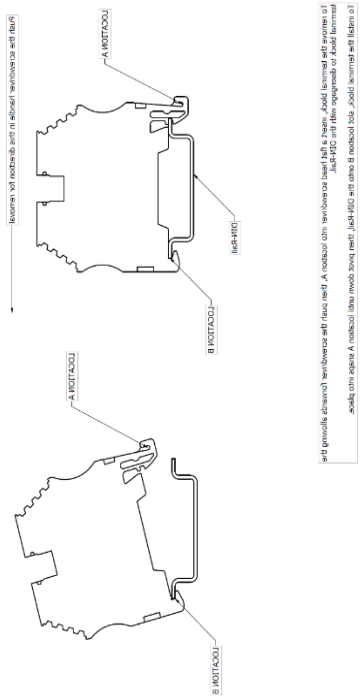
Application	Logic	Output, gph	Pressure, psi	Products	SKU
Sprinklered	Logic / Pulse	.30	250	BC	PD741-A28HI
		.52	250	Curative/Fertilizer	PD741-823SI
	Manual Setting	.30	250	BC	PD041-A28HI
		.52	250	Curative/Fertilizer	PD041-823SI
Agriculture, Irrigation, Nursery	Logic / Pulse	.7	150	BC	PD751-A38HI
		1.0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

Manual Pump Activation:

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



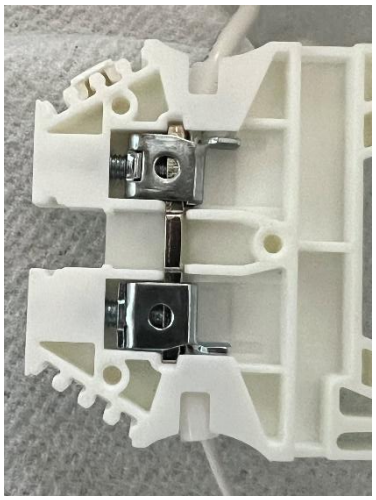
Removal of terminal Block (screwdriver, pry and lift



Wiring from Pump to FS-1

Blue = Pin 3
White = Pin 2

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

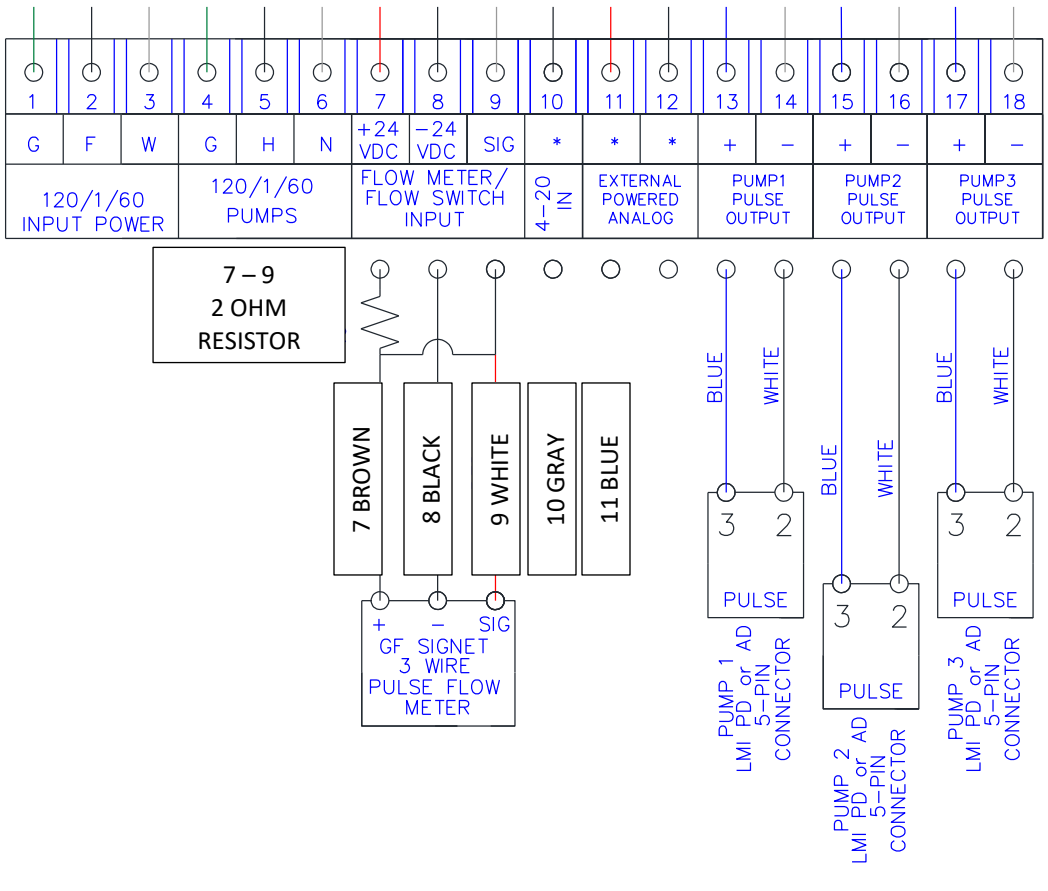


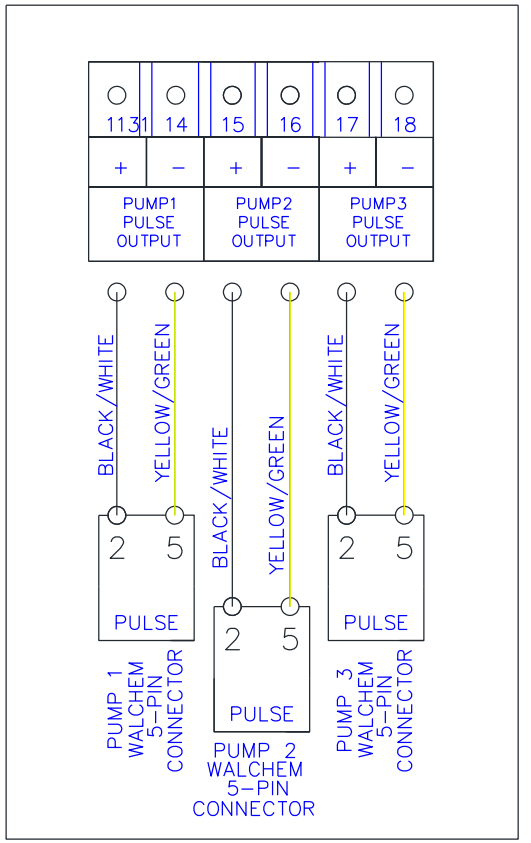
Flow Meter Signal

[Wiring Diagrams]

Pulse Flowmeter (GF Signet 3-2540-1)

