



Precision-24 Pump Proportional Feed Chlorinator Installation & Start-Up Guide

Thank you for purchasing a Clean Water System! With proper installation and a little routine maintenance, your system will be providing treated water for many years.

Please review this start-up guide entirely before beginning to install your system and follow the steps outlined for best results.

Helpful Videos:

www.youtube.com/channel/UC415QpvlRz-YAntxIMiel2w/videos

LIQUID POOL CHLORINE CAN DAMAGE CLOTHING AND IRRITATE SKIN AND EYES.

USE RUBBER GLOVES AND EYE PROTECTION WHEN HANDLING.

WARNING: Risk of electrical shock.

Read Precision-24 Pump Installation Manual before installing. The pump is supplied with a grounding conductor and grounding type of attached plug. To reduce risk of electrical shock, be certain that it is connected to a properly grounded grounding-type electrical receptacle.

This pump is intended for indoor use. Sunlight can damage the tubing and degrade liquid chlorine.

2806-A Soquel Ave Santa Cruz CA 95062

For assistance call: 1-831-462-8500

Email us: office@cleanwaterstore.com

More information online: www.cleanwaterstore.com



Precision-24 Metering Pump

Warranty and Returns

- Your pump and flow sensor come with a 1 Year Warranty from date of delivery.
- If your pump or flow sensor fails under warranty, please call or email our office to obtain a Returns Good Authorization Number before sending us back the pump for repair or replacement under the warranty. No returns can be accepted without an RGA number.

The Warranty covers repair and/or replacement of the metering pump but not shipping costs.

While defects are rare, we do our best to respond to warranty returns fast as we can. Please allow 3 to 5 business days after pump has been returned for your pump to be repaired or a new one supplied under the warranty agreement.

Conditions Not Covered by the Warranty:

1. Cutting off the power cord plug. This voids the warranty.
2. If your pump is 110-volt model: Plugging a 110-volt pump into 220-volt power will destroy the pump and is NOT covered under warranty. Please verify the voltage you are plugging your pump into.
3. Power surges or outages that cause pump failure are not covered under warranty.
4. **Surge protection is strongly recommended.** If a pump is returned for warranty replacement and the cause of failure is determined to be from a voltage spike, the pump does not qualify for replacement. This is the leading cause of failure for pumps and valve control heads. Pump failure during or as a result of power failure is not covered under warranty.
5. If you need to return the pump to switch to a different voltage (say you ordered a 110v pump but find out you want 220v) please call our office and get an RGA# and return it, and we will send a replacement to you once we receive your returned pump. A \$9.95 flat fee shipping charge will be charged for shipping replacement pump ground in the continental U.S. unless you want to pay for expedited shipping, which is available.

Clean Water Systems & Stores Inc. 2806-A Soquel Ave Santa Cruz, CA 95062

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Pre-Installation

1. Review your packing list and make sure you have received all the parts before beginning installation.
2. If you are going to be turning off the water to the house and you have an electric water heater, shut off the power to the water heater before beginning installation in case water heater is accidentally drained.
3. Pick a suitable location for your chlorination system on a dry level spot where it won't be exposed to freezing temperatures. Maximum line pressure is 100 PSI.
4. Get all of your plumbing parts together before beginning installation. Installation typically takes 1 to 5 hours.
5. After the system is installed and running, your water may temporarily be discolored from the initial chlorinated water, or full of sediment or rust, particularly if you have older or corroded piping.

Quick Start Guide

1. See typical installation for well water (see Fig 1).
2. Install flow meter (must be installed on horizontal plane, with the meter face pointing straight up.)
3. Install Injection check valve. Make all tubing connections.
4. Plug Precision pump into an 110v wall outlet and leave plugged in. The pump will display "0%" to show that the power is on, but it will not be in operation at this time.
5. Press and release the "Stop/Start" button. The pump will begin pumping. The digital display will read:

SET: 100%	Manual	0%
Flow: 3.80 L/H		
Volume: 0.0 L/H		

If the pump stays on 0% when you press and release the Start/Stop button, this means the pump has already been put in Pulse Mode, or Step 7 is set at 1, and must be set to zero.

