

Section 1

ProMinent Warranty

1) WARRANTY, REMEDY, DISCLAIMER: The warranties set out in this clause shall be conditional upon fulfillment of the Purchaser's contractual obligations, including all terms of payment. For sales of completed pumps and controllers, the warranty shall be conditional upon the Purchaser completing and returning the attached Warranty Validation Card. Seller warrants that the Drive Units and DULCOMETER Controllers will be of good workmanship and material for two (2) years from the date of purchase by owner of new equipment from an authorized distributor of manufacturer, but no longer than two and one-half (2-1/2) years from the date of shipment by manufacturer. All Dulcotest sensors are warranted for (6) months from the date of shipment by manufacturer. For sales of liquid ends, Bello Zon, Bono Zon, pump accessories, standard engineered products, custom designed items and items not manufactured by ProMinent, Seller warrants that the products will be of good workmanship and material for one (1) year from the date the goods are shipped by Seller. If purchaser claims that the goods are defective, he must permit Seller's personnel at Seller's option to inspect the goods on Purchaser's property. Purchaser shall not return the goods to Seller unless Purchaser obtains prior written approval of such from Seller. If, after inspection, Seller determines that the goods are defective, Seller will repair or replace goods at Seller's option and at Seller's cost. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED AND STATUTORY INCLUDING THE WARRANTIES OF FITNESS FOR PURPOSE AND MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. The warranty provided for herein shall not apply to any goods that become defective for the following reason:

- (a) unsuitable or unreasonable use
- (b) faulty assembly, installation or servicing by the Purchaser or any third party
- (c) faulty or careless handling

2) DISCLAIMER OF TORT LIABILITY: PURCHASER SPECIFICALLY UNDERSTANDS AND AGREES THAT SELLER SHALL NOT BE LIABLE IN TORT, WHETHER BASED ON NEGLIGENCE, STRICT LIABILITY OR ANY OTHER THEORY OF TORT LIABILITY, FOR ANY ACTION OR FAILURE TO ACT IN RESPECT TO THE MANUFACTURE, PREPARATION FOR SALE, OR DELIVERY OF THE GOODS. IT IS THE PARTIES' INTENT AND THE INTENT OF THIS PARAGRAPH TO ABSOLVE AND PROTECT SELLER FROM ANY AND ALL TORT LIABILITY.

3) EXCLUSIVE REMEDY: PURCHASER SPECIFICALLY UNDERSTANDS AND AGREES THAT PURCHASER'S SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY, TORTIOUS CONDUCT OR ANY OTHER CAUSE OF ACTION AGAINST SELLER SHALL BE THE REMEDY PROVIDED IN PARAGRAPH TWO (2) ABOVE.

4) EXCLUSION OF CONSEQUENTIAL DAMAGES: PURCHASER SPECIFICALLY UNDERSTANDS AND AGREES THAT UNDER NO CIRCUMSTANCES WILL SELLER BE LIABLE TO PURCHASER FOR ECONOMIC, SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES OF ANY KIND WHATSOEVER, INCLUDING BUT NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS AND ANY OTHER LOSS CAUSED BY REASON OF THE NON-OPERATION OF THE GOODS. THIS EXCLUSION IS APPLICABLE TO CLAIMS FOR BREACH OF WARRANTY, TORTIOUS CONDUCT OR ANY OTHER CAUSE OF ACTION AGAINST SELLER.

5) ALL TERMS AND CONDITIONS OF SALE CONTAINED IN SELLER'S ACKNOWLEDGMENT/OFFER TO SELL APPLY AND ARE IN NO WAY ALTERED BY THIS WARRANTY VALIDATION CARD.

ProMinent Fluid Controls
RIDC Park West
136 Industry Drive
Pittsburgh, PA 15275-1014
(412)787-2484

!!! IMPORTANT – PLEASE READ !!!

ProMinent® SYSTEMS

SITE DELIVERY AND STORAGE CHECKLIST

1. Check packing list for completeness and note any missing items immediately.
2. The skid may have been jarred during shipping. Inspect equipment and shipping container for damage before accepting delivery. Make note on the carrier's bill-of-lading the extent of the damage, if any, and notify the carrier. Save the shipping container until your system is started up.
3. Store equipment on firm level surface in original packing container. Do not store equipment where it may be exposed to extreme temperatures, precipitation, humidity, or dust. Avoid direct sunlight that could overheat and damage equipment.

