

CHEMICAL FEED PUMP SPECIFICATIONS

PART 1 – GENERAL

1.01 DESCRIPTION

- A. This section of the specification describes the chemical metering pumps, associated motors, controllers and related accessories.
- B. The equipment shall be installed as indicated on the plans, as recommended by the supplier, and in compliance with all OSHA, state, local, and federal codes and regulations.

1.02 QUALITY ASSURANCE

- A. Qualified suppliers shall have a certified ISO9000 quality assurance program. Supplier shall provide a copy of current certification by an accredited audit agency.
- B. Qualified suppliers shall assemble product using “touch-quality” methods and procedures.
- C. Qualified suppliers shall test each pump for acceptable performance with automated test fixtures with computer output of test results.
- D. Qualified suppliers shall have a minimum of 20 years experience at manufacturing reciprocating chemical metering pumps and shall have a minimum of 20 installations in similar applications. Upon request suppliers shall be able to provide a list of installations subject to verification by the engineer or owner’s representative.

1.03 MAINTENANCE

- A. The manufacturer shall provide a minimum 2 year warranty from time of shipment against defects in materials and workmanship on all mechanical components of the pump.
- B. Pumps shall be as similar as practical with respect to spare parts to minimize spare parts inventory
- C. All work under this specification shall be the responsibility of the Contractor.
- D. Each pump shall include Operating and Maintenance manual.

PART 2 – PRODUCTS

2.01 CHEMICAL FEED PUMP

A. Construction

1. Metering pumps shall be positive displacement mechanically actuated diaphragm type. A separate oil seal is required to provide a chamber between the gear drive and the process diaphragm to provide isolation of the process from hydrocarbons.
2. The capacity must be adjustable while operating or stopped over a 10:1 manual turndown range.
3. Metering pumps with a variable eccentric gear mechanism are acceptable for all services. The variable eccentric mechanism shall enable accuracy of +/- 2%.
4. Solenoid Diaphragm pumps and hydraulically actuated metering pumps are not acceptable. The piston must end each stroke cycle in the full forward position regardless of capacity setting to ensure maximum purge of the liquid end.
5. Mechanical lost motion metering pumps must utilize a scotch yoke mechanism with a stop plate design that minimizes mechanical stress by assuring all stress is on the piston centerline . Designs with a single stop rod and an off-center stop plate are not acceptable because of increased mechanical stress.
6. Stroke rate shall be 50% discharge stroke and 50% suction stroke.
7. The pump's moving parts shall be totally enclosed with no opportunity for moving parts to be exposed during operation.
8. No oil or hydraulic fluid will be utilized in the pump for lubrication purposes as this could inevitably contaminant the process fluid. Pump will be provided with greased for life. No standard maintenance on the drive component of the pump will be recommended.
9. The diaphragm in contact with the process fluid shall be constructed of PTFE faced Nylon. Alternative elastomer composite diaphragms are not permitted.
10. The metering pump manufacturer shall supply a back pressure valve for installation in the discharge line.
11. An external safety valve shall be provided by the metering pump manufacturer. safety relief valve shall be set at 25 psi above static back pressure.

12. Metering pump manufacturer shall supply a properly sized pulsation dampener for each pump.

B. Performance

FEED SYSTEM ⁽²⁾	NUMBER OF PUMPS ⁽¹⁾	MAX. FEED RATE (GPH)	MIN FEED RATE (GPH)	MAX. PRESSURE (PSI)	MAX. STROKES PER MINUTE	LIQUID END CONSTRUCTION	MAX. MOTOR HP