Factory Unit

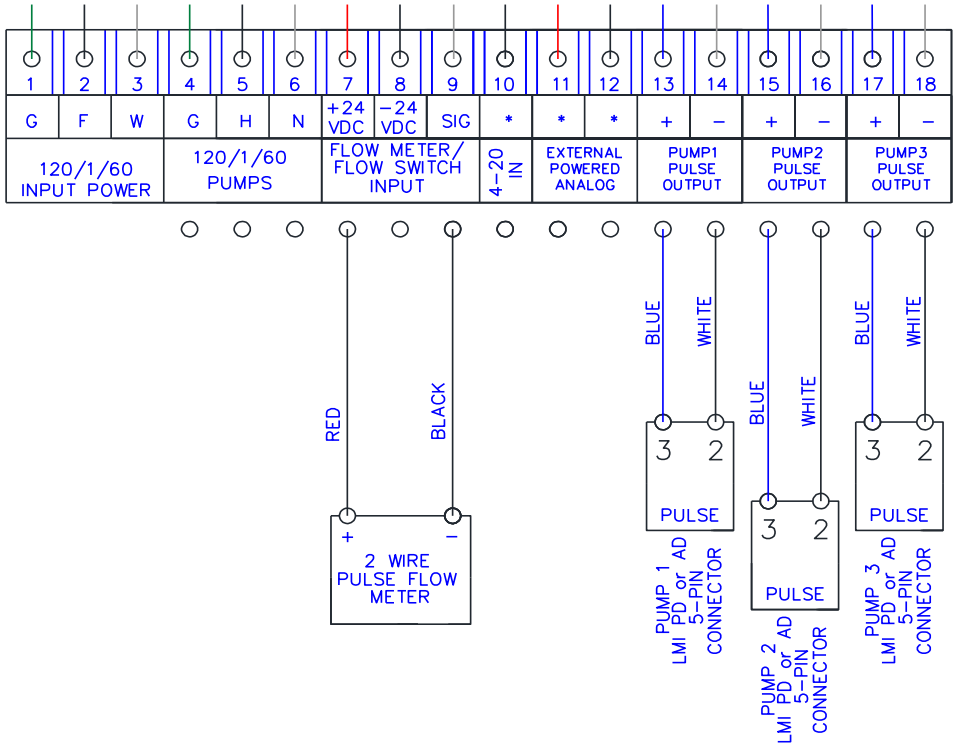


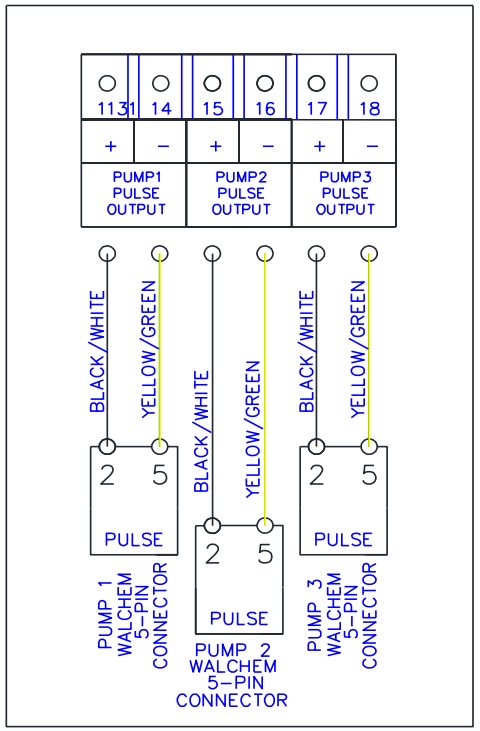


WHEN USING WALCHEM PUMP

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

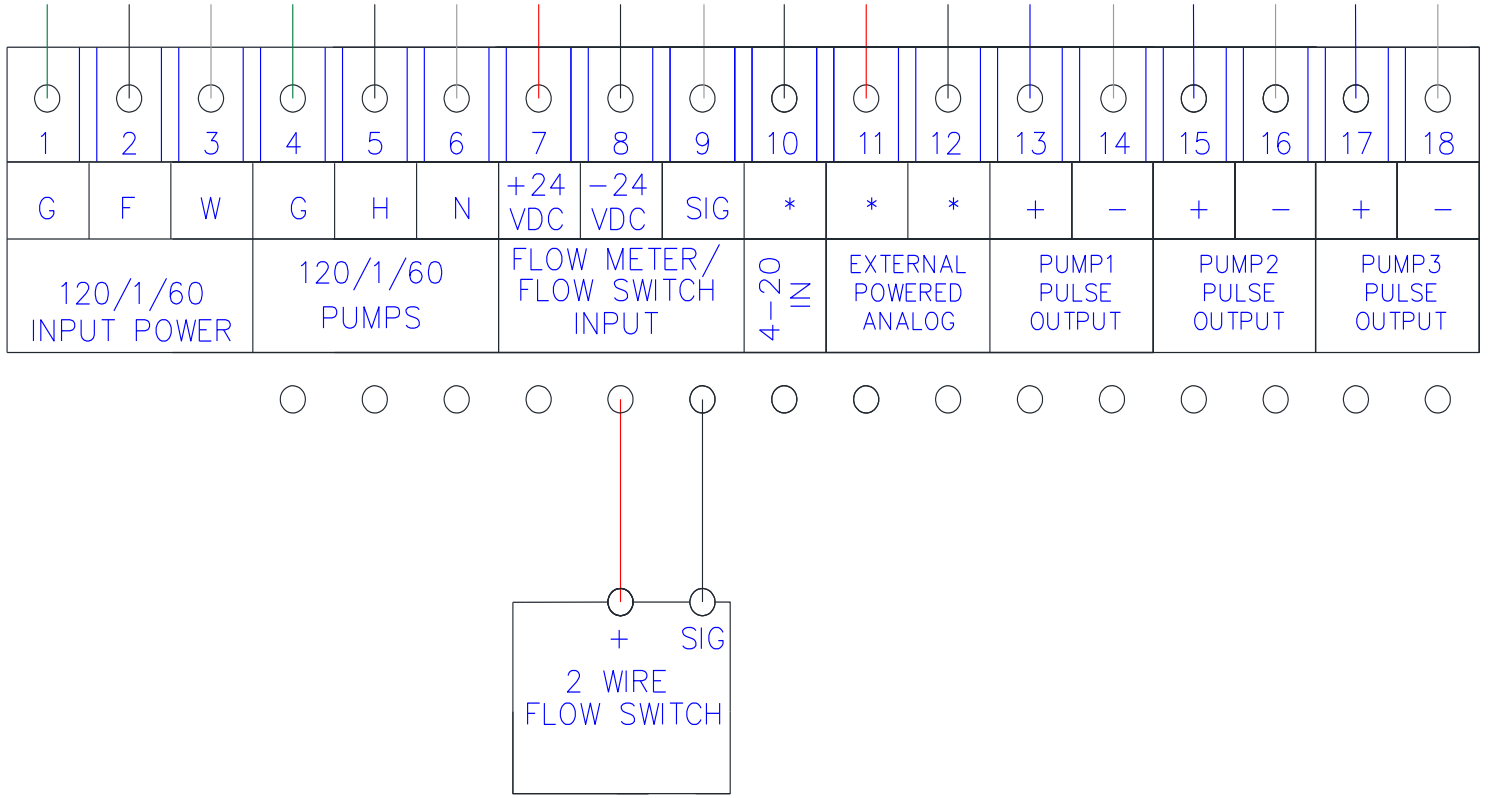
Pulse Flowmeter (2-wire)





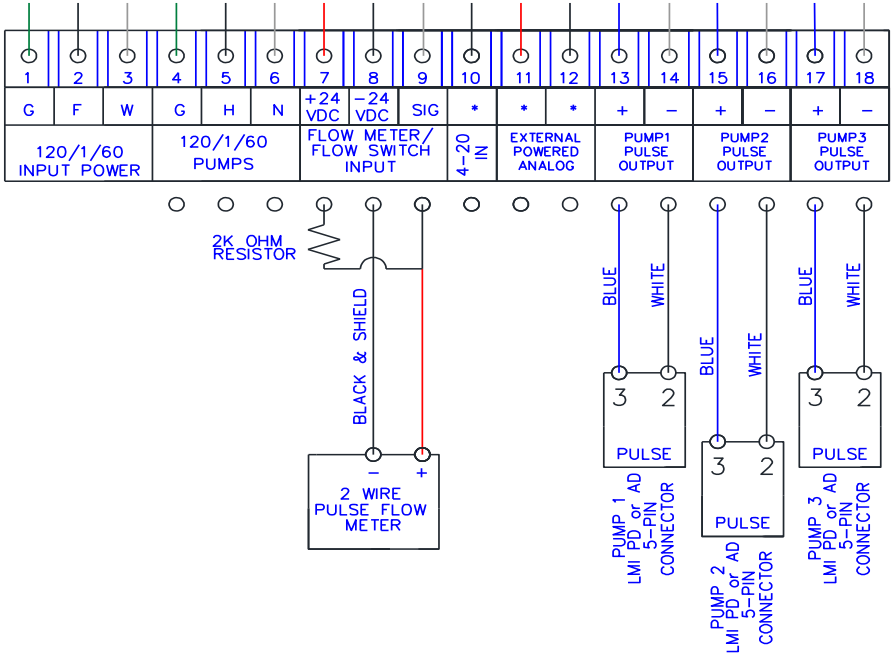
WHEN USING WALCHEM PUMP

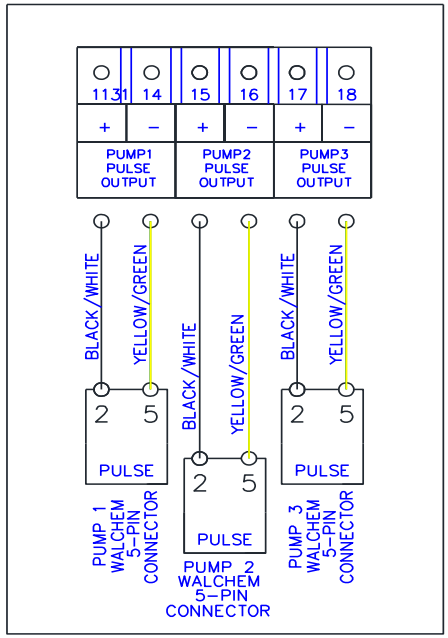
Flow Switch



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

Pulse Flowmeter (Data Industrial without Isolator)