WARNING – PUMPS MAY BE FILLED WITH OIL WHICH COULD LEAK IF TILTED

Ambient Conditions for storage and transport:

Temperature:

14°F to 120°F

Air humidity:

max. 95% relative humidity, non-condensing

Please call if you have questions.

ProMinent Fluid Controls, Inc.
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Pittsburgh, PA 15275-1014
Phone: (412) 787-2484
Fax: (412) 787-0704

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ProMinent® SYSTEMS

PRE-INSTALLATION CHECKLIST

1. Mount equipment on hard flat level surface. Stainless steel or FRP angle may be used to fasten skids down.
2. Do not install equipment in areas of extreme heat, cold, dust or humidity. Avoid areas where objects or fluids can drop from overhead.
3. Install piping so connections properly meet skid termination points. Do not “stretch” field installed piping to meet skid termination points. Stressed plastic piping will fail!
4. Check the tightness on all unions. Hand tighten only - no tools. Unions incorporate an o-ring seal. Ensure that the o-ring is seated properly before tightening.
5. Check the piping for breakage. The skid may have been jarred during shipping.
6. Allow provisions for draining the system piping. Skid components will require maintenance. Ensure that chemicals can be evacuated from skid piping and components.
7. Do not down-size piping to or from system. Piping should be at least equal in diameter to piping on skid and one or two sizes larger for long runs.
8. Install suction line strainer if one was not included with your packaged system
9. Avoid getting dirt in piping during installation. Plug ends of piping with rags if construction activities are underway. All debris must be flushed from piping before system start-up.
10. Check electrical connections to be sure proper voltage is supplied to unit.

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ProMinent® SYSTEMS QUICK START GUIDE

1. Pressure Relief Valves and Back Pressure Valves (PRV's/BPV's) are NOT pre-adjusted. ProMinent adjusts valves for QC purposes, but valves must be opened before shipping to allow water to be drained out.
2. The PRV's should be set no higher than the lowest rated component – typically the pump. In any case, do not exceed 150 psi with plastic piping. Tighten the PRV only with the a proper sized screwdriver or the furnished adjusting wrench. An improper adjustment tool will damage the valve adjustment screw.

No extraordinary start-up procedures are required. However, the following steps are recommended. WEAR SAFETY GLASSES WHILE WORKING ON CHEMICAL FEED EQUIPMENT!

- a. Unions tagged with Red Tape are purposely loosened prior to shipping. Check ALL unions for tightness and insure O-ring is properly seated before tightening. **DO NOT OVERTIGHTEN!** Hand tighten initially, and if necessary, apply one-eighth to one-quarter turn with properly sized wrench. **DO NOT OVERTIGHTEN!**
- b. Start the pumps in manual control mode with water – **DO NOT APPLY SYSTEM PRESSURE. CHECK MOTOR ROTATION!** (clockwise, looking down towards pump). Open oil vent, if applicable. Check for leaks.
- c. Check pulsation dampener fastener bolts' torque and inflate dampeners before applying system pressure (~80% of System Pressure). Set BPV for at least 15 psi pressure. Set PRV for rated pressure of weakest link in system.
- d. Run the system in manual mode with water. Build pressure. Check for leaks! Correct all leaks before introducing chemical into the system.
- e. Familiarize yourself with controls, check functionality of instruments, and verify correct pump output.
- f. Run the system in automatic mode with water. Verify functionality of alarms and safety devices. Verify correct pump output and functionality of instruments.
- g. Run the system in automatic mode with chemicals. Allow system to build pressure and check for leaks.

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Pump Selection, Accessories and Installation Tips

WHEN SELECTING, INSTALLING AND OPERATING A PUMP AND ACCESSORIES, THE FOLLOWING GUIDELINES SHOULD BE FOLLOWED:

When selecting a pump, make allowances for extra capacity and working pressure, especially if the *fluid viscosity* is higher than that of water (note: Capacities in manuals pertain specifically to water at fixed pressures).