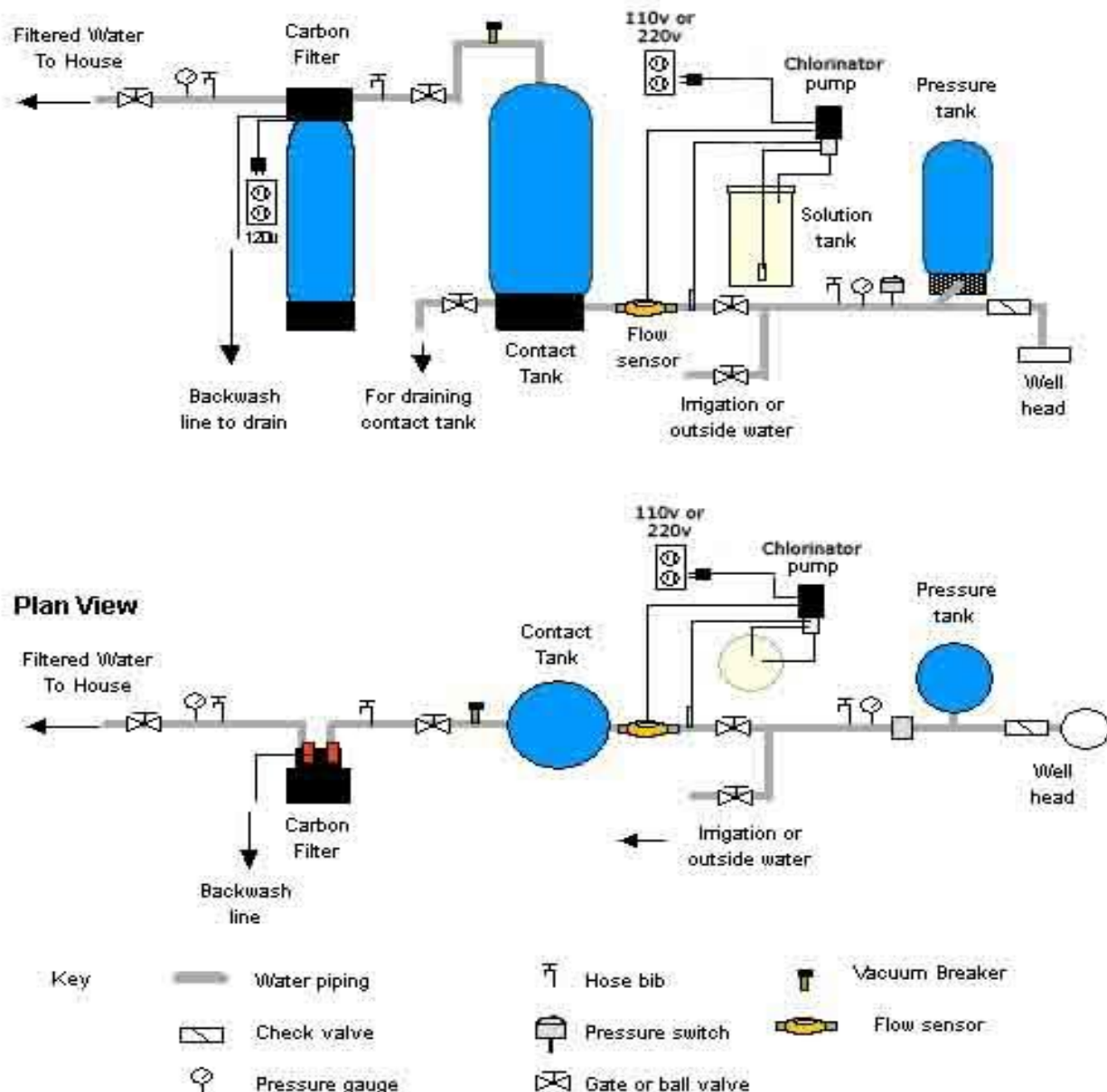
How to program the pump: Press and hold the Start/Stop button, and the display will quickly enter the programming- while it should start at 0, it will "start" wherever it was left at, the last time someone entered the programming. It also exits the programming quickly when no buttons are pressed. Adjust each of the following steps:

6. Step 0: Default value is 1, leave it at this, this step does not apply for your system.
7. Step 1: Default value is 180, leave it at this.
8. Step 2: Set to 38- this input is not important to the operation of the pump, per se, but it corresponds to the Volume of Solution pumped, which is displayed on the main screen.
9. Step 3: Default is 100, leave at 100, this parameter only applies when the pump is being used in Manual Mode.
10. Step 4: Can only be set to 0 or 1, and does not matter for your application.
11. Step 5: When this setting is on zero, the pump is in Manual Mode. When you set it to 1, now you are on Pulse, Multiplier- this means that whatever value you enter in Step Six, that is how many squirts of solution each gallon of water will get. If set at 2, now it is on Pulse, Divider- so if Step Six is set at 1, every two gallons of water will get one squirt (Pulse Divider is rarely used for home applications, you will generally want 1-3 squirts per gallon).