⁽²⁾

C. Control

1. The pump controller shall feature both automatic and manual pump speed control with a minimum turndown of 300:1. Metering pump control shall be accomplished through the combined use of AC inverter technology and intermittent motor actuation (IMA) technology. Published turndown ratings utilizing both stroke length and stroke speed to accomplish the above required turndown will not be considered. Furthermore, pumps requiring belts and pulleys to achieve the specified turndown range will not be accepted. An inverter duty motor shall be included and closed loop speed feedback will be integrated into the pump controller. The pump controller shall be the METERING PUMP CONTROLLER (MPC) as designed and manufactured by Pulsafeeder Incorporated, A Unit of IDEX Corporation.
2. The pump controller shall be supplied with a removable handheld keypad and liquid crystal display (LCD) for ease of viewing and manipulating. Keypad shall be mounted on the rear backer panel of each feed system at eye level remote from the metering pump. The handheld shall have 10 feet of cable connecting it to the base mounted unit as standard. Optionally, the handheld may be mounted up to 1000 feet away from the metering pump for optimum flexibility and consolidation of controls with other pumps and systems. A controller with a non-removable keypad will not be accepted.
3. The pump controller shall be integrally mounted in a NEMA 4X enclosure under the specified pump for maximum space savings. The controller enclosure shall be sealed independently from the bottom of the pump gearbox and shall have a double wall of protection from pump oil or chemical leakage into the electronics. Controllers utilizing the bottom of the pump to seal the controller enclosure shall not be accepted.
4. Cooling of the base mounted controller shall be by natural convection only and shall not employ the use of internal cooling fans. Pumps and controllers requiring fan cooling shall not be accepted.

5. The pump controller shall display the calibrated flow of the pump in units of flow on the LCD. The calibrated flow display will include that of the stroke length position as well. Controllers displaying only RPM or strokes per minute (SPM) will not be accepted.
6. The controller shall have the ability to automatically compensate for manual adjustments made to the stroke length of the pump while displaying the new flow rate on the LCD. A re-calibration of the pump due to a stroke length change, regardless of the percent change, in normal operation is not acceptable. Any controller requiring such a re-calibration under these conditions will not be approved.
7. The controller shall employ a motor with no brushes. An AC inverter duty motor shall be used with the metering pump controller. This motor shall be available in either NEMA or IEC frame. Motors with brushes, such as DC permanent magnet motors will not be accepted. Controllers utilizing only IEC motors will not be accepted.
8. The keypad shall utilize a single function auto-manual button. Keypads requiring toggling through a menu to switch from auto to manual shall not be accepted.
9. The controller shall utilize a security code for protection against unauthorized use.
10. The controller shall have a pump stroke and flow totalizer for data acquisition.
11. The pump controller shall not only be supplied but be designed and manufactured by the metering pump manufacturer.
12. The electrician shall have the flexibility to use the compression fit cable connections supplied with the controller or use the NPT conduit connection on the enclosure simply by removing the compression fitting to expose the NPT. Controllers utilizing MNPT connections that are integrally molded into the housing will not be accepted.
13. Functionality shall include the following.
 - a. Turndown: 300:1 with a steady state accuracy of +/- 2%.
 - b. Inputs:
 - 1.) Analog: The controller will accept (1) one 0-20mA, 4-20mA, or 0-5V DC input signal for automatic control of the metering pump flow.
 - 2.) Digital: The MPC shall have (2) two digital inputs to perform two of the following functions simultaneously:
 - a.) Remote on/off control of metering pump
 - b.) Level input from supply tank
 - c.) External pacing – pulse input
 - d.) Leak detection of the metering pump (if specified in 2.01/A above)

c. Outputs:

- 1.) Analog: The controller shall have the capacity to output an analog signal indicating pump total flow. The output signal may be either 0-20 mA, 4-20mA, or 0-5 V DC.
- 2.) Digital: The MPC shall have (3) three digital outputs to perform three of the following functions simultaneously:
 - a.) Triggering an external relay due to a fault condition
 - b.) Auto/Manual status
 - c.) On/Off status
 - d.) Pulse output – Indication each time the pump strokes

14. Calibration: The controller shall include an on board program for signal and flow calibration.

15. Input Voltage: The customer supplied voltage shall be 115VAC single phase, 60 HZ.

16. Motor Requirements: The commercially available motor shall be selected and supplied by the manufacturer of the pump controller.

17. STANDARD FEATURES: Pump controller should include the following features:

- a. AC motor speed control with speed and stroke length feedback
- b. Manual stroke length control
- c. Keypad that can be mounted on the pump or up to 1000' away from the pump
- d. Back-lit 2 line extended temperature 16 character LCD display
- e. NEMA 4X enclosure
- f. One 4-20mA input for setpoint from the customer
- g. One 4-20mA output displaying the calibrated flow
- h. Two digital inputs
- i. Three digital outputs
- j. Self diagnostics

END OF SECTION