



Liquid feeder pumps are used to inject chemicals needed for successful water and wastewater treatment. Calibrating these pumps helps control and optimize feed rates, which provides better water quality at a lower cost.

A liquid feed pump injects a chemical solution from a supply tank into a waterline or a rapid mix for water treatment. These pumps are used at different points in the treatment process, including adding ammonia and disinfectants. Because water treatment requires certain amounts of these chemicals, it is important that the feed pumps be correctly calibrated so the doses are accurate. There are two main types of liquid feed pumps; there are the peristaltic pump, which is a pump tube placed around a roller, and a metering pump, which has diaphragms and check valves and operates from a small electric motor.

Controlling metering pumps can be done both manually, with dual-speed and stroke knobs, or controlled by a 4-20 mA for a linear response. These pumps are used in multiple applications to inject any specific chemical type. KRWA staff have helped install many of these pumps for rechlorination and have set them up so that a chlorine analyzer can turn

the pump on or off or control the amount pumped by the 4-20 mA. The important issue is that the right pump needs to be provided for the appropriate chemical.

Consider the following factors when choosing a chemical feed pump:

- Type of chemical to be pumped;
- GPD required or dose range anticipated;
- Flow rate;
- Pressure on the line being pumped into;
- Type of fittings required (1/4 inch, 3/8 inch, or 1/2 inch tubing fittings or national pipe thread (NPT) fittings;
- How the pump will be controlled.

To determine the correct pump size, three pieces of information are needed:

1. The flow rate;

2. The dosage needed (parts per million (ppm) or milligrams per liter (mg/l));
3. The solution strength of the chemical, expressed as ppm. For example, sodium hypochlorite can be purchased as 6 percent, 10 percent, or 12 percent. You can write a formula as follows:

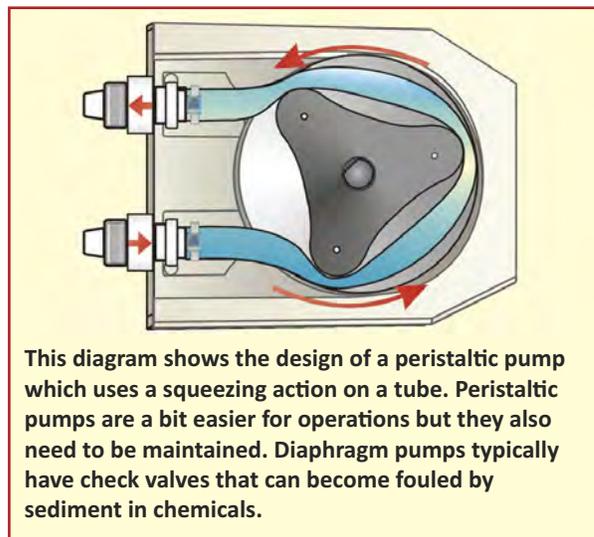
$$\text{Flow rate (gpm)} \times \text{Required Dosage (ppm)} \times 1440 \div \text{Solution Strength (ppm)} = \text{Feed Output in gallon per day.}$$

Calibrating the pump

To adjust a liquid feed pump, an operator can use a 100 ml graduated cylinder, depending on the feeder size. In some cases larger measuring devices may be necessary. It is satisfactory to set the pump up on 100 ml graduated cylinder but after it is in operation, it is better to check gallons per day to verify that the calibration is properly set.

If the discharge line of the feeder doses into a pipeline that is under pressure, it may be easier to calibrate the feeder from the suction side of the feeder. This will also ensure accuracy.

Adjust the feeder rate control to at least three, but preferably four to five different settings, keeping it above thirty percent and below ninety percent on the rate control of a peristaltic pump, and on a metering pump, between fifty



This diagram shows the design of a peristaltic pump which uses a squeezing action on a tube. Peristaltic pumps are a bit easier for operations but they also need to be maintained. Diaphragm pumps typically have check valves that can become fouled by sediment in chemicals.

percent and ninety percent. KRWA has found that these pumps have trouble maintaining prime at lower ranges. Several calibrations need to be performed at each setting. Carefully measure calibration times using a stopwatch.

Troubleshooting Tips

If the problem is leakage at tubing, check for worn tubing ends, loose or cracked fittings, or worn seal rings.

If the problem is low output or failure to pump against pressure, make sure the pump is sized for the right amount of pressure of the system; check all tubing to ensure there is no leakage; check foot valve and strainer.

If the problem is excessive pump output, check pressure at the injection point; check for siphoning effect due to check valves not functioning correctly.

KRWA recently worked with Doniphan RWD 5 in extreme northeast Kansas. This water district was having trouble keeping metering pumps primed and the degassers operating properly. We installed peristaltic pumps in place of the metering pumps; the district has

had very few problems with them, other than having to replace tubes in the pumps. I recommend replacing tubes every three to six months depending on how many hours of operation per day a system runs.

Kansas Rural Water has worked with many cities and RWDs installing these types of pumps. The peristaltic pumps work very well but have a limit due to the pressure restrictions. If a system operates with more than 100 psi, it may be necessary to go to a diaphragm metering pump, which can provide service up to 250 psi. If you need assistance in choosing a pump, do not hesitate to contact me at 785-547-5523.

Lonnie Boller is a Technical Assistant at KRWA. He has been employed by KRWA since 2001. Lonnie is a Class II certified operator; he previously was Water Plant Supervisor for the City of Horton. He has also attended and completed training at the University of Kansas Law Enforcement Training Center.



**When
Safety
&
Performance
are everything**



Is The One To Call

- Well Performance Testing
- Well Rehabilitation
- Pump Repair
- Drilling Services



Call Your Local Layne Representative Today:

- Wichita, KS**
(316) 264-5365
- Omaha, NE**
(402) 359-2042
- Kearney, NE**
(308) 234-1914
- Oklahoma City, OK**
(405) 600-6447
- Kansas City, KS**
(913) 321-5000
- St. Louis, MO**
(636) 343-3700

www.laynechristensen.com

- LINE STOPPING
3/4"- 60"
- LINE TAPPING
2"- 60"
- VALVE INSERTION
4"- 16"
- VALVE TURNING
- PIPE REPAIR



FOR ALL YOUR POTABLE AND WASTE WATER NEEDS

WWW.MUNICIPALPIPESERVICES.COM

MUNICIPAL PIPE SERVICES

BOB HENNIG
SALES MANAGER
1615 WEST "J" STREET
HASTINGS, NE 68902
1-800-395-7473
CELL: 402-469-1886
FAX: 402-462-4408
E-MAIL: BOB@MUNICIPALPIPESERVICES.COM