12. Step Six: If this is set to 0, the pump will Not pump in Pulse Mode. Set to 1, it will do one squirt of solution for each gallon that goes through the meter. The maximum it can be set at is 6 squirts per gallon.
13. Step 7: This **must** be set at zero. It can only be set to zero or one (off/on) and must be off.
14. Step 8: leave this at zero also, it is not used with your application.
15. Install the meter **horizontally** with the display facing forward and the inlet port facing the water supply line.
16. Wire the metering pump cable to the Precision pump (see picture for wiring diagram).
17. Put 5 gallons of clean water in the solution tank (no chlorine yet)
18. Turn on pump and allow pump to prime and start pumping.
19. **READ ON FOR MORE DETAILED INSTRUCTIONS**

How Your Chlorinator Works

Install the Flow Meter horizontally with the display facing up in a location where it is easy to connect with the Precision-24 and electrical outlet. It does not matter if it goes before or after the injection point, but should be installed after the pressure tank and before the contact tank.



Installation Layout

Water from the well goes through the pressure vessel, and then the gets chlorine injected; where you install the injection check valve. Generally, the chlorinated water either then goes through an in line static mixer, or into a Contact tank, or both. From there, the chlorinated water now enters the first filter in your treatment chain. For best results, install the pump on top of the solution tank. You can run as many feet of tubing from the discharge of the pump to the injection check valve as you need to.

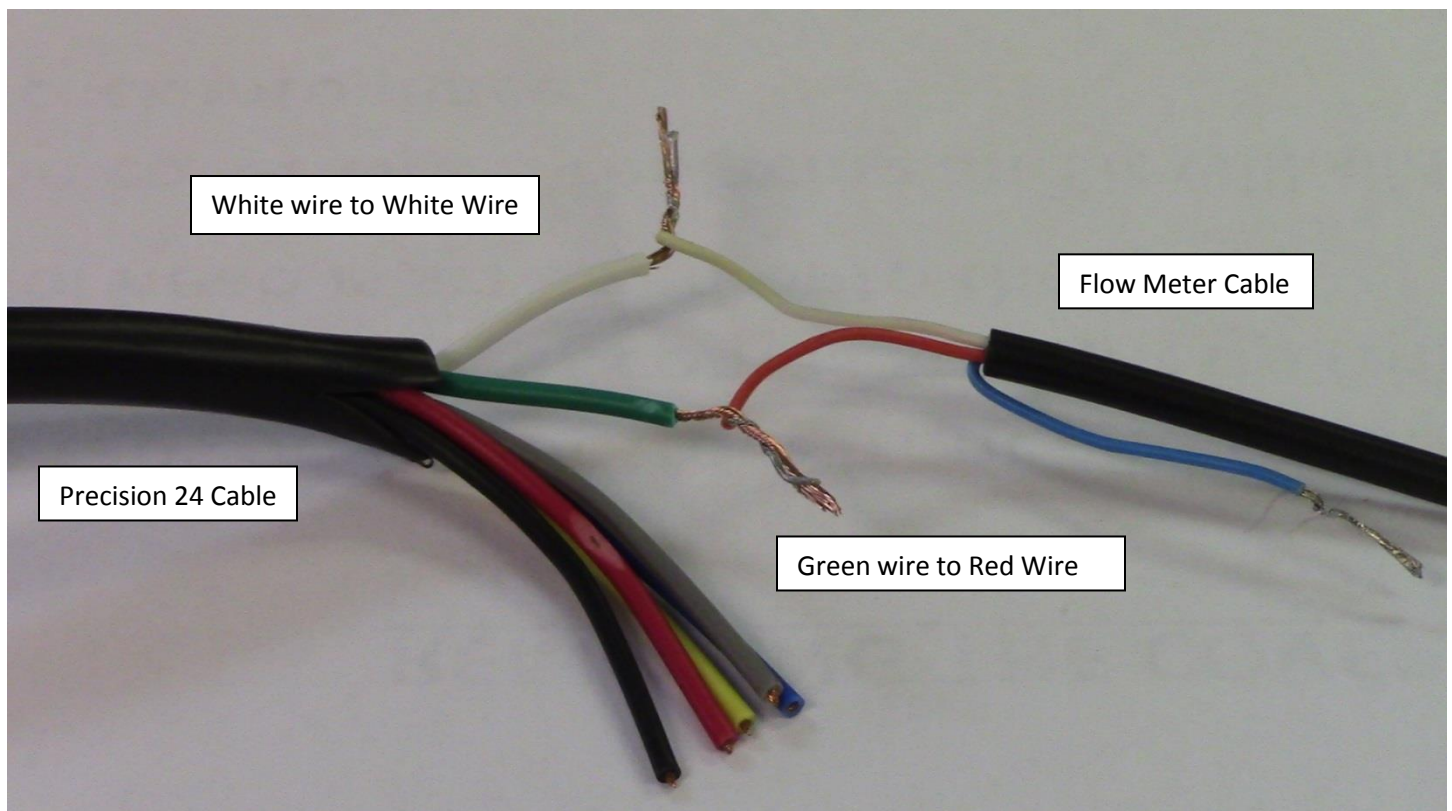
- * Make sure to install the meter **horizontally** with the display facing up and the inlet port facing the water supply line.
- * Make sure to install the pump itself **horizontally** (gray pump head parallel with the wall, not the floor)