If in doubt about the *chemical compatibility* of the liquid end materials, valves, valve balls, O-rings, suction and discharge lines and accessories, refer to the Chemical Resistance List (page 8).

For varying, *corrosive media*, the corrosiveness of which is unknown, select the highest rated PTFE (TT) version. For *abrasive fluids*, or for use in the *food processing* industry, select the stainless steel (SS) version if compatible with the media.

The site of the metering pump should be easily accessible. The metering pump should be protected against the risk of being damaged mechanically. *High ambient temperatures, radiating heat and direct sunlight* should be avoided, if possible.

The metering pump should be provided with a *power supply* of its own. If connected in parallel to other equipment, the metering pump should be switched on and off by separate contacts, e.g. by relays or contactors. If the metering pump is paced externally, the maximum input pulse rate should match the maximum stroking rate.

All pumps are *self-priming*. The suction lift varies between 5 and 20 ft. (1.5 and 6 m), depending on the pump type (refer to Technical Data). The reduced suction lift for media having a specific gravity (density) higher than 1 can be evaluated as follows:

$$\begin{array}{lcl} \text{Effective} & & \text{Rated} \\ \text{suction lift} & = & \frac{\text{suction lift, water}}{\text{(f)}} \quad \text{S.G.} \end{array}$$

Note: Suction lift decreases with high altitude. Contact factory for pump selection.

Accessories and tips. . .

– The suction line should be. . .

- as short as possible.
- sloping upwards to eliminate vapor pockets.

– The discharge line should have. . .

- a drain valve when corrosive media is to be handled.

Installation Tip:

- Draining is achieved by means of a tee and bleed valve, or an adjustable pressure relief valve in the discharge line.

– A foot valve with ball check valve, ceramic weight and strainer facilitates. . .

- priming.
- prevents loss of prime.
- protects the liquid end against coarse impurities.

Installation Tip:

- Must install vertically, slightly above the bottom of the tank; directly under pump taking pump maximum suction lift into account.

Note: Pump capacity is effected if not installed properly or if plugged.

– Postive suction head (flooded suction)

- Recommended with media which tend to develop gases.
- Recommended with media which has high viscosity.

Installation Tips:

- Degassing pump must be used on suction lift applications, not flooded suction.
- Metering pump can be located at and fed from the foot of the supply tank.

– A ball-check-type injection valve

- Prevents back flow.

Installation Tip:

- Should be at the end of the discharge line; Teflon injection valves are not spring-loaded and must be oriented vertically into bottom of pipe for ball to seat.

Note: Pumps will not give consistent results without backpressure; our injection valve provides minimum backpressure when pumping into atmosphere.

– Backpressure valve

- Adjustable spring tension on a diaphragm.
- Ensures accurate metering and prevents siphoning.

Installation Tips:

- Must be in the discharge line or mounted onto the pump in the following cases:
 - ✓ When the discharge head is negligible (open-end discharge).
 - ✓ The metering pump discharges into a vacuum system or the positive suction head exceeds the discharge head.

Note: At least 15 psig differential pressure is required to provide repeatability of metering.

– Pulsation dampener

- Bladder type cavity with pressure gauge.
- Required for very long discharge lines.
- Required when high-viscosity media are handled.
- Required when a smooth flow profile is required.

Pump Selection and Installation Tips Cont. . .

Installation Tips:

- Should be as close to the pump as possible.
- Set pressure at 90% of discharge line pressure.
- No further than 12 inches from the metering pump discharge, in direction of flow.

Note: Backpressure valve is required at point of injection, downstream of pulsation dampener. Consult ProMinent for verifications when discharge lines are greater than 100 feet.

– Pressure relief valve

- In form of an adjustable backpressure valve or 3-port relief valve.
- Protects metering pump against "dead head" (pumping against a closed valve).

Installation Tip:

- Must be close to the pump, upstream of the backpressure valve, for system protection.

Application Suggestions:

- Where the discharge line is hard piped.
- When pumping into high pressures.
- Where the discharge line has several check valves installed.