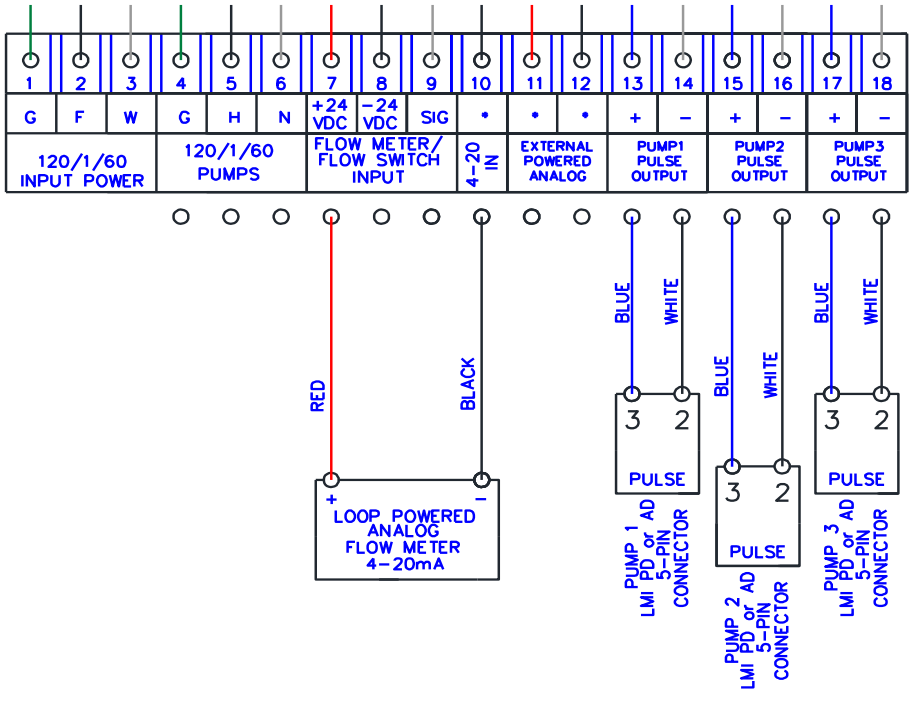


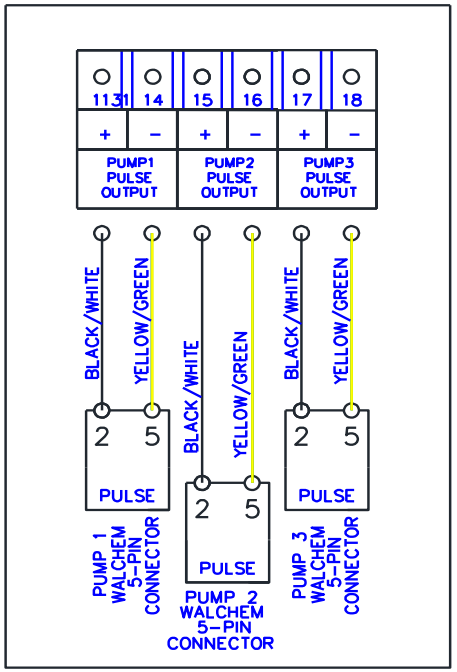


WHEN USING WALCHEM PUMP

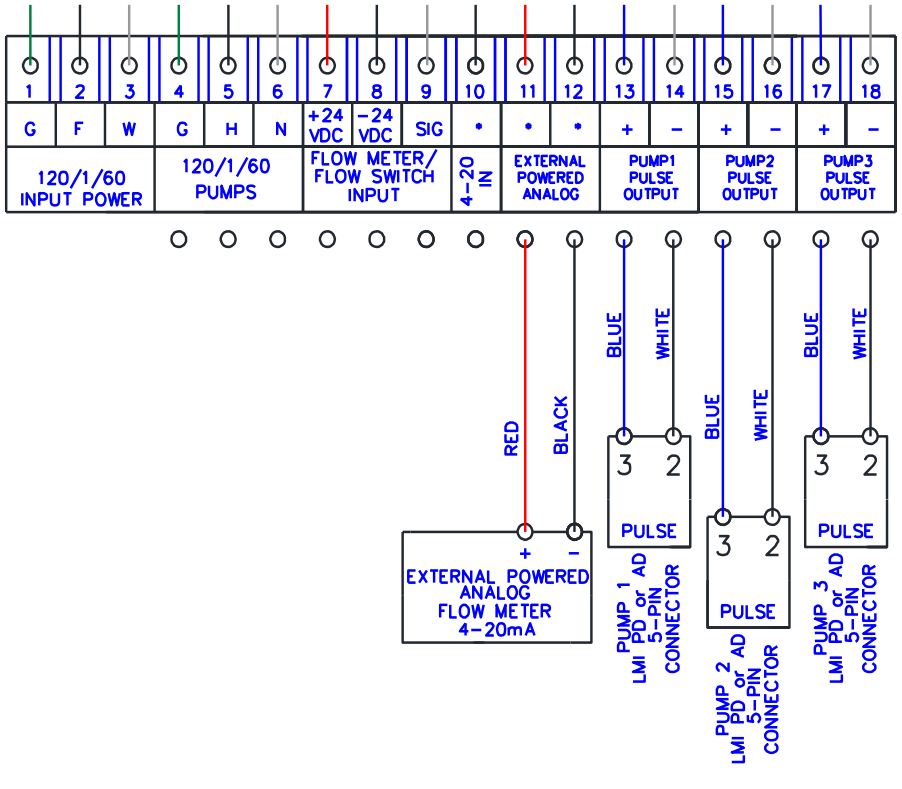
9/2022 - Pump 1, 2 and 3 are pre-wired.

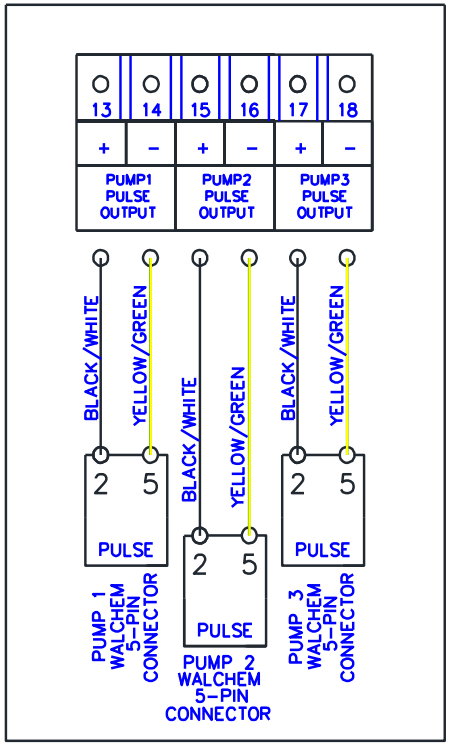
Loop Powered Analog Flowmeter





External Powered Analog Flowmeter





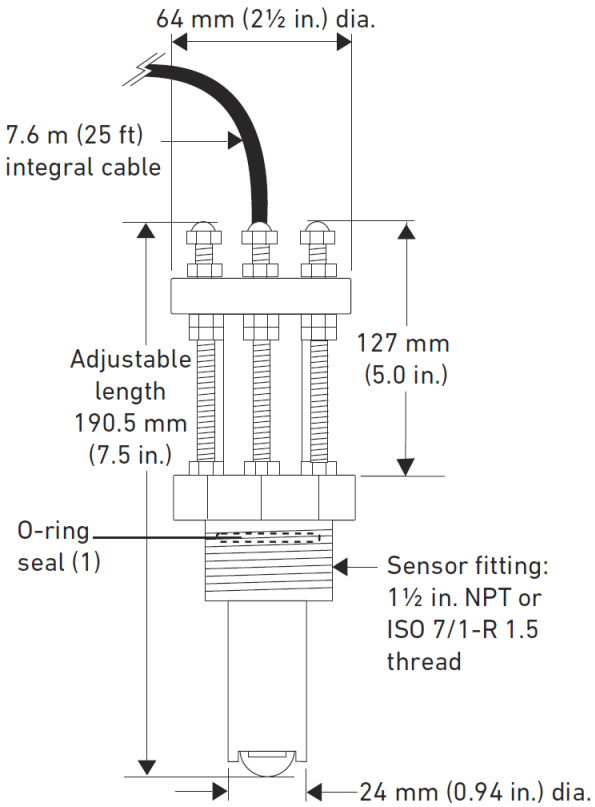
WHEN USING WALCHEM PUMP

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 fi eld 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.