Wiring the Precision-24 Pump

After placing the equipment where you would like it to be installed, plug the Precision-24 into the outlet, and plug in the metering pump cable to the Precision-24.

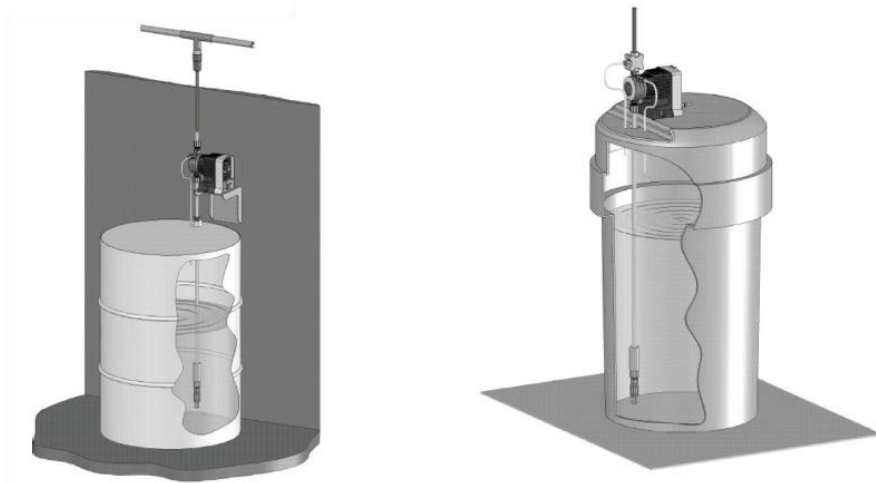
To connect the flow meter to the Precision-24, cut back the rubber on the flow meter cable, and strip the Red and White wires (blue is not used). Cut back the rubber on the metering pump cable, and strip the white and green wires.

Next, connect the white wire from the metering pump cable to the white wire from the flow meter cable. Finally, connect the green wire from the metering pump cable to the red wire from the flow meter cable. It should look like the diagram below. Lastly, either solder or connect the wires with wire nuts, and then seal the connection with shrink wrap or electrician's tape.



Installation Instructions

Typically the Precision-24 Pump is mounted on the tank, but can be mounted on a shelf above the tank as long as the pump is less than 60" from the bottom of the suction tubing.



Mounting Pump to Solution Tank

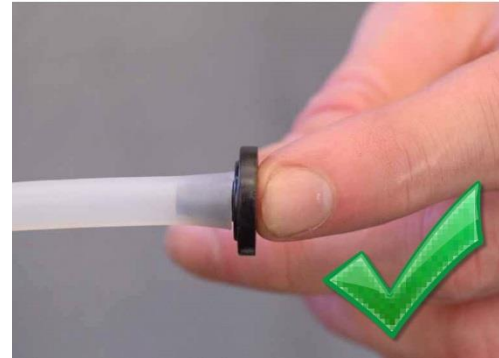
1. Position pump for installation. It really doesn't matter how the pump is oriented on the tank, just make sure it will be easy to change the pump settings and refill the solution tank with chlorine.



