#### beta

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#### PROMINENT FLUID CONTROLS, INC. - beta 4 and beta 5 (for flow rates less than 9 gph)

#### SECTION \_\_\_\_\_ CHEMICAL METERING PUMPS

#### 1.1 APPLICATION

- A. Quantity: \_\_\_\_
- B. Chemical Service: \_\_\_\_
- C: Tag. Nos.: \_\_
- D: Capacity (US gallons per hour)\_\_\_\_\_
- E. Backpressure (psig): \_\_\_\_\_

#### 1.2 DESCRIPTION

- A. The chemical metering pump(s) shall be a microprocessor-controlled, simplex, solenoid-driven, reciprocating, mechanically-actuated diaphragm type. The housing shall be rated NEMA 4X.
- B. The manufacturer shall provide a two year warranty on the pump drive and one year warranty on the pump liquid end, including diaphragm and O-rings. The pump shall be fully tested to meet rated flow and pressure by the manufacturer.
- C. The power supply shall be \_\_\_\_\_ VAC, \_\_\_\_ Hz, single phase.The microprocessor is to automatically compensate for supply voltage variations within 15% of the rated voltage such that frequency of the pump remains constant.
- D. The liquid end shall be physically separated from the drive unit by backplate with weep hole creating an air gap. An elastomer shaft wiper seal shall prevent contamination of the solenoid if the primary diaphragm fails. The diaphragm shall be nylon-reinforced EPDM with PTFE-faced fluid contact surface.

#### 1.3 LIQUID END((SELECT ONE))

- The liquid end shall be glass-filled polypropylene, with built coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure. The suction and discharge valve shall be of the double ball check design.
- The liquid end shall be PVDF, suitable for pumping high viscosity fluids, with springloaded single ball check valves.
- The liquid end shall be Plexiglas (acrylic) with built coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure. The suction and discharge valve shall be PVC, with double ball check design
- The liquid end shall be of the self-degassing type, with integral automatic air relief valvefor self priming under maximum rated discharge line pressure. The liquid end shall be constructed of (PVC). The suction valve shall be of the double ball check design and discharge valve shall be double ball design, perpendicular to the suction valve.
- The liquid end shall be constructed of carbon-filled PTFE.The suction and discharge valve shall be of the double ball check design.
- The liquid end shall be constructed of 316 stainless steel. The suction and discharge valve shall be of the double ball check design.
- The liquid end shall be constructed of PVDF with Teflon seals, with built coarse and

#### beta

ON-OFF operation using the PAUSE function via a voltage-free contact relay through an optional control cable.

## 1.5 STATUS / LOW LEVEL INDICATION((OPTIONAL))

- A. Low Level Control A 2-stage Float Switch shall be supplied to stop the pump prior to losing prime and annunciate low level on the pump via a LCD light.
- B. Relay Output An SPDT relay shall be installed on the pump for: ((SELECT ONE OR BOTH OF THE FOLLOWING))
- Fault Indication ((OPTIONAL)) the metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low supply solution early warn-ing/lack of supply solution shut down, flow monitor, system faults, and fuse/power supply failure).
- Pacing Relay ((OPTIONAL)) the metering pump shall have an integral relay to issue a contact closure with every pump stroke to pace a second PROMINENT metering pump.
- If both of the above options are chosen, two SPST relay contacts shall be provided through a four-conductor cable.