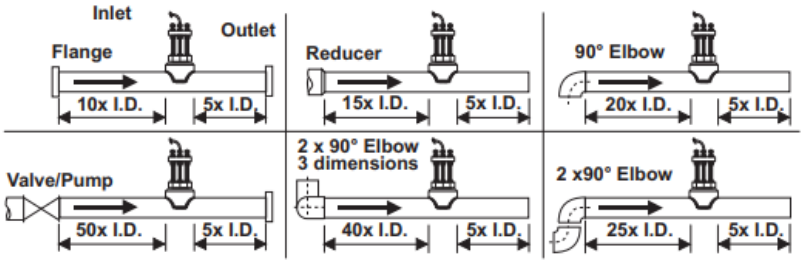
Dimensions

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



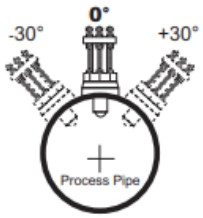
1. Location of Fitting

Recommended sensor upstream/ downstream
mounting requirements.



2. Sensor Mounting Position

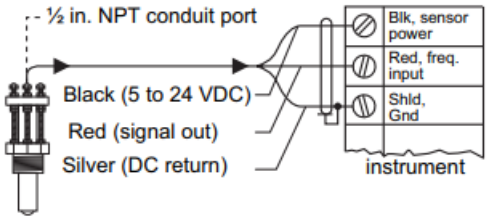
Vertical mounting is recommended for best overall performance. Mount at a maximum of 30° when air bubbles are present. **DO NOT** mount on the bottom of the pipe when sediments are present.



Note: Three options

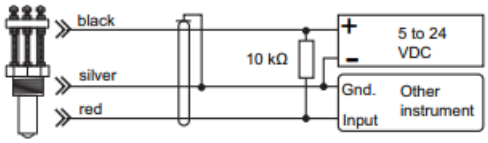
3. Sensor Wiring

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 – HCT FS-1 Chemigation System

No.	Action	Status
1.	What flow meter is used, is it the existing or a new meter?	
2.	WaterSOLV™ BC container is shaded, out of exposure to sunlight	
3.	Qualifying provision for eye wash – 3 second access	
4.	Qualifying provisions for BC water dilution, in case of spill or contact, including volume and gpm	
5.	Acid Neutralizer (baking soda, 1 lb/gl. of Curative)	
6.	Provision to keep Curative and BC from leaking into each other	
7.	Pump discharge lines – one continuous line, no couples or connectors	
8.	All lines exposed to the sun is the UV protected black tubing	
9.	Lines exposed to floor foot traffic are enclosed in flexible electrical conduit	
10.	Safety Signage is in place	

11.	All tubes from pumps, back into container, are tight fitting to alleviate fumes	
	2 lines from Curative – tight and not releasing vapors	
	1 line from TOP of BC Pump (degassing)	
12.	All fittings are not leaking	
13.	Client instructed to tighten all tube fittings 1-2 weeks after installation, tight “by hand only” to avoid breakage	
14.	Client instructed to periodically tighten pump head hex bolts.	
15.	Suction lines from pumps to the bottom of pumps, are upright, not sideways in the bottom of the container	
16.	Manually priming the pump, you observe the suction line drawing chemical	
	Hold down the START/STOP 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	
17.	Each pump individual data screens have been validated for settings	
	Pump is left with green circle, in auto mode, and degassing showing for BC	
18.	No pump discharge lines are overhead	
19.	WaterSOLV™ Curative is injected into the discharge side of the system	
20.	WaterSOLV™ Curative is injected through an EXTENDED quill, centered in the pipe - **HORIZONTALLY**	

21.	WaterSOLV™ Curative Injection quill in the last port on the discharge line.	
22.	Between waterings, you have observed the chemical levels in the containers drop.	
	Remember – each ppm is 1 gallon per million gallons of water output.	
	If you put out 1 million gallons of water, and are set at 2 ppm, the container should be 2 gallons less.	
23.	Chemical Application Feed Rates Set, ppm Curative	
	ppm, BC	
	ppm, Fertilizer	
24.	Are there any galvanic, different metal alloys, concerns of this piping, post the injection point of the WaterSOLV™ Curative?	
25.	Has a zinc anode insertion been considered on he discharge side of the of the water, post WaterSOLV™ Curative - recommended	
26.	Customer is aware of existing corrosion concerns and potential leaks, age of system / piping / alloys, sulfurous acid use over time, prior corrosion experiences.	
27.	Auto Degas sign Screen is set properly – every 360 minutes, 5 seconds, and on.	
28.	Pro Model Multifunctional Value is used for Curative, to prevent siphoning, in applications of depressurized irrigation lines (similar to drip systems and nurseries)	

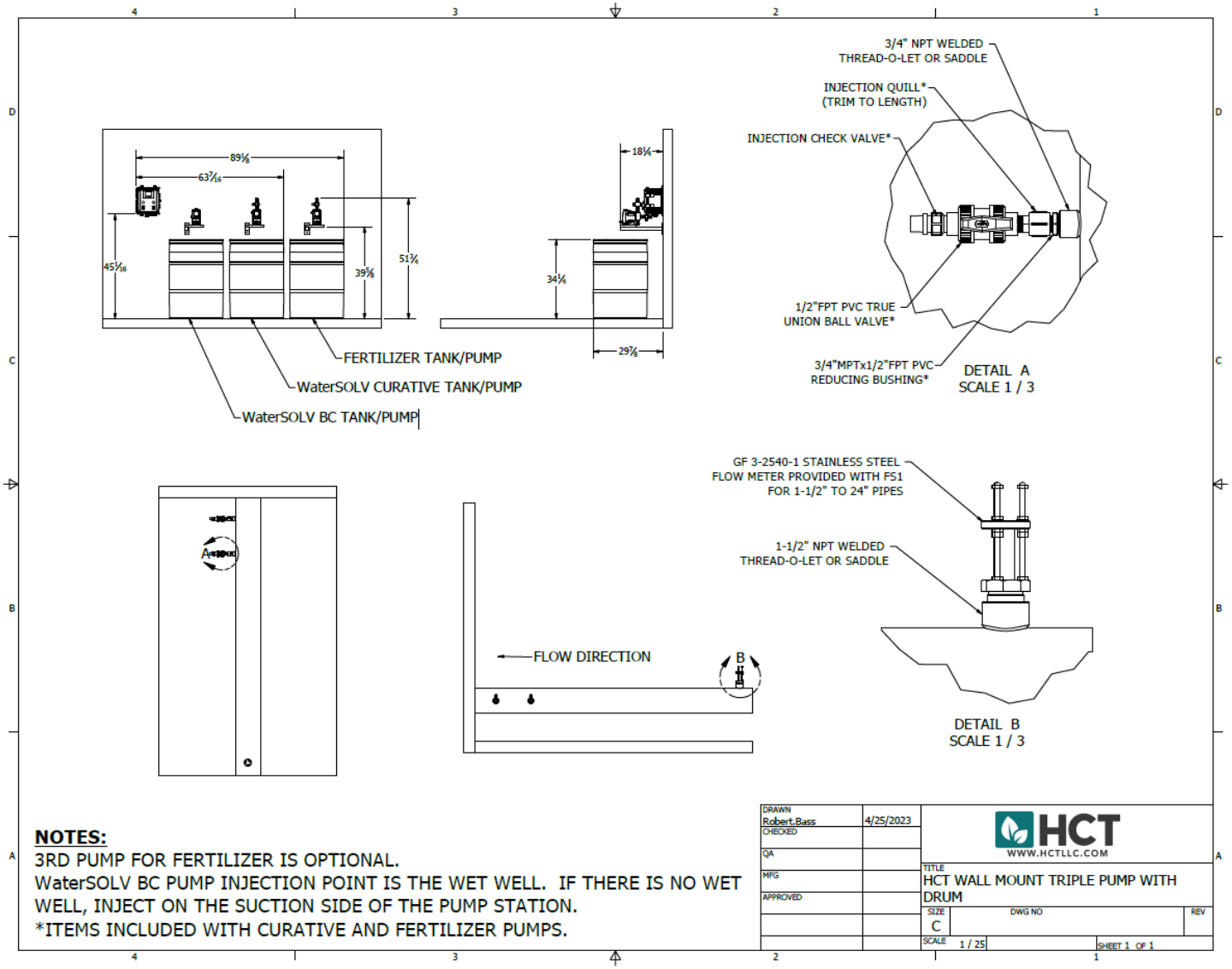
Both parties' signoff hereto that the above items are completed and in good operating order. It is mutually understood that return visits are fee based.