2. Mark where the anchor holes will connect the pump to the tank. Drill the pilot holes with a drill bit so that the pump can be mounted on the tank with two wood or sheet metal screws (screws not included). We recommend tightening the screws **after** the pump has been primed and the tubing has been hooked up for easiest installation.
3. Mark the hole for the suction tube and the degassing prime valve and drill with a 3/8" drill.



Installing the Pump Tubing



When attaching the tubing, make sure to push the tubing all the way to the end, so that it is up against the barbed compression fitting. Try heating the end of the tubing by dipping it in a cup of hot water or pressing it up against a hard surface if you are having trouble getting it to the end.

Discharge Side (tubing that feeds from top of pump into pipe where the water is to be chlorinated)

1. Shut off well pump or water supply and de-pressurize pipe.
2. Install injection check valve by installing a pipe tee in your pipe that has a $\frac{1}{2}$ " NPT fitting, where you can screw in the injection check valve (included with your Precision-24 pump). Wrap two wraps of Teflon tape on the $\frac{1}{2}$ " pipe threads of the injection check valve and apply a light coating of Teflon white pipe paste and install into pipes. **Do not apply too much tape or paste, and do not over-tighten the check valve into the threaded bushing, as you will crack the bushing.**
3. Install tubing that came with your pump and connect pump to injection check valve.
4. Cut lead tube to desired length with enough slack to avoid kinks. Hand tighten only. Do not use Teflon tape on the tubing fitting connections.

Degassing Prime Valve (tubing that allows the solution to be pumped back into the tank for fast priming)

1. Connect the $\frac{1}{4}$ " tubing supplied to the degassing prime valve to the solution tank by drilling a hole as shown on Page 6.
2. Insert and trim the tubing so it inserts into the solution tank a few inches, but does not touch the solution.

Suction Side (tubing inside solution tank)

1. Measure the lead tube on outside of solution tank to ensure it will be 2-3" from the bottom of the tank. Do not allow weight to sit at the bottom of the tank.
2. Run the lead tube to the solution tank. Allow for some slack in the tube to avoid kinks.
3. Add the weight, and connect the nut ferrule to the suction side of the pumping head (labeled 'in' on cover of head). Hand tighten only. Do not use Teflon tape.
4. Make sure that the tubing is FULLY inserted over the conical shaped fitting, so that it totally bottoms out and is pressed up against the fitting. If it is difficult to push the end of the tubing to the bottom of the fitting, try



heating the tubing with water or hot air (such as a hair dryer). The tubing can then be worked a little back and forth and worked down until it is seated. Then proceed by putting the fitting on and tighten.

5. Sometimes, if the tubing is sliding off the cone every time you push it on, it is because some oil or lube has gotten on something- wash Your Hands First, and then the parts in warm soapy water, rinse with water, dry, and try again.

Prime & Start The Pump:

1. Fill solution tank with 5 gallons of clean water (don't add chlorine bleach yet).
2. Connect the foot valve to the length of tubing you've cut to length for the suction side (6 o'clock, straight down)
3. Connect that tubing through the hole in the solution tank, and attach it to the Inlet (suction side, 6 o'clock)
4. Connect the degassing prime valve tubing and route to the solution tank, above the water line.
5. Open the degassing prime valve three turns counter-clock-wise to open it up before priming. There may be back pressure on the pump, so it will be easier to prime if the degassing valve is open at first
6. Turn the pump on in Manual Mode, with the % at 100%
7. You will quickly see water being pumped out the discharge tube.
8. After the pump is primed and is pumping, close the degassing valve 2-1/2 turns. The little valve should be just slightly open, so a small amount of chlorine solution can be pumped back into the tank, when the pump is running.
9. Your pump is now ready for use!
10. After the pump has been in operation for an hour or so, you should check the liquid end of the pump (back end) and re-tighten the Allen screws on the head in a crisscross fashion, if needed.
11. Add 1 gallon of chlorine to 9 gallons of water. You may change this solution strength later, but it is a good starting point.

