

Frequently Asked Questions Pumps & Accessories

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General

What information is required to select the proper pump?

1. Volume of liquid to be dispensed.
2. Properties of liquid such as viscosity, specific gravity and chemical resistance
3. System backpressure.
4. Suction lift if applicable.
5. Options needed such as analog control, pulse control, flow monitoring and timer

What are the primary advantages of a solenoid driven metering pump?

The pump drive has only one moving part, the armature shaft. Generally, the less moving parts, the more reliable the pump. Solenoid pumps are very good for low pressure applications and compensation for line voltage fluctuations are excellent.

What are the advantages of a variable frequency, constant stroke length metering pump over a constant frequency, variable stroke length pump?

The capacity per stroke is known by calibration. The total output can be calculated by (Capacity / Stroke x Frequency). The total output is linear with frequency. (50 % frequency = 50 % output.) It can adjust from minimum to maximum in < 1 second with external pulse or analog control. The cost is much lower than motorized stroke length adjustment.

How do I use a pump nomograph?

1. Find the nomograph page that applies to the model of pump needed.
2. Mark the backpressure present on the lower diagram marked Capacity.
3. To determine the correction factor, take the determined backpressure in bars and follow upwards until the curve is reached. At this point go vertical to the left, until the correction factor can be read.
4. Divide the required capacity by the correction factor to get the capacity in ml/min. or L/h.
5. Place the result in the middle scale marked Capacity.
6. Once this value is placed on the capacity scale, a ruler may be used to reflect the stroke setting and the frequency setting.

Application

What are the most important considerations when working with metering systems?

The most important considerations when working with metering systems are:

- A. Discharge pressure
- B. Stroke Frequency
- C. Suction lift
- D. Altitude
- E. Chemical compatibility

When discharging to atmosphere, what steps will improve repeatability of dosing?

Installing a spring in the discharge valve of the pump gives some improvement, but for the maximum improvement, a backpressure valve should be installed at the end of the line.

What should I adjust the backpressure valve to?

1. Never exceed the maximum operating pressure of the pump.
2. When working with a positive displacement metering pump, the discharge must be at least 15 psig higher than the pressure on the suction side of the pump.

To what pressure should the pressure relief valve be set?

The pressure relief valve should be adjusted within the range and not to exceed the maximum operating pressure of the pump. The pressure relief valve is designed to prevent an over pressure condition with the pump. For example, if the pump maximum operating pressure is 50 psig, the pressure relief valve should be set at 50 psig. or below to insure proper operation of the pump. Over pressure conditions are the prime reason for pump failure.

What is the maximum recommended positive pressure that I can apply to a ProMinent pump?

The Alpha pumps can handle up to 1 Bar less than the pressure on discharge, providing that the pump is not running over its allowable pressure rating.

How can the suction lift be calculated for liquids other than water?

Divide the pumps rated suction lift by the specific gravity of the liquid.

When should flooded suction be used?

Flooded suction should be used when:

1. Fluid being pumped out gases.
2. Fluids have high specific gravity.
3. High stroke frequency is needed.
4. The pump is operated in a high altitude region.
5. The application requires a large storage tank where suction lift is impractical.

Can you give me some advice on choosing liquid ends? What are some common problem areas involving chemicals with liquid end and seals that should be avoided?

Some of the common problem areas involved with metering pump heads include pumping acids, chlorine, fluorides and hydrogen peroxide. It is difficult to specify exact materials because of the **concentration level** and the **operating temperature**. We recommend a PVC head with Viton seals for fluoride applications. Most Chlorine applications are good with a NP head (Acrylic) and EPDM seals. Hydrogen Peroxide mixtures can only be used with a PTFE or Stainless Steel head with PTFE seals. Hydrochloric acid concentrations can generally be handled with an Acrylic head and Viton seals. Sulfuric acid concentration should be run with a PTFE head and seals. The chemical manufacturer may have suggestions or the ProMinent chemical resistance chart may be used to determine the compatibility.

When working with liquids in hydraulic systems, what considerations must be taken into account?

The primary considerations are Viscosity, Specific Gravity, Vapor Pressure and Temperature.

Accessories/Options

How do I know which accessories go with each pump?

The ProMinent catalog gives a good explanation of each pump and it's identification code. By looking at the identification code, the options available for that particular pump can be selected.

What parts are included in the accessory parts kit?

The accessory kit includes a foot valve, injection valve, 5 feet of suction tubing and 10 feet of discharge tubing.