Installation Site: Contact: Pump Station ID:

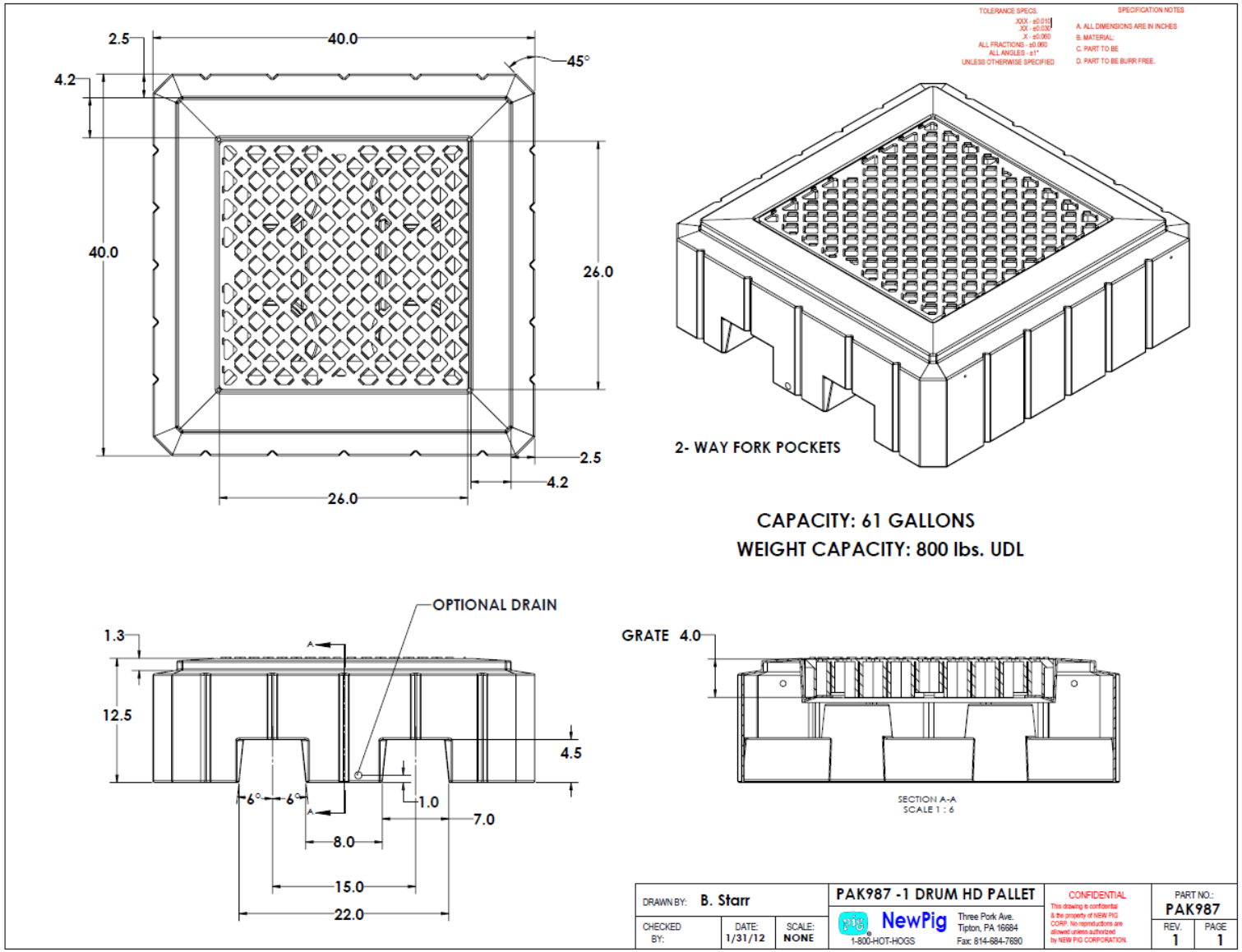
Installation Company: Technician: Date:

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

Floor Diagrams



Secondary Containment Platform



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							
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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

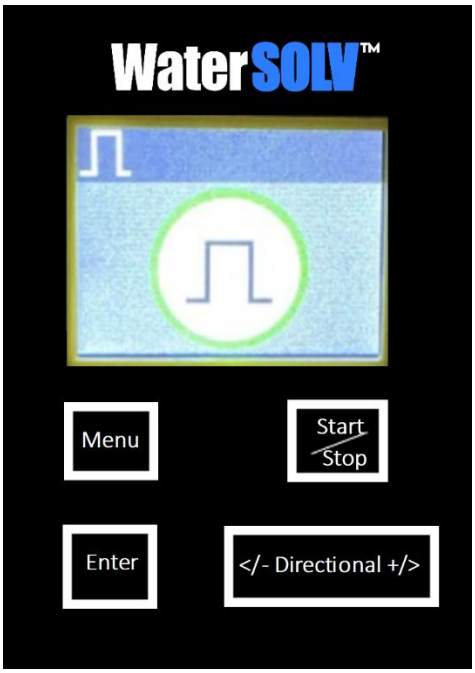


IMAGE – ON STANDBY, AWAITING PULSES

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

Degassing feature activated (BC Pump only)

Common Settings

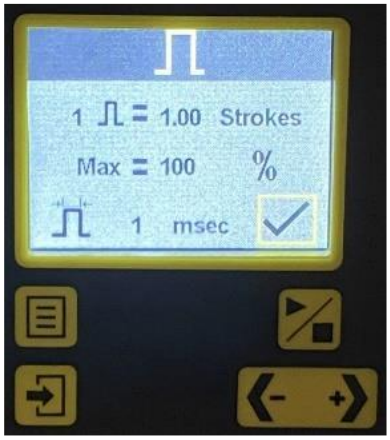
Note: Pump Menu heading.

Arrow over to the Top Hat.

Press Enter.

Enter

Assure next screen is at these settings.



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

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

Container Chemical Height	Total Container Product Inches
30 gl	36
55 gl	35
275 gl	45

Maintenance

Pumps and Tubing:

1. Having a gallon of water for rinsing aids in the reduction of fumes.
2. Inspect weekly.
3. Keep all fittings tight.
4. 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.
5. 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.

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 valves are not being used, removed, thrown away
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 appliable 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.

