



Precision-24 Pump 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.

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: support@cleanwaterstore.com

More information online: www.cleanwaterstore.com



Precision-24 Metering Pump

Warranty and Returns

- Your pump comes with a 1 Year Warranty from date of delivery.
- If your pump 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. If the water supply and its continuous chlorination are absolutely critical, a back-up pump should be on hand. Shipping charges are not covered under warranty. A flat fee of \$9.95 each way will be charged for ground shipping (continental US). Any expedited shipping (overnight, 2-day, etc.) is the customer's responsibility.

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.

Best Practices for Installation

1. See typical installation for well water (see Fig 1).
2. Make sure that the Precision-24 Pump turns on and off with the well pump, or if you are using a flow switch, plug into the flow switch so the Precision-24 Pump is activated based on water flow.
3. Do not cut the cord on the Precision-24 Pump for direct wiring to the pressure switch. It is better to install a dedicated wall receptacle that is wired to power on and off with the well pump, unless you are using a flow switch.

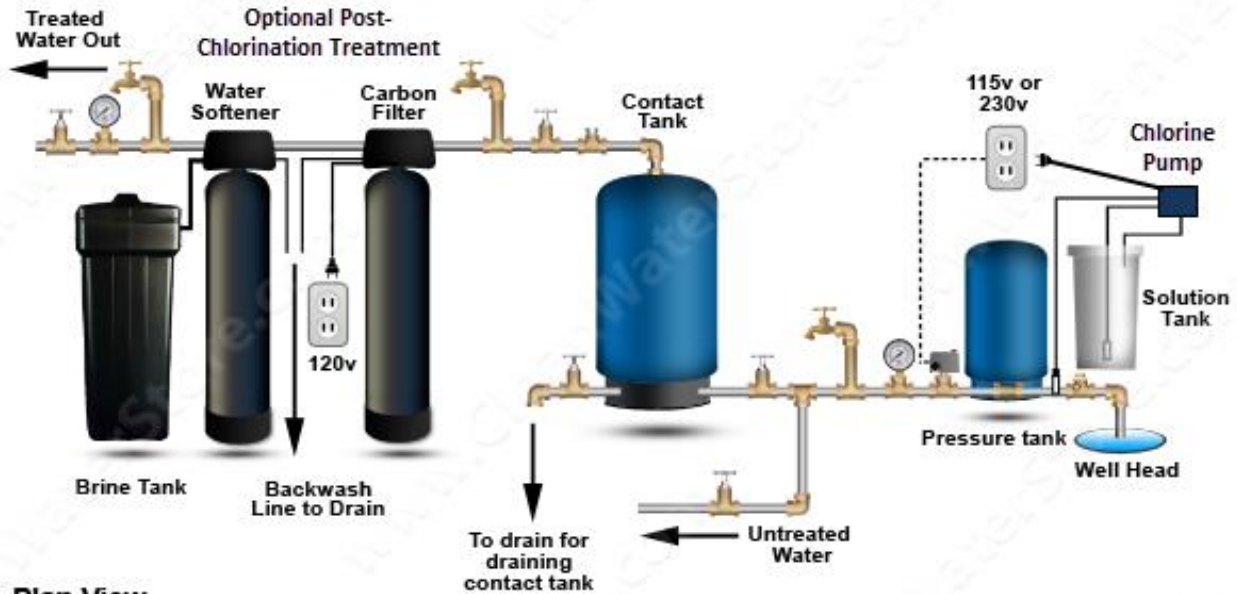
Quick Start Guide

1. Install metering pump so it turns on when the well pump does.
2. Make all tubing connections.
3. Put 7 gallons of clean water in the solution tank (no chlorine yet)
4. Turn on pump and allow pump to prime and start pumping.
5. Adjust Speed setting to desired speed (typically 80- 100) using the up or down arrow speed setting.
6. Adjust the Stroke knob to the desired setting (typically 75% to 100%)
7. READ ON FOR MORE DETAILED INSTRUCTIONS