#### 1.6 ACCEPTABLE MANUFACTURER:

A. ProMinent Fluid Controls, model \_\_\_\_

#### 1.7 ACCESSORIES ((ALL ARE OPTIONAL AND MAY BE INCLUDED AS SEPARATE ITEMS OR AS COMPONENTS OF A PUMP STAND))

- A. The pump shall be mounted on a ((CHOOSE ONE: Black, UV-protected polypropylene / Stainless Steel)) support stand suitable for wall, floor or top-of-tank mounting, and including the following accessories pre-piped and factory tested:
- B. A foot valve and strainer shall be provided with each pump.
- C. An injection check valve shall be provided with each pump.
- D. A universal control cable with 4 pole round plastic connector and 5-wire cable with loose ends shall be provided with each pump.
- E. A two-stage float switch compatible with the chemical metering pump shall be provided for monitoring tank level.
- F. A diaphragm failure detector shall be provided to ((open/close)) a contact in the event of diaphragm failure.
- G. An adjustable-pressure, diaphragm-type backpressure/antisiphon valve shall be provided with each metering pump.
- H. An in-line, adjustable-pressure, diaphragm-type pressure relief valve shall be provided with each metering pump.
- I. A pump-mounted, multi-function, fixed-spring pressure diaphragm-type valve for backpressure/antisiphon protection, pressure relief, priming and discharge line drain shall be provided with each metering pump.
- J. An air-charged, bladder-type pulsation dampener shall be provided with each metering pump.
- K. A clear PVC calibration column with FNPT fittings top and bottom shall be provided with each pump.
- L. Fifteen feet of tubing compatible with the fluid pumped shall be provided with each pump.

#### END OF SECTION

gamma/ L

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#### PROMINENT FLUID CONTROLS, INC. – gamma/ L (for flow rates up to 8.4 gph)

#### PART 1 - GENERAL

#### 1.1 GENERAL

A. This specification covers the supply, installation, and testing of completely functional metering pump feed systems including all necessary accessories and appurtenances as shown on the drawings and described herein. A single chemical metering pump manufacturer shall be responsible for supplying all components of the metering pump feed system.

#### 1.2 QUALITY ASSURANCE

A. For the purpose of establishing quality assurance, experience, and system reliability, the products described herein are based on those metering pumps manufactured by ProMinent Fluid Controls, Inc. All pumps shall be shop-tested for capacity and pressure prior to shipment with documented results provided.

#### 1.3 WARRANTY

A. The chemical metering pump manufacturer shall provide a two year warranty on the metering pump mechanical drive and one year on the liquid end.

#### PART 2 – PRODUCTS

#### 2.1 GENERAL

- A. Manufacturers:
  - 1. ProMinent Fluid Controls, Inc.
  - 2. Pre-approved equal.

#### 2.2 DESCRIPTION

- A. The chemical metering pump(s) shall be microprocessor-controlled, simplex, solenoid-driven, reciprocating, mechanically-actuated diaphragm type.All pumping functions shall be set by membrane-switch keypad and status shall be displayed on an illuminated LCD which is readable at an offset angle of 45 degrees.Keypad will allow for simple scrolling and display of programmed parameters.The housing shall be rated NEMA 4X.
- B. The power supply shall be \_\_\_\_VAC, \_\_\_Hz, single phase. The microprocessor is to automatically compensate for supply voltage variations within 15% of the rated voltage such that the frequency of the pump remains constant.
- C. The liquid end shall be physically separated from the drive unit by a backplate with weep hole creating an air gap. An elastomer shaft wiper seal shall prevent contamination of the solenoid if the primary diaphragm fails. The diaphragm shall be constructed of a steel core, vulcanized into nylon-reinforced EPDM, with PTFE-faced fluid contact surface.

pump engineering specifications

#### gamma/ L

#### 2.3LIQUID END ((SELECT ONE))

- The liquid end shall be glass-filled polypropylene with ((EPDM/Viton) seals, (without/ with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure. Note-bleeder valve is not available with model type 0232)). The suction and discharge valves shall be of the double ball check design.
- The liquid end shall be PVC with ((EPDM/Viton)) seals, (without/with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure.. Note-bleeder valve is not available with model type 0232)). The suction and discharge valves shall be of the double ball check design.
- The liquid end shall be Plexiglas (acrylic) with ((EPDM/Viton)) seals, (without/with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure. Note-bleeder valve is not available with model type 0232)). The suction and discharge valves shall be PVC, with double ball check design.
- The liquid end shall be of the self-degassing type, with integral automatic air relief valve for self-priming under maximum rated discharge line pressure. The liquid end shall be constructed of ((acrylic/polypropylene)). The suction valve shall be of the double ball check design and discharge valve shall be spring-loaded, horizontally acting single ball design. Note-this liquid end is not available for model types 1000 and 0232.
- The liquid end shall be constructed of carbon-filled PTFE with PTFE seals. The suction and discharge valves shall be of the double ball check design.
- The liquid end shall be constructed of 316 stainless steel with PTFE seals. The suction and discharge values shall be of the double ball check design.
- The liquid end shall be constructed of PVDF with Teflon seals, ((without/with built-in coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure.Note-bleeder valve is not available with model type 0232)).