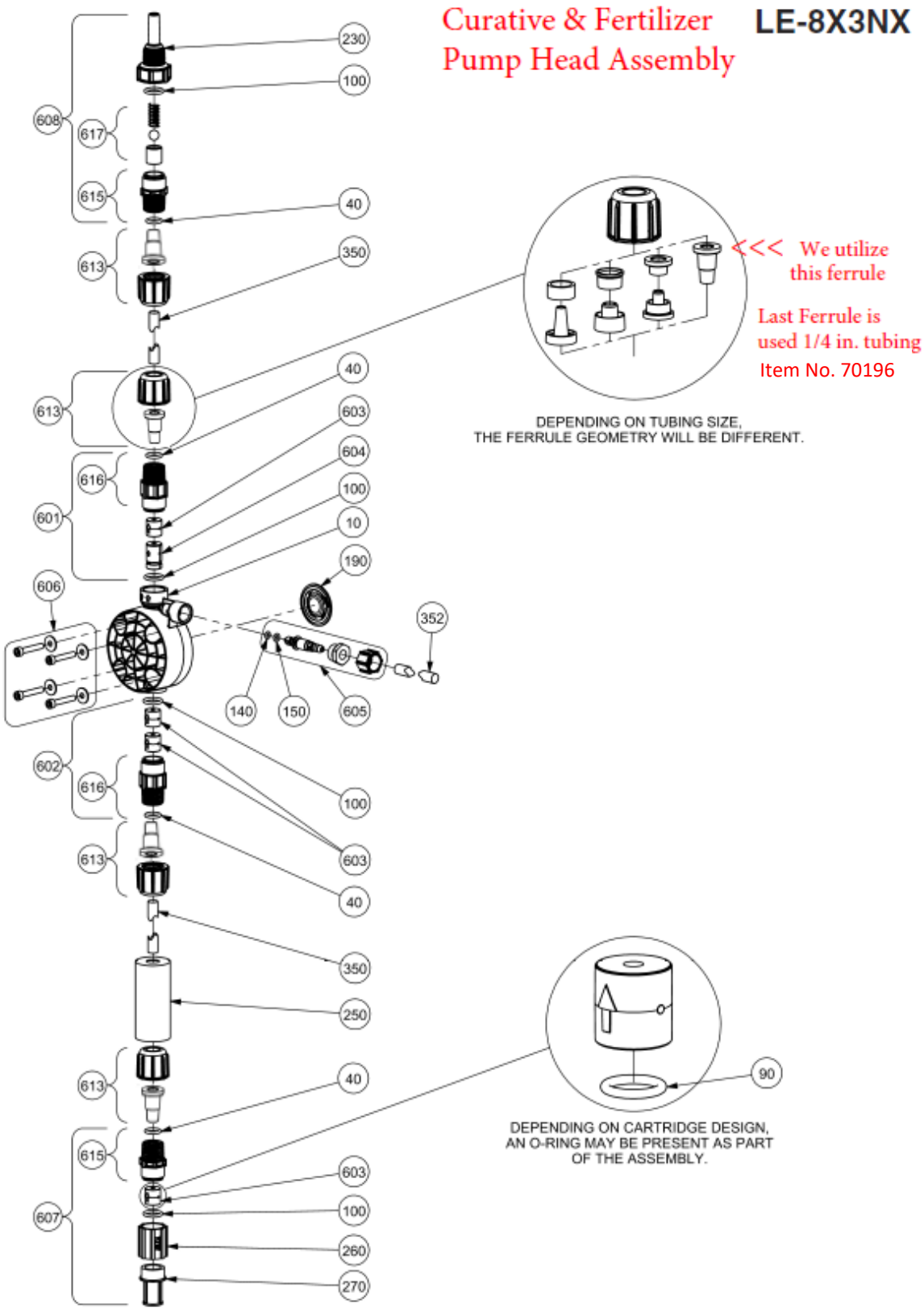
WaterSOLV™ BC

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

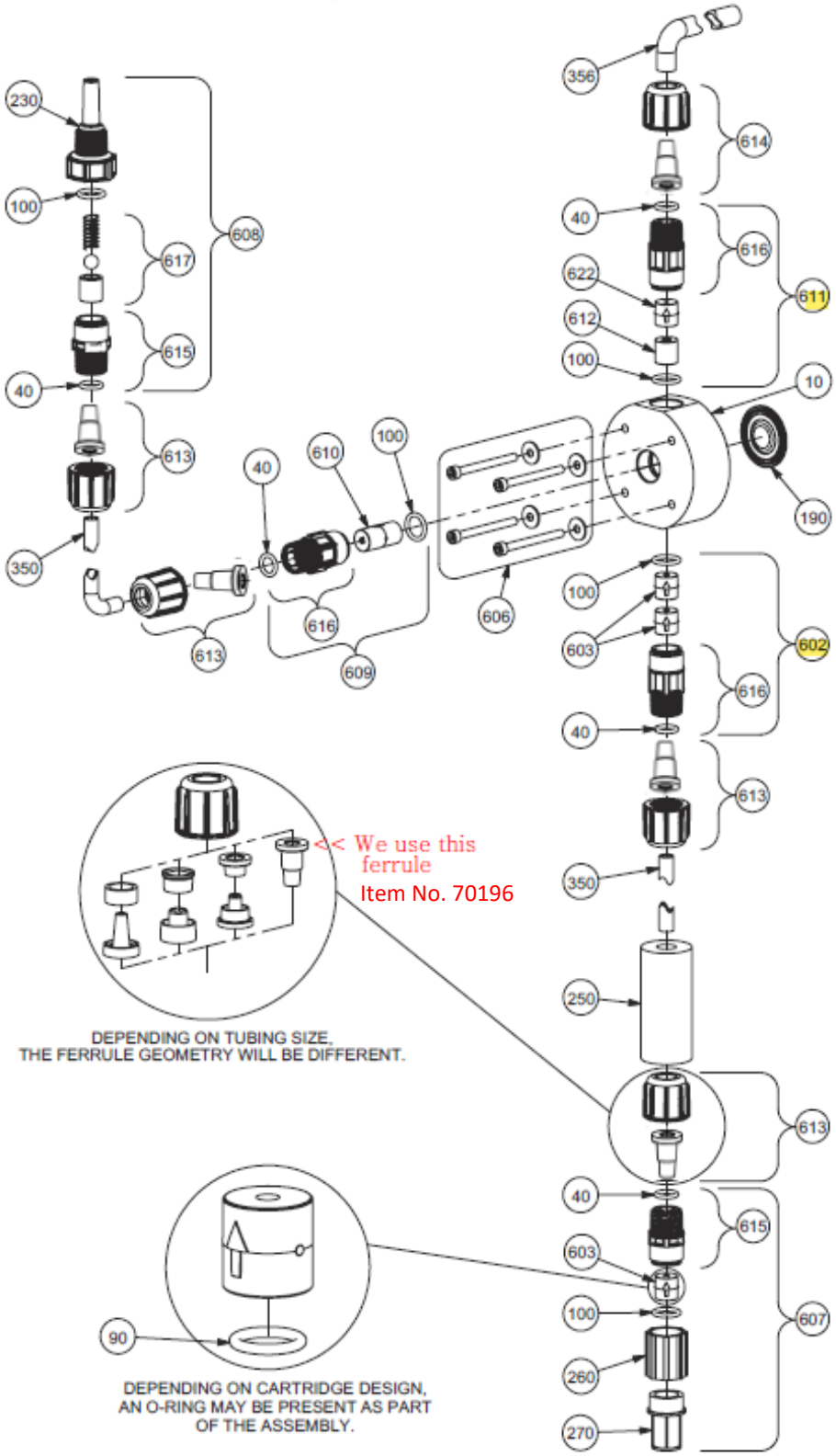

Curative & Fertilizer
Pump Head Assembly
LE-8X3NX
<<< We utilize this ferrule
Last Ferrule is used 1/4 in. tubing
Item No. 70196
DEPENDING ON TUBING SIZE, THE FERRULE GEOMETRY WILL BE DIFFERENT.
DEPENDING ON CARTRIDGE DESIGN, AN O-RING MAY BE PRESENT AS PART OF THE ASSEMBLY.
230
100
608
617
615
40
613
350
40
613
603
604
616
100
601
10
190
606
352
140
150
605
602
616
100
613
603
40
350
250
613
40
615
603
607
100
260
270
90

LE-8X3NX

Key Number	Description	Part Number	QUANTITY			
			813NX	823NX	833NX	843NX
10	Pump Head Molded FastPrime™	48361	1			
		48364		1		
		48367			1	
		48370				1
40	O-Ring	48591	4	4	4	4
90	O-Ring	39413	5	5	5	5
100	O-Ring	48589	4	4	4	4
140	O-Ring	48590	1	1	1	1
150	O-Ring	48347	1	1	1	1
190	Liquifram™	48186	1			
		48187		1		
		48188			1	
		48189				1
230	Injection Check Valve Body	48618	1	1	1	1
250	Ceramic Weight	10322	1	1	1	1
260	Foot Valve Coupling	36204	1	1	1	1
270	Foot Valve Strainer	10123	1	1	1	1
350	Tubing, Suction & Discharge	25636-16	1	1*		
	8XXNI ONLY	10342-16		1#	1	1
	Tubing, Suction & Discharge	28636-16	1	1*		
	8XXNU ONLY	27342-16		1#	1	1
352	Tubing, FastPrime™	10469-06	1	1	1	1
601	FastPrime™ Discharge Check Valve	48666	1			
		48668		1	1	1
602	Suction Check Valve	48678	1			
		48680		1	1	1
603	Cartridge Valve	48545	4			
		48546		4	4	4
604	FastPrime™ Cartridge Valve	48551	1			
		48552		1	1	1
605	FastPrime™ Valve	48700	1	1	1	1
606	Liquid End Hardware	48703	1	1	1	1
607	Foot Valve	48724	1			
		48725		1	1	1
608	Injection Valve	48732	1	1	1	1
613	Tubing Connection Kit	77382	4	4*		
	8XXNI and 8XXNU	77383		4#	4	4
	Tubing Connection Kit	77378	4	4*		
	8XXNM ONLY	77379		4#	4	4
615	Single Ball Check Valve Fitting	48789	2	2	2	2
616	Double Ball Check Valve Fitting	48793	2	2	2	2
617	Injection Valve Cartridge	48795	1	1	1	1