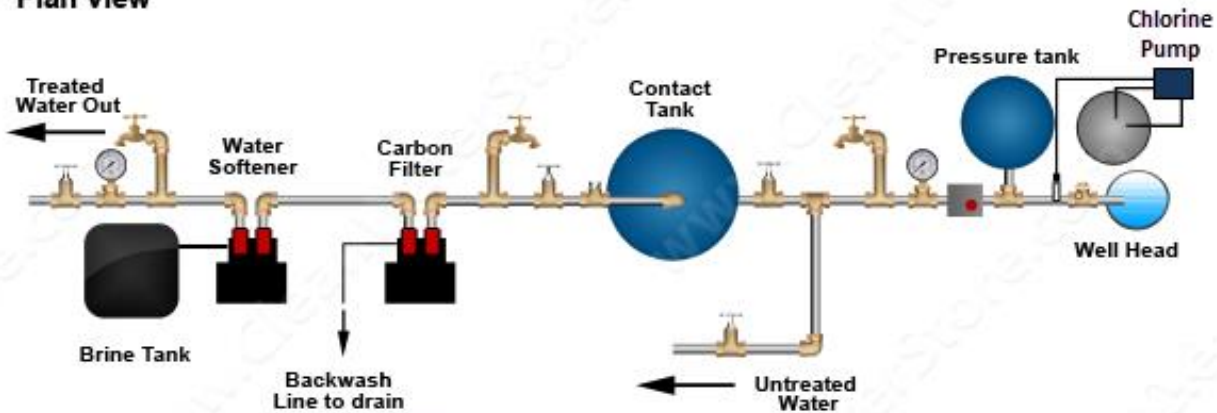
How Your Chlorinator Works:

See Fig 1. The well pump is controlled by the pressure switch. A dedicated outlet for the Precision-24 Pump is installed and wired so it is energized when the well pump is energized. When the water pressure in the pressure tank drops below the cut-in point on the pressure switch, the well pump and metering pump turn on. As water is pumped through the system, a small amount of chlorine is pumped into the water by the chlorine metering pump.

Fig 1: Typical installation with contact tank and carbon backwash or iron filter. NOTE – Precision-24 Pump must be wired so it switches on and off with well pump by wiring to same circuit as well pressure switch. Alternatively a Flow Switch can be used (Option 2 on next page). The Precision-24 Pump cannot just be plugged into a wall and left to run for 24 hours a day.



Plan View



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Key

-  Water piping
-  Pressure Gauge
-  Pressure switch
-  Vacuum Breaker
-  Hose Bib
-  Check Valve
-  Gate or ball Valve

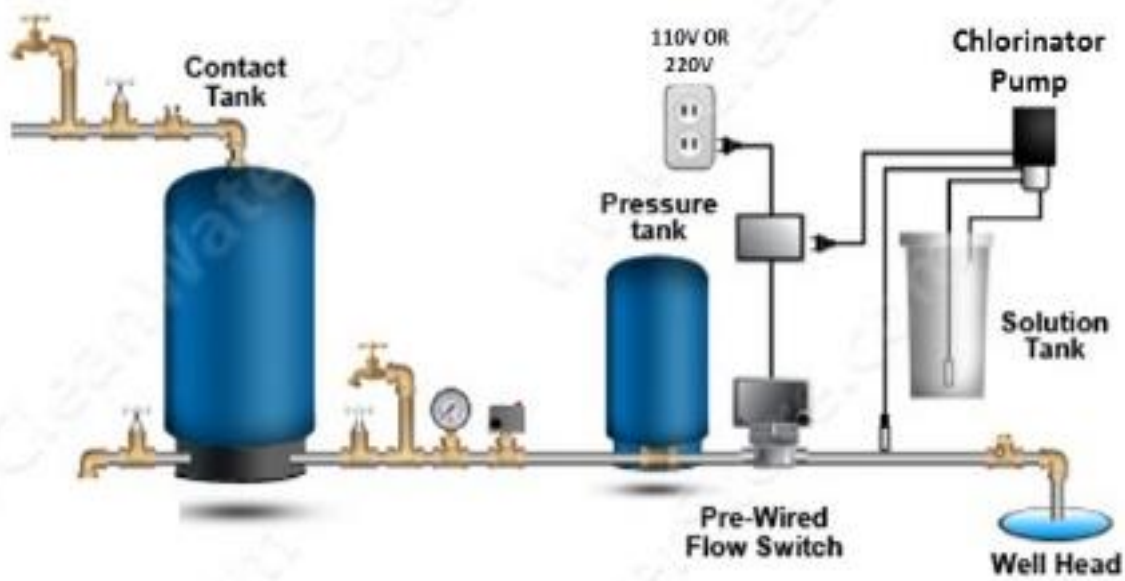
Two Options To Turn ON and OFF Chlorinator Pump Automatically:

Option 1: Wire to your well's pressure switch. This is the lowest cost method. Simply install a dedicated wall outlet, that is wired in to the existing pressure switch and powered up whenever the well pump turns on (and off).