Note: Recommended for all motor-driven pumps.

– Viscous fluids

- Require valve springs to ensure balls seat properly.

Installation Tips:

- Should be spring-loaded for viscous media.
- Operation at a greater stroke length is better than operation at a higher stroking rate.
- The suction piping should be sized up by one pipe size and a pulsation dampener used.
- Select PP4/PP5 series pumps with special liquid ends for extremely high viscosities. Positive suction recommended.

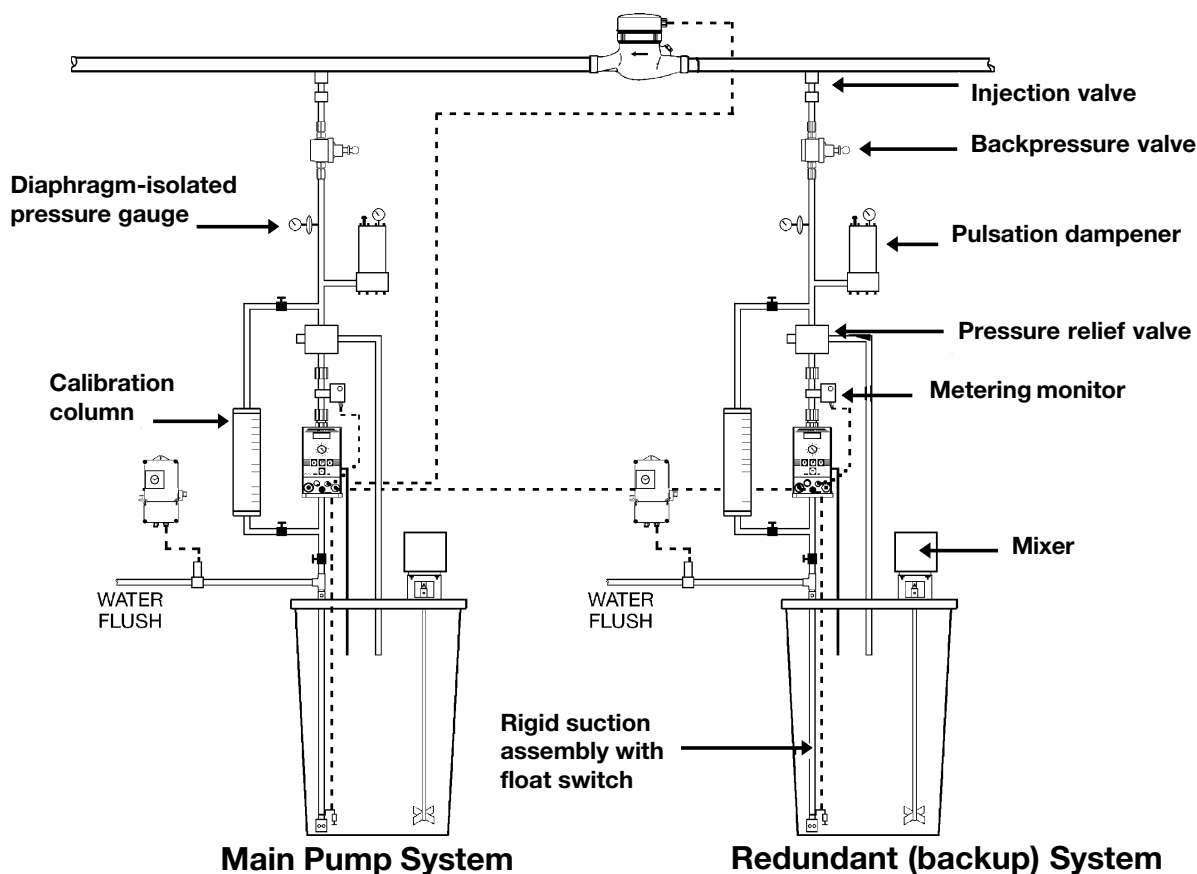
– Calibration column

- Draw down, graduated cylinder.
- Useful for setting up metering pump to reach desired capacity.
- Single pump dosing package can be equipped with a self-filling calibration assembly for application where the pump is installed above the tank (eliminates chemical handling).