Adjusting the Metering Pump Settings:

How To Select the Chlorine Solution Strength and Pump Setting

The goal of a properly functioning chlorine injection system is to have a free-chlorine residual of 0.2 to 1.0 ppm after sufficient contact time, before any carbon filter system. Or if no carbon filter or other de-chlorination is used, to have a free-chlorine residual of 0.2 to 1.0 ppm at the end of the distribution system or furthest point in the plumbing.

This is accomplished by adjusting the chlorine bleach solution strength and setting the Precision-24 Proportional number of squirts per gallon (each time the pump registers a gallon and sends a pulse to the pump).

In determining your metering pump's settings and solution strength, keep in mind that it's best to make up fresh solution once every 1 to 3 months. The chlorine solution loses strength as it ages, and is sensitive to heat and light. Generally, keep solution tank out of the sun and use fresh solution regularly for best results.

You can use household bleach (5%) for emergencies, but in general, you want to only use liquid pool chlorine, 12.5 % (sodium hypochlorite). Household bleaches may contain additives and/or heavy metals.

Step Two: How Much Chlorine Should Be Injected? Determine the parts per million of chlorine you are trying to achieve in parts per million (PPM).

Chlorine is injected in parts per million ('ppm') which is the same as saying milligrams per liter ('mg/L'). The amount of chlorine to add depends on the "chlorine demand" of the water. Chlorine demand is the amount of various contaminants in the water that combine with the chlorine after the chlorine has been injected and sufficient contact time has occurred. After the chlorine has combined with the various substances such as bacteria, iron, manganese and odor, some level of uncombined or "free" chlorine will exist. The goal is to have some small amount of free-chlorine, usually around 0.2 to 0.4 ppm of free-chlorine, up to a maximum of 1.0 ppm of free-chlorine.

For bacteria you want to inject 1 – 2 ppm of chlorine with approximately 10 minutes of contact time. If the water is colder than 50F (10C) and/or the pH is higher than 7.5 you may need longer contact time or a higher residual. For each part per million of iron or manganese generally you want to inject 1 ppm of chlorine. For each 1.0 ppm of hydrogen sulfide gas (which causes the rotten egg smell in water) you want to inject 2 to 3 ppm of chlorine. So, say you have bacteria and 2.0 ppm of iron. For our example here, we will assume you want to inject 3 ppm of chlorine.

Instead of trying to figure out, mathematically, what solution strength and number of squirts of solution per gallon to inject, it is much easier to just test for a residual- when you have a residual of between 0.2 and 1.0 ppm, you are done.

The proportion feed system does not have a "pump speed". However much or little you open a faucet(s), that rate of flow, small or large, is the "speed" – it is the speed of the water, in gpm, going through the flow meter.

There are two parameters that you need to adjust, to obtain a free residual: The solution strength (mix of chlorine to water) and the number of squirts each gallon gets.

Always go from lower to higher, that is, you want to gradually raise your chlorine input, until you show a residual, you do not want to over-chlorinate and then work down. If you start with one gallon of 12.5% bleach to 9 gallons of water, and set Step Six to one squirt per gallon, then after the chlorine has had contact time and you measure the residual, you will either have: too much (not likely, and you would add more water to the solution tank), or you will have close to the right range, or you will not test a residual at all- put Step 6 to 2, and run more water and test... If your chlorine demand is really high, you might get all the way to 6 squirts per gallon, and still not have a residual- add chlorine to the solution, and go back to Step 6 with one squirt, and repeat. Once you get the residual, then you will use the same solution

strength from batch to batch, and you should not have to further adjust the pump- always check the residual after making a new batch.

For those of you who do have a strong math background, this section covers dosage math. Be aware that other factors besides the ppm of iron, etc., determine how much to apply, water temperature and pH play a factor here, so even using the math, you will still check for, and adjust, the free residual. Also, your flow rate is always going to vary, that is the point of the proportional feed system.

Formula for Finding the Solution Strength and Metering Pump Settings:

1.0 Chlorine Calculations (Using an example or assumed maximum flow rate of 15 gallons per minute, which is a typical maximum flow rate for many homes. You can change the calculations by using your number, this is an example only.)