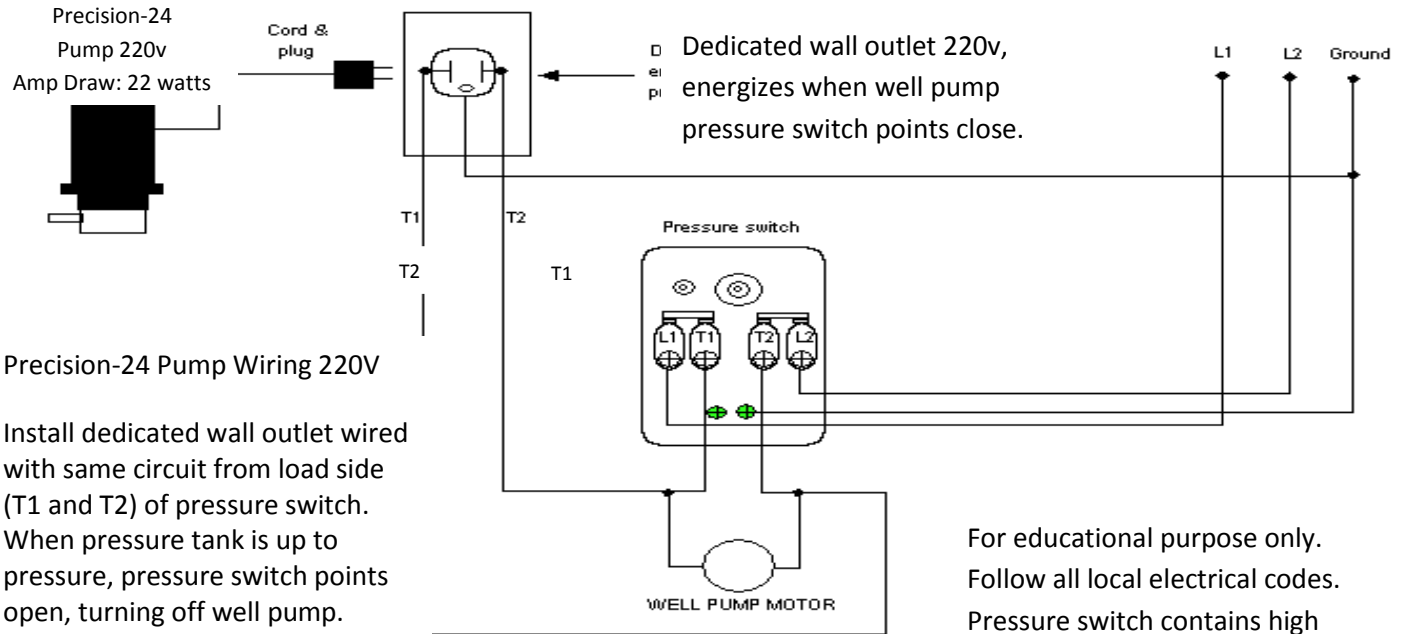
Option 2: Install a flow switch. This makes it fast and easy. No electrical wiring to do and any plumber, or person familiar with basic plumbing can install the chlorinator. No electrician required or electrical wiring to do.

Simply install the pre-wired flow switch. Plug the flow switch into a standard 120V wall outlet. Then, plug the chlorinator pump into the electrical outlet on the flow switch. Whenever there is flow, the metering pump will then turn on.



Wiring the Precision-24 Pump

Figure 2: (Option 1) Typical wiring 220v Precision-24 Pump on same circuit as well pump. Run wires from T1 and T2 (load side of pressure switch) to dedicated wall outlet, and plug Precision-24 Pump into an outlet so the Precision-24 Pump only runs when well pump is energized.



Precision-24 Pump Wiring 220V

Install dedicated wall outlet wired with same circuit from load side (T1 and T2) of pressure switch. When pressure tank is up to pressure, pressure switch points open, turning off well pump. When pressure drops, pressure switch points close, energizing well pump motor and dedicated wall outlet for the pump. The pump only runs when the well pump is running.

For educational purpose only. Follow all local electrical codes. Pressure switch contains high voltage. Turn off power before attempting to service or install.