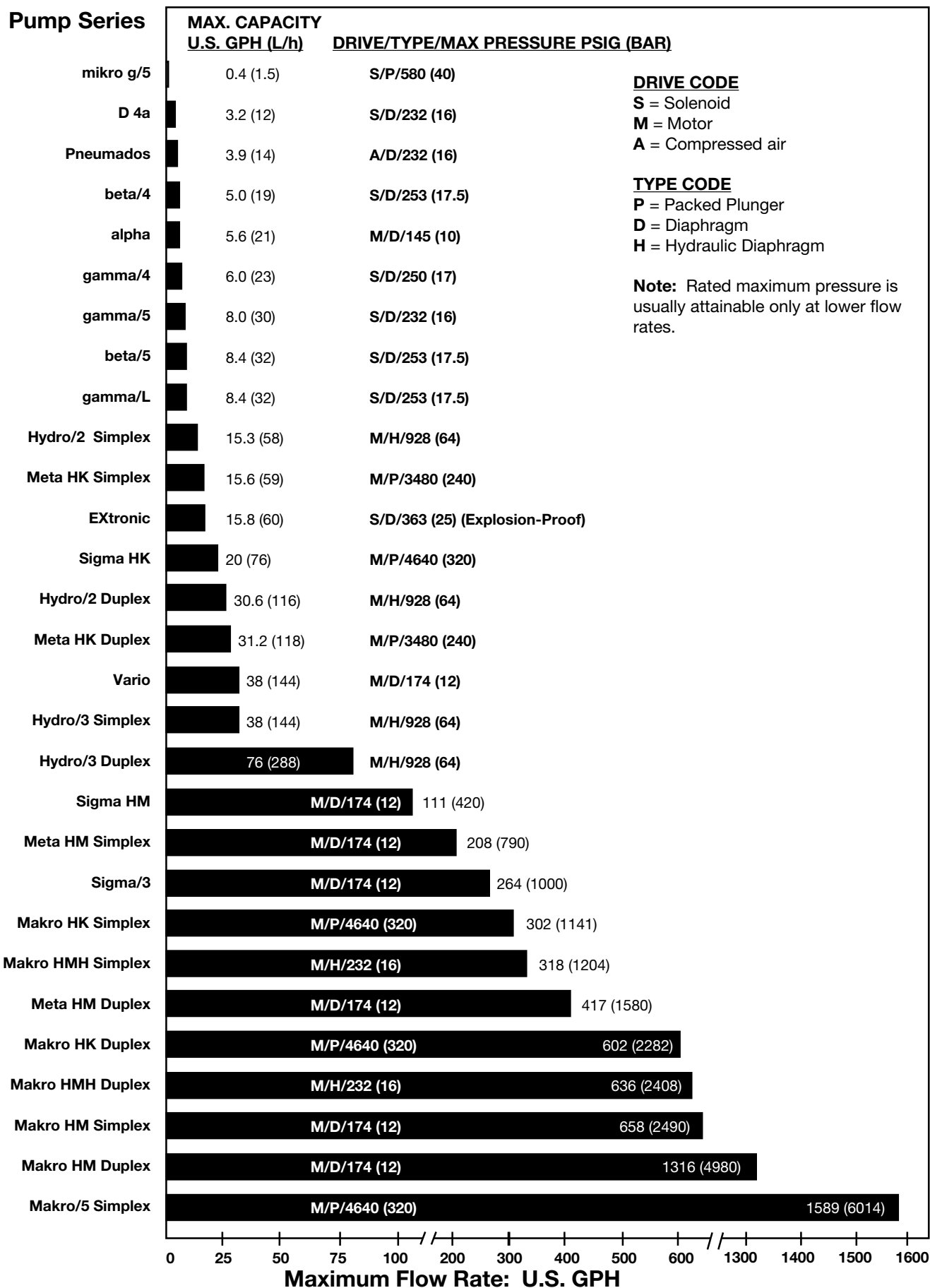
Installation Tip:

- Easy to install off the suction side of the metering pump with a ball valve to isolate from the tank.