#### 2.4 PROGRAMMING AND CONTROL

- A. Stroke length control shall be manually adjusted between 100% and 0% with a stroke adjustment knob on the pump face control.The LCD shall digitally display stroke length setting in 1% increments in the full range between 100% and 0%
- B. Programming shall allow pump to be calibrated so as to display pump output in gallons/hour or liters/hour.Calibration shall be maintained when stroke length is altered up to plus or minus 10% on the stroke length knob.If stroke length is altered by more than 10%, a yellow warning light will light light and a flashing message "calib" will appear.
- C. The pump shall be equipped with the programmable function of pressure levels to allow pump to operate at reduced pressures from the maximum rated pressure of the pump.
- D. The pump shall be equipped with the programmable function of electronic interlocking of the keypad by access code to prevent unauthorized adjustments to the pump.
- E. Keypad shall allow for scrolling and display on LCD such parameters as stroke frequency, stroke length, stroke counter, pump output in gals/hr or l/hr, dosing quan-

pump engineering specifications

# **Solenoid Pump Specifications**

#### gamma/ L

tity, mA current input being received by pump, and indication of external mode.

Stroke frequency control shall be manually adjusted by touch keypads, with the set F. stroke rate displayed on the LCD. The metering pump shall be capable of receiving a pulse input via optional external control cable such that 1 pulse gives 1 pump stroke rate. The pump shall be capable of remoteON-OFF operation using the pause function via a voltage free contact relay through an optional control cable.((OPTIONAL SELECTIONS))

PULSE MULTIPLIER/DIVIDER - The pump shall allow factoring to issue from 1 to 9,999 stokes per pulse input or to issue 1 stroke per 1 to 9,999 input pulses. Or

ANALOG- The pump shall accept an analog signal such that stroke frequency is proportional to 0/4-20mA or 20-4/0mA, the choice of which is programmable at the pump. The pump shall allow the setting of a maximum stroke rate which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured. Analog to digital converters external to the pump shall not be allowed. Or

PULSE MULTIPLIER/DIVIDER AND ANALOG – Both modes of frequency control, as described above, shall be configured into the metering pump.

#### 2.5 FLOW ASSURANCE ((OPTIONAL, SELECT AS REQUIRED))

- Α. Low Level Control – A 2-stage float switch shall be supplied to stop pump prior to losing prime and annunciate low level on the pump LCD display.
- Β. Flow Monitor – A flow monitor shall be installed on the discharge line to automatically stop pumping and annunciate a fault condition on the pump LCD display upon loss of discharge flow. The pump shall be programmable, between 1 and 125 strokes per minute, to actuate the fault annunciation after flow is lost.
- C. Relay Output - An SPDT relay shall be installed for ((SELECT ONE)) fault Indication. The metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low chemical supply in tank/lack of chemical supply shut down, flow monitor, system faults, and fuse/power supply failure).Configure as ((NO/NC)) contact closure relav.

Or pacing relay. The metering pump shall have an integral relay to issue a contact closure with every pump stroke to pace a second ProMinent metering pump or both fault indication and pacing. The fault relay shall be configured as a ((NO/NC)) contact closure relay. The pacing relay shall be electrically isolated via an optical coupler with a semiconductor switch.

#### ACCESSORIES((ALL ARE OPTIONAL AND MAY BE INCLUDED AS SEPARATE ITEM-2.6 SOR AS COMPONENTS OF A PUMP STAND))

- The pump shall be mounted on a ((black, UV-protected polypropylene/304 stain-Α. less)) support stand suitable for wall, floor or top-of-tank mounting. A single chemical metering pump manufacturer shall be responsible for supplying and assembling all components of the skid, in addition to testing the skid-mounted metering system prior to shipment. The stand shall include the following accessories, pre-piped;
- Β. A foot valve and strainer, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- C. An injection valve, constructed of materials compatible with chemical to be used, shall be provided with each pump.