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

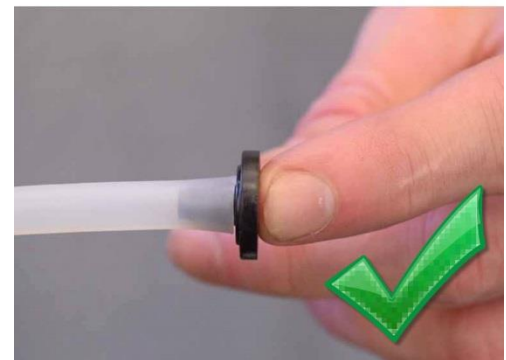
1. Position pump for installation. It doesn't really matter how the pump is oriented on the tank, just make sure it will be easy to change the pump settings and refill the solution tank with chlorine.



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 ½" 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 ½" pipe threads of the injection check valve and apply a light coating of Teflon white pipe paste and install into pipes.
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 1/4" tubing (Not supplied) to the degassing prime valve and return to the solution tank by drilling a hole as shown on Page 7.
2. Insert and trim the tubing so it inserts into the solution tank a few inches, but does not touch the solution.



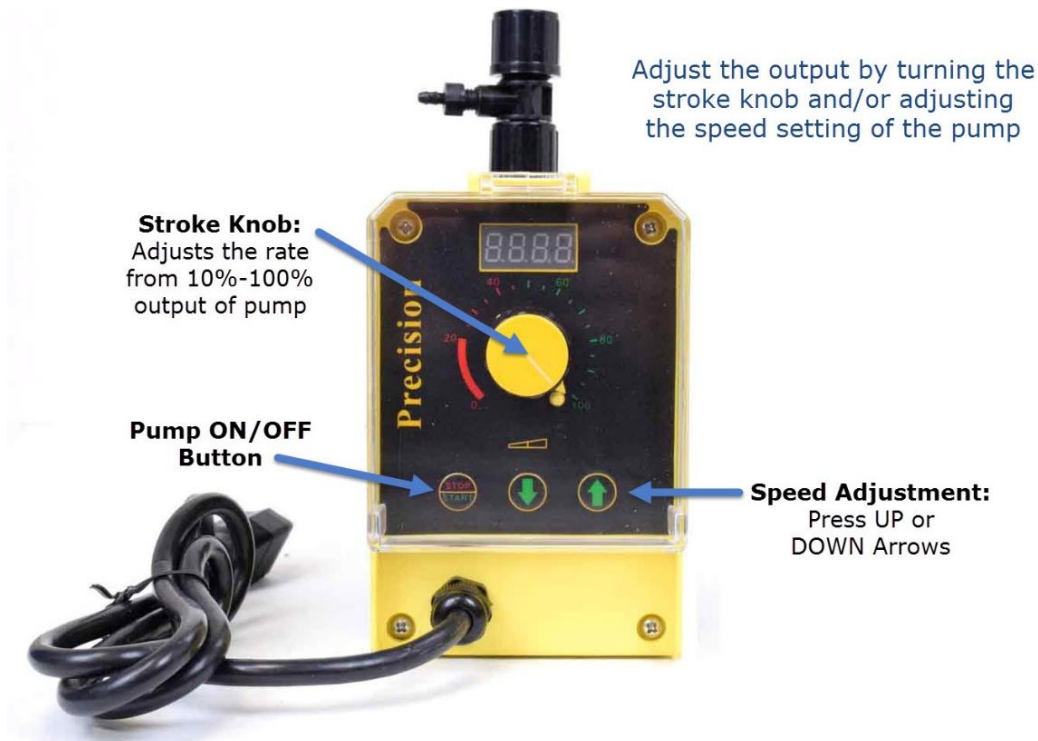
Suction Side (tubing inside solution tank)

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. Pass the tubing up through the hole you've drilled, slide on the connector nut and collet, insert the cone on the end that connects to the inlet check valve, at the bottom, or 6 o'clock position on the pump head, and tighten.

Prime & Start The Pump:

1. Verify your five connection points: foot valve to tubing (in solution tank), foot valve tubing to Inlet (suction) valve at bottom of pump, tubing coming off of degas tee and returning to solution tank, Outlet (discharge) tubing, and injection check valve. Three pieces of tubing, two have connections on each end, degas does not.
2. Fill solution tank with 7 gallons of clean water (don't add liquid pool chlorine yet).
3. Open up 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
4. Turn on the pump and adjust the Stroke Knob to 100% and Speed control to 100%.