BC Pump Head Assembly

LE-AX0AX, AX8AX



LE - AX0AX, AX8AX

Key Number	Description	Part Number	QUANTITY				QUANTITY			
			A10AX	A20AX	A30AX	A40AX	A18AX	A28AX	A38AX	A48AX
10	Pump Head AutoPrime™	48422	1							
		48423					1			
		48425		1						
		48426						1		
		48428			1					
		48429							1	
		48431				1				
		48432								1
40	O-Ring	48349	5	5	5	5	5	5	5	5
90	O-Ring	39413	5	5	5	5	5	5	5	5
100	O-Ring	36103	5	5	5	5	5	5	5	5
190	Liquifram™	48186	1				1			
		48187		1				1		
		48188			1				1	
		48189				1				1
230	Injection Check Valve Body	48617	1	1	1	1	1	1	1	1
250	Ceramic Weight	10322	1	1	1	1	1	1	1	1
260	Foot Valve Coupling	36204	1	1	1	1	1	1	1	1
270	Foot Valve Strainer	10123	1	1	1	1	1	1	1	1
350	Tubing, Suction & Discharge **AXXAI ONLY**	25636-16	1	1			1	1		
		10342-16		1	1	1		1	1	1
	Tubing, Suction & Discharge **AXXAU ONLY**	28636-16	1	1			1	1		
		27342-16		1	1	1		1	1	1
356	Tubing, AutoPrime™	10142-10	1	1	1	1	1	1	1	1
602	Suction Check Valve	49166	1				1			
		49163		1	1	1		1	1	1
603	Cartridge Valve	48545	3				3			
		48546		3	3	3		3	3	3
606	Liquid End Hardware	48702	1	1	1	1	1	1	1	1
607	Foot Valve	49164	1				1			
		49165		1	1	1		1	1	1
608	Injection Valve	48728	1	1	1	1	1	1	1	1
609	AutoPrime™ Disch. Check Valve	48704	1				1			
		48705		1	1	1		1	1	1
610	AutoPrime™ Disch. Cartridge Valve	48706	1				1			
		48707		1	1	1		1	1	1
611	AutoPrime™ Shuttle Valve	48708	1	1	1	1	1	1	1	1
612	AutoPrime™ Cartridge Valve	48709	1	1	1	1	1	1	1	1
613	Tubing Connection Kit **AXXAI and AXXAU**	77382	4	4			4	4		
		77383		4	4	4		4	4	4
	Tubing Connection Kit **AXXAM ONLY**	77378	4	4			4	4		
		77379		4	4	4		4	4	4
614	Tubing Connection Kit **AXXAI and AXXAU**	77384	1	1	1	1	1	1	1	1
	Tubing Connection Kit **AXXAM ONLY**	77380	1	1	1	1	1	1	1	1
615	Single Ball Check Valve Fitting	48787	2	2	2	2	2	2	2	2
616	Double Ball Check Valve Fitting	48791	3	3	3	3	3	3	3	3
617	Injection Valve Cartridge	48795	1	1	1	1	1	1	1	1
622	Cartridge Valve	48543	1	1	1	1	1	1	1	1

HCT – LMI Curative Pump Rebuild Kit

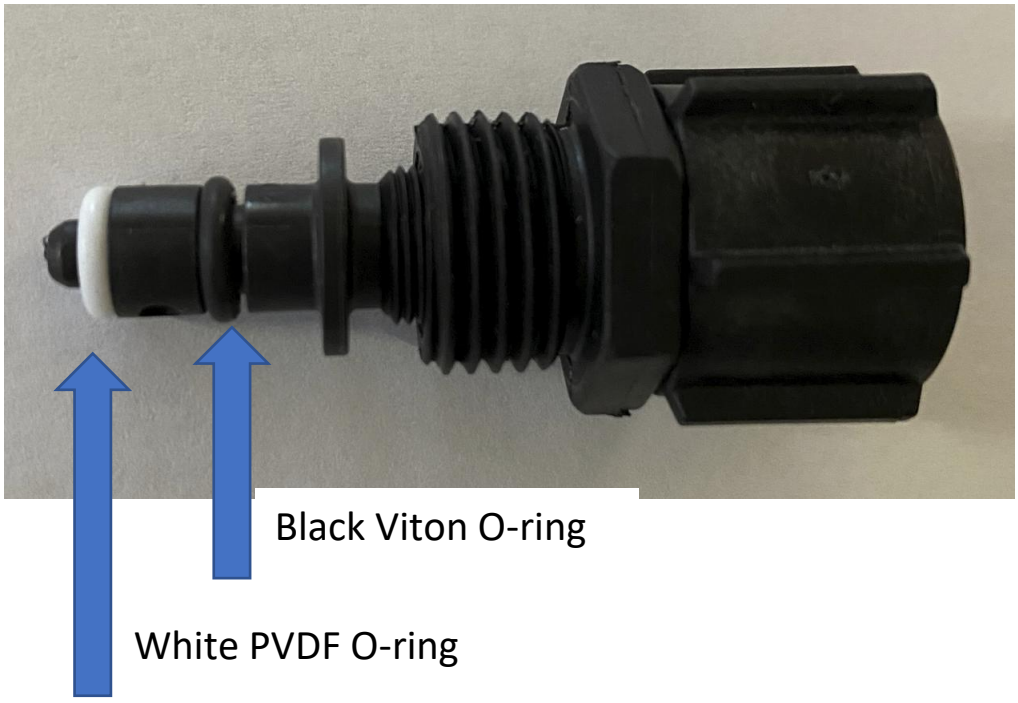
And Curative and BC Priming
HCT, LLC (ver. 7/2024.2)

Online Video: https://youtu.be/vOFudi0LX38
Internet path: HCTLLC.com > Chemigation > Pump Head Int…

Priming Valve & O-ring Configuration

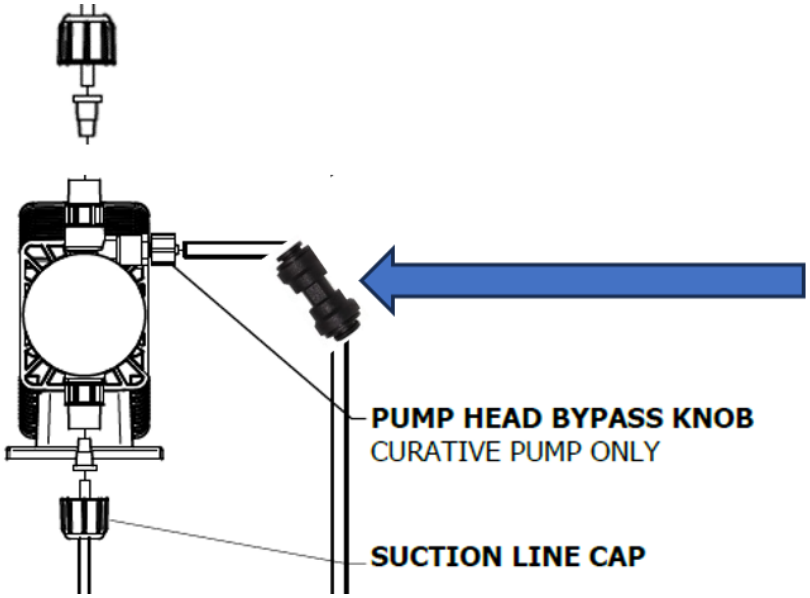
This is the bypass valve on the Curative & Fertilizer pump. It is screwed into the side of the pump head by the main nut, then screwed on by the ridged tab to close. When priming the pump, the valve may be opened to release pressure, by turning the ridged tab counter clockwise. This operates similar 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.



Look inside the pump head, to be sure you do not put two white o-rings in the head.

Priming Valve Tubing & Line Connector



New tubing connector provided – 3/8 vinyl to ¼ snap connector (black). Connect 3/8 vinyl tubing to ¼ inch PVDF tubing. Run the ¼ in. tubing to the product container.

Removing and replacing Liquifram Plunger

See online Video: https://youtu.be/vOFudi0LX38

Plunger, screw off, screw on – inside discharge head.

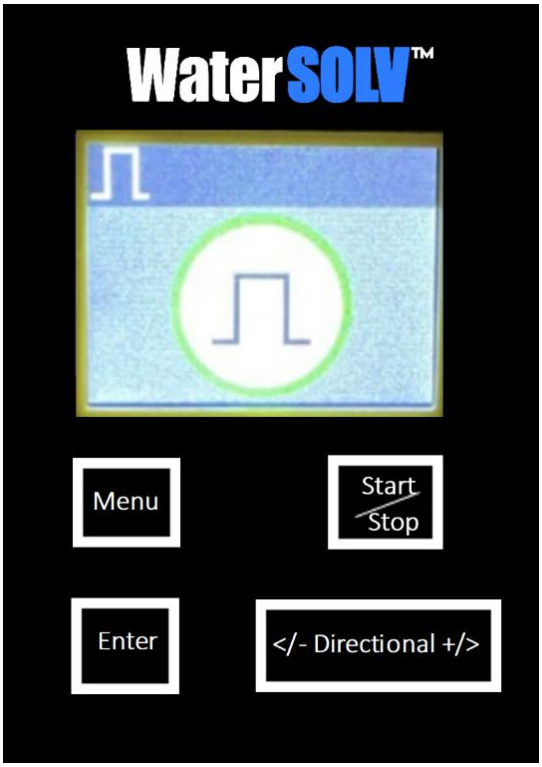
1. Remove 4 screws (4 mm hex)
2. Pull head off
3. Unscrew plunger
    a. Pill plunger head out if stuck in the head
    b. Unscrew metal/plunger from shaft of motor plunger
4. Remove spacer plate and assure rubber seal behind it is in place.
5. Place plug into the bottom of the Spacer plate