APPLICATION OF PUMP ACCESSORIES FOR AN OPTIMAL METERING SYSTEM



ProMinent® Metering Pump Selection Guide



Data required to size metering pumps and accessories

Complete this data sheet and fax it to ProMinent Pittsburgh at (412) 787-0704 or ProMinent Canada at (519) 836-5226 for a review of the system hydraulics and recommendations on pump and accessory selection.

Desired capacity min./max.	GPH (l/h) _____
Available power supply	_____ V, _____ Hz, _____ phase
Working temperature min./max.	°F (°C) _____
Description of process fluid	_____
Concentration %	_____
Solids content %	_____
Absolute viscosity, cP	_____
Vapor pressure at working temperature	psig (bar) _____
Remarks (e.g. abrasive, developing gases and fumes, flammable, corrosive)	_____ _____

Suction conditions:

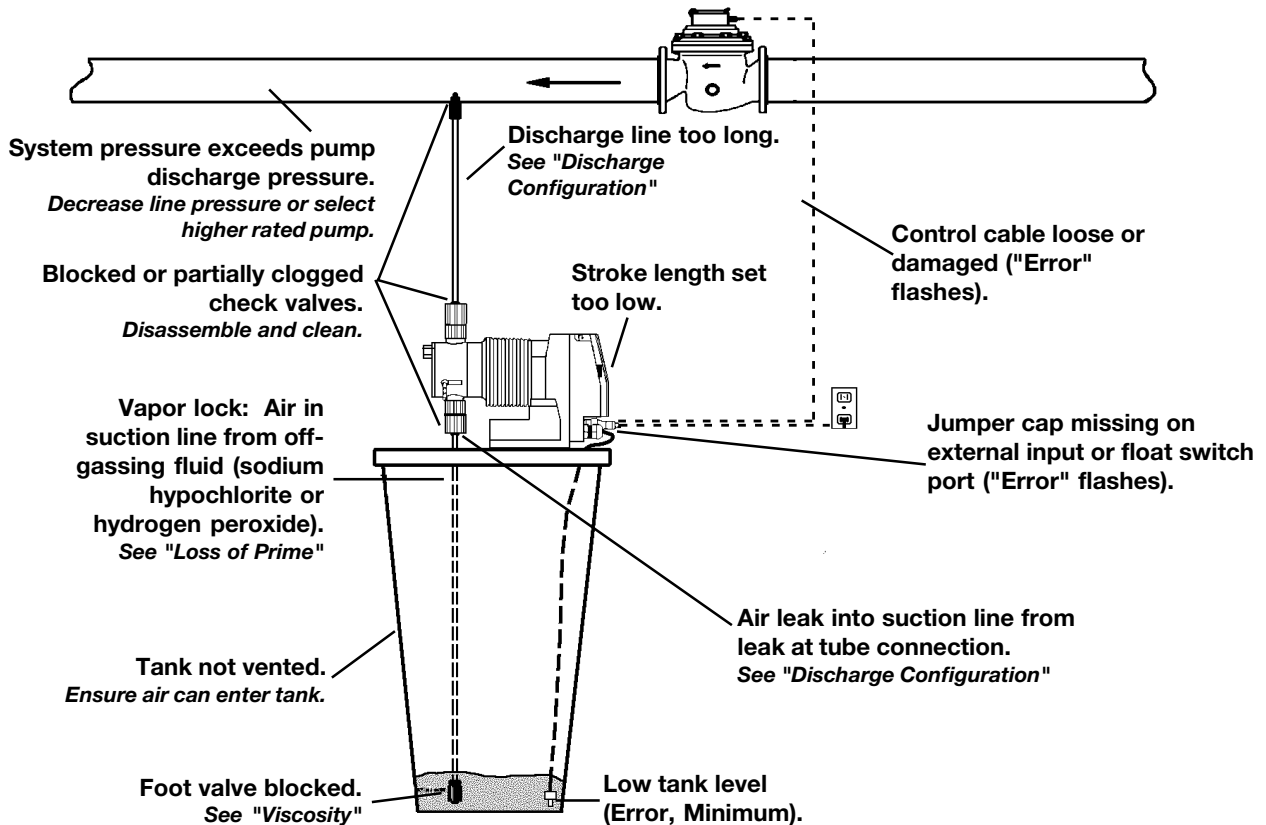
Suction lift min./max., or	ft. (m) _____
Positive suction head min./max., or	ft. (m) _____
Pressure in chemical tank	psig (bar) _____
Length of suction line	ft. (m) _____
Size (I.D.) of suction line	in. (mm) _____
Number of valves and fittings in suction line	_____