5. You will quickly see water being pumped up the foot valve tubing, into the pump head, and then out the de-gas



and back into the solution tank. If it does not do this, it almost always means that you have failed to make a positive connection at the cone and collet, on one of the ends of the foot valve tubing. Trim the pipe squarely and try again.

6. 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. You will notice now that the tubing going into the injection check valve now moves, or twitches, at the same time the pump strokes; that is how you know it is injection solution.
7. Your pump is now ready for use!
8. After the pump has been in operation for an hour or so, you should re-torque the liquid end of the pump (back end) and re-tighten the Allen-head screws on the head in a crisscross fashion. Do not over tighten! They can “back off” and become a bit loose, but not always!
9. Add 1 gallon of liquid pool chlorine to 9 gallons of water, or follow your own solution strength and speed settings by consulting the formula, further along in the guide.

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 can be accomplished by adjusting the liquid pool chlorine solution strength and setting the Precision-24 Stroke Knob and/or adjusting the speed setting until you achieve the desired residual.

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.

Step One: Determine flow rate of the water stream you are injecting into, in Gallons Per Minute (GPM)

1. Open any hose bib or faucet until pump turns on.
2. Close hose bib or faucet and let pump fill up pressure tank until it turns off.
3. Using a 1 or 5 gal. bucket, open faucet, collect and measure all water discharged until pump turns on.
4. When pump turns on, immediately close faucet and start timing pump cycle.
5. When pump turns off, record pump cycle time to refill pressure tank in seconds.
6. Divide the number of gallons collected in Step 3 by the number of seconds in Step 5.
7. Multiply the answer from Step 6 by 60.
8. The answer in Step 7 is the average pumping capacity of the pump in gallons per minute (GPM).

Step Two: How Much Chlorine Should Be Injected? Determine the parts per millions 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.

Step Three: Determine what solution strength of bleach to use

USE ONLY LIQUID POOL CHLORINE. Pool chlorine is 10 to 12.5%. 12.5% is the same as saying 125,000 PPM.

Regarding the solution strength: If you mix one gallon of liquid pool chlorine 125,000 ppm with 9 gallons of water, you end up with solution strength of 12,500 ppm, which is a good solution strength to use for most home well water applications with water flow rates of 5 to 20 gallons per minute. Regarding setting the output of the metering pump: You can vary the applied dosage of chlorine by adjusting the liquid pool chlorine solution strength (gross adjustment) and then the Speed (mid-range adjustment) and Stroke Knob (fine-tuning) until you achieve the desired residual.

Formula for Finding the Solution Strength and Metering Pump Settings:

The formula is simple; you only have to: Multiply the Well Pump Flow Rate (in gallons per minute) times the Applied Chlorine Dosage in Parts Per Million Desired times 1440. Then divide by the Solution Strength in PPM that is being used.

Example: Assume that you have a well pump that has a flow rate of 12 gallons per minute (12 GPM) and that you want to inject 3.0 ppm of chlorine into the water. You have decided to use a solution strength of 12,500 ppm or 1 gallon of 12.5% chlorine to 9 gallons of purified or at least softened water. There are 1440 minutes in 24 hours, and the formula will tell you how many gallons of chlorine you will use for every 24 hours the well pump runs.