#### gamma/ L

- D. A universal control cable with 5-pole round plastic connector and 5-wire cable with loose ends shall be provided with each pump.
- E. A two stage float switch compatible with chemical to be used shall be provided with each pump to monitor tank level.
- F. An adjustable discharge flow monitoring device, compatible with chemical to be used, shall be provided with each pump. The flow monitor shall be capable of signaling a fault condition to the pump.
- G. A diaphragm failure detector shall be provided to ((open/close)) a contact for alarm in the event of a diaphragm failure.
- H. An adjustable-pressure, diaphragm-type back pressure/anti-siphon valve, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- I. An in-line, adjustable-pressure, diaphragm-type pressure relief valve, constructed of materials compatible with chemical to be used, shall be provided with each pump. J.A pump-mounted, multi-function, fixed-spring pressure diaphragm-type valve for backpressure/anti-siphon protection, pressure relief, priming, and discharge line drain, constructed of PVDF, shall be provided with each pump.
- K. An air-charged, bladder-type pulsation dampener, constructed with materials compatible with chemical to be used, shall be provided with each pump.The pulsation dampener shall be sized to reduce pulsations by at least 90% at full pump capacity.
- L. A clear PVC calibration column with FNPT fitting on top and bottom shall be provided with each pump. The column shall be sized to provide at least 2 minutes draw down at maximum pump capacity.
- M. Fifteen feet of tubing compatible with chemical to be used shall be provided with each pump.

#### 2.7 APPLICATION

- A. Quantity:
- B. Chemical Service:
- C. Capacity (US gph):
- D. Backpressure (psig):

## END OF SECTION

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#### PROMINENT FLUID CONTROLS, INC. – DELTA (for flow rates 3.1 to 21.1 gph)

#### PART 1 - GENERAL

#### 1.1 GENERAL

A. This specification covers the supply, installation, and testing of completely functional metering pump feed systems including all necessary accessories and appurtenances as shown on the drawings and described herein. A simple chemical metering pump manufacturer shall be responsible for suppyling all components of the metering pump feed system.

#### 1.2 QUALITY ASSURANCE

- A. For the purpose of establishing quality assurance, experience, and system reliability, the products described herein are based on those metering pumps manufactured by ProMinent Fluid Controls, Inc.
- B. All pumps shall be shop-tested for capacity and pressure prior to shipment with documented results provided.

#### 1.3 WARRANTY

A. The chemical metering pump manufacturer shall provide a two year warranty on the metering pump mechanical drive and one year on the liquid end.

#### PART 2 - PRODUCTS

#### 1.2 GENERAL

- A. Manufacturers:
  - 1. ProMinent Fluid Controls, Inc.
  - 2. Pre-approved equal.

#### 2.2 DESCRIPTION

- A. The chemical metering pump(s) shall be microprocessor-controlled, simplex, solenoid-driven, reciprocating, mechanically-actuated diaphragm type. All pumping functions shall be set by membrane-switch keypad and status shall be displayedon an illuminated LCD, which is readable. Keypad will allow for simple scrolling and display of programmed parameters. The housing shall be rated NEMA 4X.
- B. The power supply shall be \_\_\_\_\_ VAC, \_\_\_\_ Hz, single phase. The microprocessor is to automatically compensate for supply voltage variations within 15% of the rated voltage such that the frequency of the pump remains constant.
- C. The liquid end shall be physically separated from the drive unit by a backplate with weep hole creating an air gap. An elastomer shaft wiper seal shall prevent contamination of the solenoid if the primary diaphragm fails. The diaphragm shall be constructed of a steel core, vulcanized into nylon-reinforced EPDM, with PTFEfaced fluid contact surface.
- D. The pump shall utilize optoDrive<sup>®</sup> technology or equal whereby the time sequence of the dosing flow can be exactly matched to the requirements of the application. The user can set a slow pressure stroke for almost continuous dosing, or a quick stroke as needed to prevent incomplete filling of the liquid end due to viscosity of

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the media being pumped. In cases of outgassing dosing media, the settable suction stroke shall assist in preventing cavitation. Fluctuation in backpressure shall be automatically compensated by the drive.

E. The pump shall have optoGuard<sup>®</sup> technology integrated into the drive to detect blocked metering points or broken metering lines, and to detect airlocks within the delivery unit. This will function to prevent uncontrolled metering. These problems are to be shown on the pump delay.