What parts are included in the in a complete liquid end kit?

The parts included in the complete liquid end kit include a pump head, diaphragm, valves, backplate and mounting screws.

What is the purpose of the foot valve?

The foot valve is comprised of a weight to help hold it straight and vertical in the chemical tank. It is also a check valve to keep a positive direction of flow. This valve also aids in repeatability and priming of the pump. It has a strainer to prevent particles from being drawn into the suction line. Small particles may cut or tear the diaphragm. The foot valve also has a connector set to adapt it to the suction line. The foot valve should be kept off the bottom of the tank and should be mounted in a vertical position. A foot valve is required in most applications using suction lift.

What is the purpose of the injection valve?

Injection valves are used to connect the pump discharge line to the point of injection. Injection valves are not to be used as an isolation device or for anti-siphon protection. The injection valve gives a 7 psig backpressure for non-critical metering.

What is a flushing device used for?

It is a device that flushes the pump head and discharge line. It is mainly used on applications where chemicals tend to solidify, or if the pump is going to be turned off for extended periods of time.

What is a float switch and when is it most useful?

A float switch is a very useful device to control the liquid level in a tank. As the liquid level decreases, the float sinks and closes contacts that can be used to control the functions of a pump, such as stopping pump 1 and starting pump 2. It can be used to turn on an alarm or indicator lamp to show that the tank is empty. It can also be used in a holding tank off the discharge line by reversing the float action, to show that the tank is full and stop the pump.

What is the difference between a single stage and a two stage float switch?

A single stage float turns off the pump when the switch activates. A two-stage float activates the first level that can be used as a low tank level warning indication. When the second switch activates, the pump is stopped.

What is a Multifunction valve?

The Multifunction valve is a very versatile product that generates constant backpressure to insure constant metering. The device has a built in anti-siphoning valve that prevents siphoning of chemicals into vacuum lines, water lines with Venturi effect, or negative discharge head applications. The built-in pressure relief valve, protects the pump, lines and equipment against over pressure in the event of dead heading. It has a built-in priming valve that relieves pressure in the discharge line allowing the pump to prime. The discharge drain valve allows fluid to be safely drained back to the tank.

How does a metering monitor function?

Meter monitoring uses a proximity switch that trips with every fluid pulse. The pump compares discharge strokes to fluid pulses sensed. If flow is not sensed in 8 strokes, or on the gamma/L the set number of strokes, the pump stops and a fault is indicated. It will sense loss of flow due to an empty, blocked or leaky suction line, deadhead or diaphragm failure. A proportional meter monitoring will sense volume failure below 20%, or the set volume.

What is the fault annunciation and pacing relay options?

- The fault annunciation relay either drops out or pulls in on a pump fault.
- The pacing relay pulls in on a pump fault and generally connects to pace a secondary pump at the same rate as the primary pump.

What is the purpose of a pulsation dampener?

A properly sized pulsation dampener reduces pulsations by 90% or more and gives a nearly laminar flow. It reduces acceleration and deceleration head loses.

How do I calculate the proper pulsation dampener for my system?

Multiply the pump's displacement per stroke (ml) x 26 to get the minimum pulsation dampener volume (ml) to achieve 90% reduction in pulsation.

What are the functions of an accumulator and how does it differ from a dampener?

An accumulator reduces pulsations along with reducing acceleration and deceleration head loses. The accumulator has no separation of fluid from air. The chamber may eventually fill with liquid and need to be drained.

What is a diaphragm rupture monitor and how does it work?

The backplate between the drive and the pump head has a weep hole. A tube connects the weep hole to a small cylinder. If the diaphragm ruptures, liquid drains from the weep hole into the small cylinder. The cylinder has a float switch that activates when it sees as little as 10 mL of liquid. The contacts can be set up as normally open or normally closed.

Electrical

Which wires do I use from the control cable?

1. There are five wires on the universal control cables: blue, black, brown, grey and white. The wiring for analog is brown and black tied together connected to the negative terminal. The blue wire connects to the positive terminal. The white and grey wires are not used. Note: If the remote pause option is used, the brown and black wires are connected across relay contacts or a switch.
2. For contact operation, the brown and black wires are tied together and connect to one of the terminals. Connect the white wire to the other terminal. (Connection to a water meter is a typical application for contact operation.)
- 3.

What are the individual colour coded wires on the Universal control cable used for?

Black Common

Brown Remote On / Off (+) Black and brown must be connected together for pump to run. Connect with a switch for a remote function.