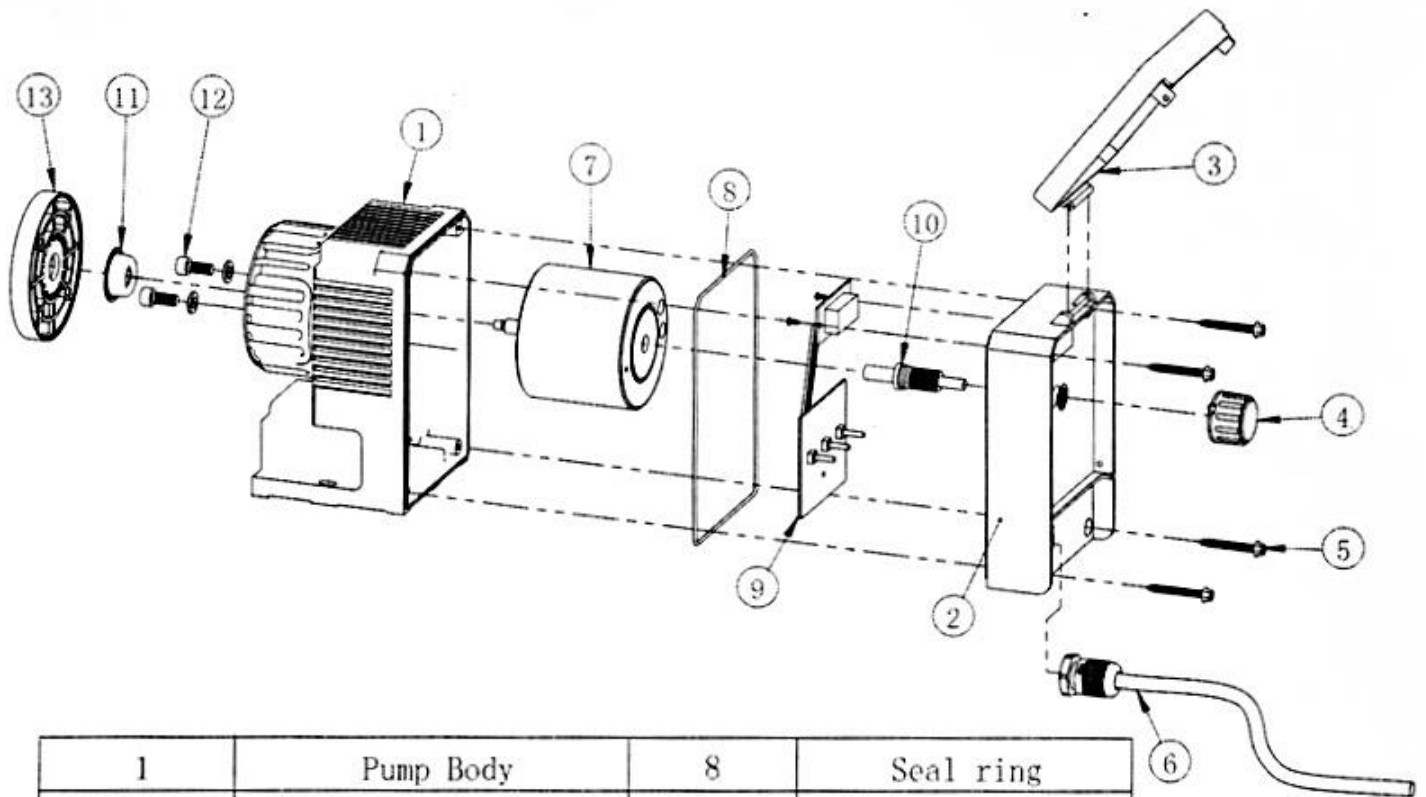
The formula is: $12 \text{ GPM} \times 3.0 \text{ PPM} \times 1440$ and then divided by 12,500 = 4.14 Gallons Per Day

This means that you need a metering pump that has an output of 4 gallons per day. The maximum output of your Precision-24 metering pump is 24.0 gallons per day, but it can be easily adjusted to put out 4.0 gallons per day. This means if the Precision-24 pump were to run for 24 hours, it would pump a total of 4.0 gallons.

For example, by setting the stroke knob to 70% and the speed to 25% we can achieve the output needed of 2.0 gallons per day. $(24 \times 0.7) \times 0.25 = 4.2$ gallons per day.

Your well pump might run for 1 hour a day, so at this rate you would use 4.0 gallons of your chlorine bleach solution every 24 hours the pump runs. It is better to add more solution every one to two months as the solution will lose its potency over time.

Whatever your initial setting be sure to test for total and free-chlorine and then adjust the pump and/or the solution strength to achieve your desired free-chlorine residual in your piping.