6. Place spacer plate in position
    a. Without disturbing rubber seal behind it
    b. Plugged hole on the bottom
7. Screw plunger onto pump motor shaft – hand tighten as firm as possible, NO TOOLS
8. Re-attached head
9. Tighten head screws evenly in a crisscross manner
10. CHECK tubing connections, make sure they are all tight
11. Open bleed valve
12. Hold Start/Stop Button down 3 seconds to initiate 60 second manual pumping operation
    a. Repeat as needed until liquid flows from the Priming Valve.
    b. Close Priming Valve
    c. Observe discharge line pulsating
13. CHECK Liquid level of container each day thereafter to validate chemical is being distributed
14. Calendar a new Plunger for this time next year

How is your tubing?
Opaque tubing fails in about one year exposed to UV and 2 years unexposed. NEW - Extended Life tubing – ¼ x 40 ft. black - https://www.hctllc.com/product-page/extended-life-tubing-x-40-ft-black

Pump Labels

Words versus Icons



Replacement Head Screws and Lock Washers (4)

Curative and BC LMI Pump Priming

Basic Pump Overviews

1. Pumps are good at pumping, they are BAD at suction, so we refer to them as pumps.
2. Is the suction line is too far away, too high, you will likely experience problems. Please refer to the installation guidelines if this is a new installation, versus re-priming a previously working installation.
3. The pumps have three basic functions
    a. A plunger disc will create a pull/suction, and a push/discharge.
4. Suction is the bottom port of the pump head.
5. Discharge is different between both pumps
    a. Curative, the discharge is the top port
    b. BC, discharge is the port on the back end of the pump head
6. Both pumps have a pressure relief system to provide function.
    a. Curative has a pressure relief, priming valve on the side of the pump head. By turning the ribbed knob, not the hex head up against the pump head itself, it opens the valve, thereby reliving discharge pressure for easier priming. Once fluid come out of this line, then it needs to screwed back in and you should see the discharge line pulsating.
        i. By holding down the Start/Stop button (top right) 3 seconds, you will activate the pump on to generate pumping. It will stop in 60 seconds. You can do this again until you see fluid from the bleed line, and when closed, the discharge line pulsation
    b. BC has a “degassing” line, coming out the top of the pump head. On the face of the pump, it has bubbles, indicating the degassing function”s”, are on. Based on the degassing screen setting, the pump will come one a given frequency and duration. The degassing cartridge in the top of the pump head remains open when gasses pass by, and when liquid comes by it then closes. This is to assure more precise delivery of the fluid, by removing the gasses it creates.
7. Suction and Discharge is done by a plunger in the head. It is activated with a rod from the motor. To replace the plunger, you remove the head and screw it off, by hand. To put a plunger on, you screw it on by hand, as tight as you can.

    Re-cap:

    Curative - Suction, Discharge, Bleed / Prime lines
    BC – Suction, Discharge, Degassing lines

If you have a three-way valve in the discharge line, remove it. Do not use it.
When handling BC, wear protective rubber gloves
When handling Curative, mitigate the aggressive fumes you experience, along the way, as you go, by rinsing the area with water.

Curative:

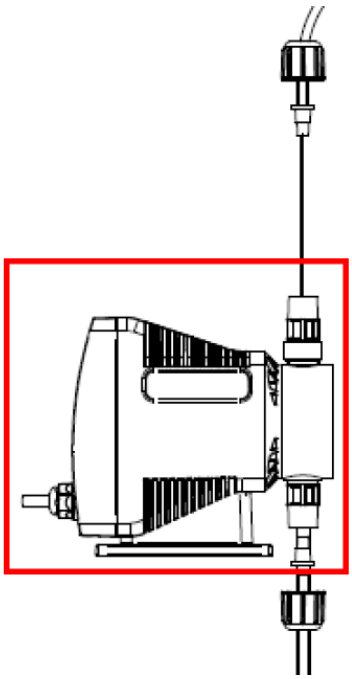
1. Pump is less than 1 year old – plunger is likely then in good shape. If over one year old, consider replacement (annually).
2. Configuration of the Curative lines
    a. Top port, line goes to discharge the chemistry into the discharge side of the water line
    b. Bottom port / line is the suction of chemistry into the pump head
    c. Side line from the pump head, is run back into the container.
3. Configuration of the BC lines
    a. End of the pump head port, line goes to discharge the chemistry into the suction side of the water line or water well, or wet well.
    b. Bottom port / line is the suction of chemistry into the pump head
    c. Top line from the pump head, is run back into the container.
4. Suction fitting at the pump head is tight.
5. Suction line in the container has to be upright, no more angle than 45 degrees. (This has a ball and check valve in it. It must be upright for the line to hold chemistry in it when the suction draws chemistry into the line. Similar to stepping up a ladder, each suction, gets the fluid to the top.
6. The suction line should be as short as possible, although allow for easy chemical replenishment.
7. The discharge line fittings are tight. PLEASE BE CAREFUL WHEN TIGHTENING LINE CAPS, YOU DON'T BREAK THE HOUSINGS THEY ARE SCREWING ONTO. FITTINGS INTO THE PUMP HEAD CAN BE LIGHTLY WRENCHED ON. LINE CAPS SHOULD ONLY BE AS TIGHT AS YOU CAN BY HAND. BE SURE TO SECURE THE FITTINGS YOU'RE TIGHTENING THEM ONTO SO THAT THEY DON'T BREAK.
8. Open the bleed ribbed knob > press the Start/Stop button 3 seconds, wait for chemistry to come out, tighten the knob > the discharge line should pulse.
    a. The bleed line should not leak any liquid when the pump is pumping. If it does, the two o-rings of the part may need to be replaced. ASSURE you remove "TWO o-rings, and then replace them both. MAKE sure one o-ring is not stuck in the pump head (white Teflon o-ring)
    b. Periodically tighten the pump head screws (4 mm Allen wrench)
9. If all this fails, it is likely a plunger issue – even if it primes, but does not pulsate the discharge line. Inspect the plunger, replace it if needed, and utilize new head bolts and locking washers

BC:

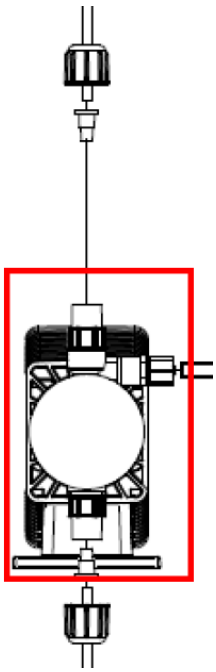
1. This plunger is quite bullet proof. It should be replaced every 2-3 years.
2. Assure the suction line is upright, no more than 45-degree angle
3. Assure the caps are tight where it connects to the pump on the bottom of the head.
4. DO NOT EXPECT FLUID TO COME OUT THE DEGASSING TUBE (TOP OF PUMP). That line release gas, NOT fluid.
5. If still not priming, consider removing the discharge line off the pump head (from the end of the pump head), and try to prime. If fluid pulses out. Relace the line on the head, start the pump, and look for the line to pulse.
6. If the line does not pulse, remove the degassing cap > pour water into the fitting still attached to the head > re-attach the line, start the pump, look for the line to pulse.
7. If the pump does not operate, contact HCT.
8. Please make sure BC is placed avoiding sunlight. This is a chemical reaction / bubbling, gaseous and safety situation, not a product degradation problem.

Pump & Head Return Items (do not include lines, just pump motor, head and all associated fittings)

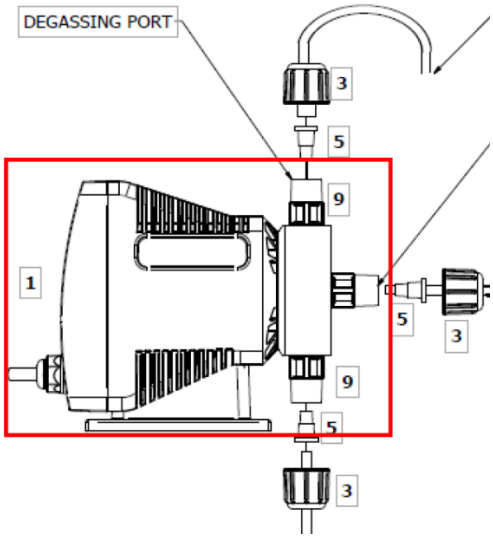
Curative Side View



Curative End View



BC Side View



Warranty / Repair Return Address

Joe Thomas JoeT@apumpstore.com

JL Wingert

1906 S. Quaker Ridge Place

Ontario, CA 91761

www.Jlwingert.com

FS-1 Fuse

#SB 15A 125V BEL <PS> EJET 125V