White Pulse control

Blue Analog control (Optional analog function must be ordered on pump)

Grey Auxiliary Frequency

How do I connect a pump to a water meter?

1. The universal control cable plugs into the front of the pump.

With the 5 -wire control cable: connect the white wire to one terminal and the brown and black wire tied together to the other. Note: If the remote pause option is used, the brown and black wires are connected across relay contacts or a switch.

Can I connect more than one pump to a water meter?

We do not recommend connecting more than one pump directly to a water meter. The safest way to connect multiple pumps to a water meter is to use the pacing relay function, the pump would be connected in series. Another popular way to connect multiple pumps is to use a ProMinent Contact Repeater.

How many pumps can I run from my 4 - 20 mA signal?

This question can best be answered by evaluating the devices in the system. The first information needed is the load impedance of the device supplying the pumps. This impedance is generally 750 Ohms, but could be less, in the range of 300 Ohms. Our controllers also have an impedance of 750 Ohms. Our gamma pumps have an impedance of 120 Ohms when used with a 4-20 mA signal. The resistance of the wire (length & diameter) must be added to the total impedance. Very long runs of wire and a small wire gauge can add up very fast.

Maintenance and Troubleshooting

How do I replace the pump diaphragm?

1. Remove the four screws that hold on the liquid end. The screws are located in the back of the pump.
2. Once the liquid end is loose, before removing it, turn the stroke length down to 0%. This insures that the solenoid shaft will have enough pressure on it to hold the assembly stationary, which allows the diaphragm to spin off.
3. Pull the liquid end out far enough to disengage the screws from their slots. Grab the liquid end and rotate it counter clockwise. The diaphragm will spin off with a little resistance.
4. Once the diaphragm has been removed, inspect the safety diaphragm and make sure it is intact and not deteriorated. Install the new diaphragm, rotating the back plate and the new diaphragm clockwise until it is snug. Rotate the backplate until the weep hole in the backplate is near bottom of the pump.
5. After the diaphragm is installed and the backplate weep hole is situated vertically, install the liquid end. Make sure that the suction valve is aligned near the weep hole and that the liquid end screws are aligned with the four corresponding holes.
6. Turn the stroke length up to 100%. This allows the complete assembly to spin so the backplate weep hole may be aligned at the bottom. The liquid end and diaphragm will adjust to this position while the pump is running.

7. Once the liquid end is seated in the proper direction along with the backplate the four bolts may be tightened in an X pattern until snug. Then an even torque is applied to finish the job.

I have received a spare parts kit and I am having trouble removing the old diaphragm. Can you give me some additional advice for removing the diaphragm?

Remove the liquid end by loosening four head screws. Do not remove it all the way. Turn the stroke length adjustment down to 0% and grasp the liquid end. Then, slide it away from the threaded holes so the screws do not make contact with them but still has a hold on the back plate and diaphragm. Then turn the assembly counter-clockwise. The diaphragm should loosen off the solenoid shaft with little resistance. If the diaphragm does not loosen, penetrating oil should be applied to the surface where the diaphragm and solenoid shaft meet. Let it sit for a couple minutes and lightly tap diaphragm and slightly with a plastic hammer. Then follow the above specifications again.

When running Hydrogen Peroxide with suction lift, the system develops air lock. How can this problem be eliminated?

Install a self-degassing head on the pump, and use flooded suction. Keep the suction line short.

The pump is installed and running but will not pump?

1. If discharge tubing is installed the bleed valve is closed and needs to be opened during priming. Note: Not all pumps have bleed valves.
2. There may be an air leak on the suction side. The liquid end may be missing an O-ring on the suction connector or the valve may be loose.
3. The foot valve may be clogged and may not be allowing fluid to pass.
4. The pump stroke length control may not be adjusted properly.
5. Dried chemical may have accumulated in the liquid end, preventing the valve ball and seat from checking properly.

I am pumping a high viscosity material and using flow monitor. I receive a flow failure indication during priming. What can I do to eliminate this problem?

The pulse duration may not be long enough for the sensing time. A duration extension may be activated in the flow monitor to increase duration time to 300 msec compared to the standard time of 80 msec. To activate outsmart switching, remove the cover holding the electronics and remove jumper X-1. This activates the extension and allows more time before a flow failure is indicated.

I am having a problem with the stroke positioning motors burning out. How can I prevent this from happening?

Make sure the pump motor is running while adjusting the stroke position. Driving the stroke length rod against the compressed spring without the pump motor running will cause premature failure of the stroke positioned motor.