1	Pump Body	8	Seal ring
2	Rear end plate	9	Integrated circuit
3	Protective cover	10	Adjusting Screw
4	Stroke adjusting Knob	11	Safety diaphragm
5	Tapping Screw	12	Hexagonal Screw
6	Feed Cable	13	Adapter Base
7	Electro magnet		

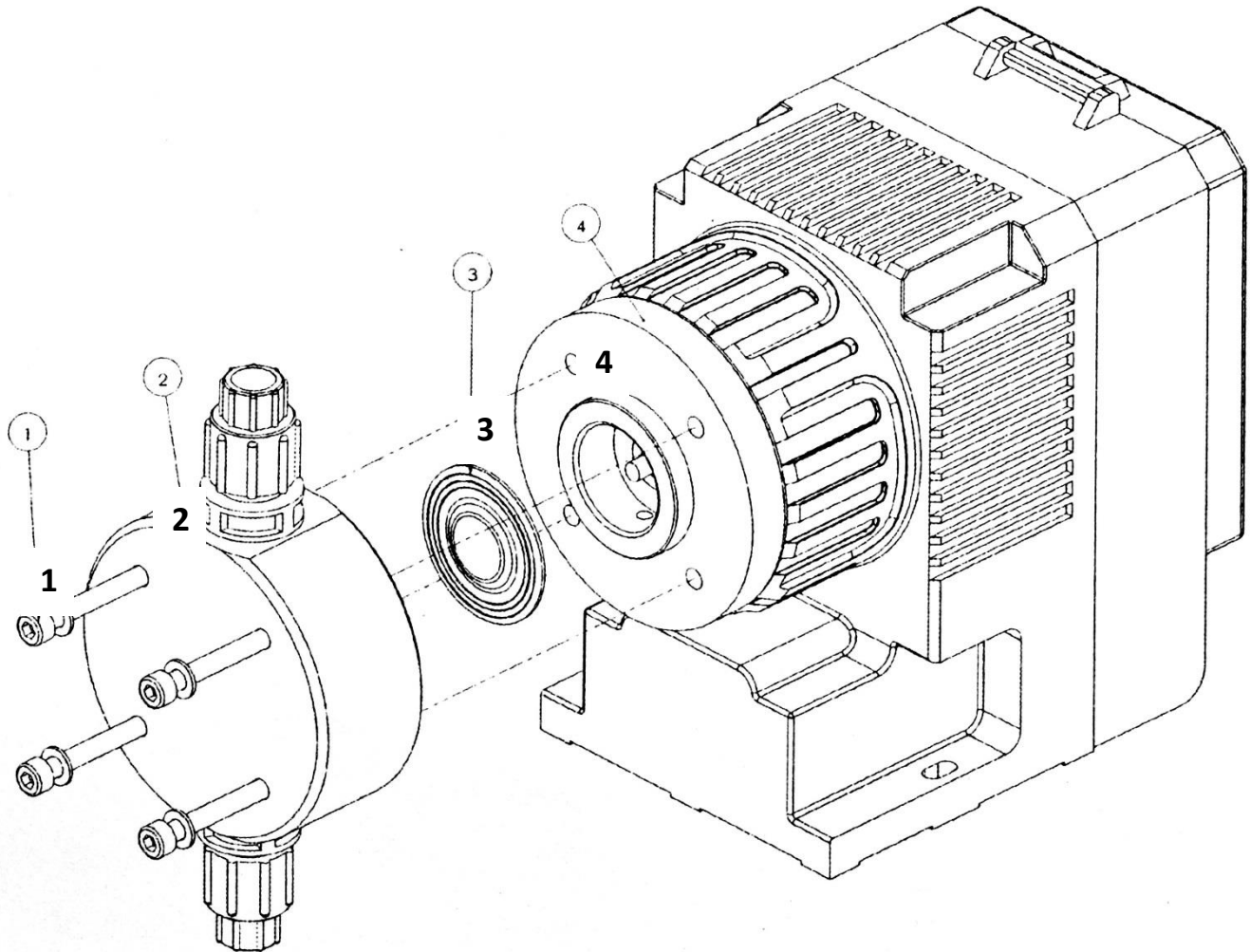
Troubleshooting: If the pump does not keep the settings you have programmed, adjust the speed to the desired setting and allow it to run for more than one minute before turning off the pump. **The pump needs to run for at least one minute to remember the speed setting.**

Maintenance: Check free-chlorine residual at least once per month and adjust the Precision-24 Pump and/or solution strength if needed. Check for leaks or “salting-up” around fittings.

Diaphragm Replacement (refer to diagram below):

1. Adjust stroke length to 0% when the pump is working
2. Cut off the power, loosen the bolts (1)
3. Pull out the pump head (2) and bolts (1) from pump body
4. Turn the diaphragm counter-clockwise (3) and turn it off
5. Take off the adapter base (4)

Screw on a new diaphragm (3) clockwise, as tight as possible



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.

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.