Max flow rate: 15 gpm

Minimum flow rate: 0.5 gpm

Applied chlorine dose: 4.0 ppm

Solution strength: 1% sodium hypochlorite (5,000 ppm) diluted from 5% bleach by adding 9 gallons of pure water to 1 gallon of 10% pool chlorine.

Formula Steps: (formula below uses cubic centimeters, or CC's of which there are 3785 CC's in one gallon)

1.1 Figure Pump Size and Model Required

$$\frac{15 \text{ GPM} \times 3785 \times 1}{5,000 \text{ ppm}} = 11 \text{ cc/minute}$$

Choose Precision 24 metering pump, which has output of 0.25 to 63 cc/min

1.2 Figure Percent of pump output required related to maximum output of pump.

$$\frac{11 \text{ cc/min required output}}{63 \text{ cc/min max. output}} = 17\% \text{ of pump output required}$$

1.3 Choose Pulses Per Gallon Setting

Choose pulse rate to yield 50-100 pulses/min. at maximum water flow rate.

Maximum pump rate of pump is 100 pulses per minute. Over 100 pulses per minute, the pump will not pump.

Choose 2 pulse/gallon; i.e. program FT420 flow computer for 2 pulse per gallon.

$$40 \text{ GPM} \times 2 \text{ P/G} = 80 \text{ pulses/minute to pump at the maximum speed.}$$

1.4 Figure Stroke Length Setting of Pump.

$$\frac{.57 \text{ of pump output req}}{.80 \text{ of max. pump speed determined by flow meter}} = .71 = 70\% \text{ stroke length knob setting}$$

Troubleshooting and Maintenance:

Most problems occur with the connections, it can sometimes be hard to push the tubing onto the cones, sometimes fittings are over-tightened, or people use Teflon tape and paste on fittings that do not need it.

Remember, above all, if the pump pumps in manual mode (makes a ka-thunk, ka-thunk sound), **then it works**. If you cannot get it to prime, it is either because a fitting is too loose, too tight, or not installed correctly. The link to our main You Tube page is below, you can also enter Clean Water Store in the You Tube search box...

<https://www.youtube.com/channel/UC415QpvlRz-YAntxIMiel2w/videos>

There are dozens of videos here, several of them are for the two models of Precision 24 pumps we carry- only the programming is different, so the video on the tubing connections is good for both pumps.

Troubleshooting:

If you cannot get the pump to prime (get the water to pump from the suction side to the discharge side):

While the pump is running (usually, on Manual), observe if the fluid is coming up the tube- if you see the water going up and down in the tubing, this indicates the foot valve is not tight, or you installed the pump too high above the solution tank, or you mounted the pump improperly. Sometimes, as mentioned earlier in the guide, it is because the four Allen head bolts on the grey pump head have loosened, and need to be tightened, do not over-tighten.

If the solution has completely filled the tubing, but it is not discharging, make sure the de-gas is opened, and then close it until the point when it starts pumping. **The tubing going from the outlet/discharge to injection check valve will twitch and move at the same time the pump triggers, that is how you can confirm you are pumping solution.**

If this does not work, remove the discharge-to-injection check valve tubing from the outlet fitting, and see if it squirts out of the top- if it does, this indicates that the problem is in the injection check valve, or that you are trying to pump against greater than 100 psi.

Maintenance: Check free-chlorine residual at least once per month and adjust the Precision-24 Pump and/or solution strength if needed.

Winterizing: do not let the Precision-24 Pump or tubing freeze. If you need to winterize, drain the chlorine solution tank and discard chlorine solution. Place the suction of the pump into a bucket of clean water and allow the pump to run until the Precision-24 Pump is free of any chlorine solution. Remove the suction from the water, and allow the pump to pump dry. Pump is ready to store.

NOTE: when diluting the bleach, use only distilled water, water from a reverse osmosis system, or at least softened water. Do not use untreated well water.

Need Assistance? Call us at 831-462-8500 or email support@cleanwaterstore.com

Spare Parts:



Part # P7007360 Spare Parts Package (foot valve, injection check valve, 12 feet of tubing)



Part # P7007300 De-gassing valve



Part # P7007350 Foot valve



Part # P7007270 Injection check valve



Part # P7007280 Pump diaphragm



Part # P7007290 Check ball fittings (for in or out, of metering pump)



Part # P7007300 Metering pump tubing, 12 Feet. Also can be purchased in longer lengths by the foot.