Discharge conditions:

Back-pressure min./max.	psig (bar) _____
Discharge head min./max.	ft. (m) _____
Negative discharge head min./max.	ft. (m) _____
Length of discharge line	ft. (m) _____
Size (I.D.) of discharge line	in. (mm) _____
Number of valves and fittings in discharge line	_____

System sketch

TROUBLESHOOTING TYPICAL PROBLEMS



Metering pumps are affected by:

- Pressure
- Viscosity
- Suction conditions (length, line size, configuration)
- Discharge conditions (length, line size, configuration)

Take these precautionary measures

- Metering pumps should not be primed against pressure (open the bleed valve on the liquid end, where available, until product appears).
- Ensure all connections on suction side are "leak free," especially at the foot valve.
- If the chemical being pumped is compatible with water, it is helpful to prime the pump with water, if possible - this will help wet the pump seals when the pump is left idle for a long time.
- For metering pumps with high viscosity heads or with standard liquids with light duty springs, priming will take longer. It is sometimes easier to prime the metering pump with water.

Pressure

Problem:

Metering pump capacities are greatly effected by pressure.

Solution:

Must be calibrated at your process pressure to determine capacity.

Viscosity

Problem:

Products where viscosity increases with a decrease in temperature or aging are a potential problem for metering pumps. They can block up the foot valve and/or pump valves.

Solution:

The best solution is to keep the pump pumping continuously. If the pump will be off for an extended period of time it is best to FLUSH the pump head and foot valve.

Tip:

Where possible, install the metering pump in flooded suction (i.e. at the base of the tank).

Note:

Metering pumps require valve springs to ensure the valve balls seat properly.

Troubleshooting Cont. . .

Loss of Prime

Problem:

Introduction of air on the suction side of the pump caused by missing or blocked foot valve, poor connection at suction valve and/or foot valve or pumping from an empty tank.

Solution: Check fittings for air leaks, check chemical tank level.

Problem:

Pumping off-gassing products such as NaOCl, PAA or H_2O_2 .

Solution:

Try to use metering pumps with a manually adjustable bleed valve or, preferably, a self-degassing liquid end.

Problem:

Using teflon tape on pump valves that are sealed by O-rings can prevent the valve from seating properly in pump head and may cause the operator to overtighten the valves thereby over-compressing the seals and causing leaks.

Solution: Only use thread type on NPT joints where the threads are the seating mechanism. O-ring sealed joints should not have thread tape or pipe dope.

Siphoning

Problem:

When installing a metering pump at the base of a tote/bulk tank, the head pressure of the container will force product through the pump - siphoning.

Solution:

The surest way to prevent siphoning is to install a backpressure valve in the discharge line.

Note:

The backpressure valve will also improve the pump consistency.

Suction Configuration

- ¹ Size the piping/tubing no smaller than the metering pump manufacturer's specification.
 - ² When drawing from the top of a drum, a foot valve must be used.
 - ³ When draining from the base of a tote/bulk tank, a strainer is recommended to prevent sediment from entering the metering pump valves.
 - ⁴ When draining from the base of tote/bulk tank with the pump mounted mid-way up the tote/tank, a check valve should be installed (foot valve without ceramic weight).
 - ⁵ As the tank level gets below the pump height, the output capacity of the metering pump will change unless a ball check valve is installed.
- KEEP IT SIMPLE.

Discharge Configuration

- ¹ Size pipe/tubing no smaller than the metering pump manufacturer's specification.
- ² Piping/tubing should be laid out such that the entire discharge line is full of product. If there are sags in tubing, there will be air at the highest point. As the amount of air varies, so will the capacity coming out of the injection valve.
- ³ Where a pulsation dampener is used, the bladder pressure must be maintained.