#### 2.3 LIQUID END ((SELECT ONE))

- The liquid end shall be constructed of 316 stainless steel with PTFE seals. The suction and discharge valves shall be of the double ball check design for discharge pressure greater than 100 psi.
- The liquid end shall be constructed of PVDF with Teflon seals, ((without/with builtin coarse valve and needle valve for air bleed, manually adjusted for continuous degassing of process fluid and self-priming against pressure)). The suction and discharge valves shall be of the double ball check design for discharge pressures greater than 100 psi.

#### 2.4 PROGRAMMING AND CONTROL

- A. Stroke length control shall be manually adjusted between 0% and 100% with a stroke adjustment knob on the pump face control, The LCD shall digitally display stroke length setting in 1% increments in the full range between 0% and 100%
- B. Programming shall allow pump to be calibrated so as to display pump output in gallons/hour or liters/hour. Calibration shall be maintained when stroke length is altered up to plus or minus 10% on the stroke length knob. If stroke length is altered by more than 10%, a yellow warning will light and a flashing message "calib" will appear.
- C. The pump shall be equipped with the programmable function of pressure levels to allow pump to operate at reduced pressures from the maximum rated pressure of the pump (not available for models 0450 and 0280).
- D. The pump shall be equipped with the programmable function of electronic interlocking of the keypad by access code to prevent unathorized adjustments to the pump.
- E. Keypad shall allow for scrolling and display on LCD such parameters as stroke frequency, stroke length, stroke counter, pump output in gals/hr or l/hr, dosing quantity, mA current input being received by pump, and indication of external mode.
- F. Stroke frequency control shall be manually adjusted by touch keypads, with the set stroke rate displayed on the LCD. The metering pump shall be capable of receiving a pulse input via optional external control cable such that 1 pulse gives 1 pump stroke rate. The pump shall be capable of remote ON-OFF operation using the pause function via a voltage free contact relay through an optional control cable. ((OPTIONAL SELECTIONS))

CONTACT-The pump shall allow fine-tune factoring to issue from 1 to 9,999 strokes per pulse input or to issue 1 stroke per 1 to 9,999 input pulses. The dosing can be activated by an impulse via external control through a contact or a semiconductor switching element.

#### Or

Batch-The dosing can be activated by pressuring the P key or by an external impulse through a contact or a semiconductor switching element. A dosing quantity

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(batch) or a number of strokes (max 65535) can be preselected via the control unit. Or

ANALOG-The pump shall accept an analog signal such that stroke frequency is proportional to 0/4-20mA or 20-4/0mA, the choice of which is programmable at the pump. The pump shall allow the setting of a maximum stroke rate which corresponds to the maximum analog signal, with stroke rate proportional to signal strength below that rate. Programming for curve processing shall also be possible, in which any stroke frequency ratio in proportion to the electrical signal can be configured. Analog to digital converters external to the pump shall not be allowed.

Or

PULSE AND ANALOG – Both modes of frequency control, as described above, shall be configured into the metering pump.

#### 2.5 FLOW ASSURANCE ((OPTIONAL, SELECT AS REQUIRED))

- A. Low Level Control – A 2-stage float switch shall be supplied to stop pump prior to losing prime and annunciate low level on the pump LCD display.
- B. Flow Monitor – A flow monitor shall be installed on the discharge line to automatically stop pumping and annunciate a fault condition on the pump LCD display upon loss of discharge flow. The pump shall be programmable, between 1 and 125 strokes per minute, to actuate the fault annunciation after flow is lost.
- C. Relay Output - An SPDT relay shall be installed for ((SELECT ONE)) fault indication. The metering pump shall have an integral relay to allow remote annunciation of a fault condition (i.e. low chemical supply in tank/lack of chemical supply shut down, flow monitor, system faults, and fuse/power supply failure). Configure as ((NO/NC)) contact closure relay. or pacing relay. The metering pump shall have an integral relay to issue a contact closure with every pump stroke to pace a second ProMinent metering pump or

both fault indication and pacing. The fault relay shall be configured as a ((NO/NC)) contact closure relay. The pacing relay shall be electrically isolated via an optical coupler with a semiconductor switch.

D. Diaphragm Failure - A diaphragm failure detector will alert the possibility of a ruptured or distressed diaphragm.

#### 2.6 ACCESSORIES ((ALL ARE OPTIONAL AND MAY BE INCLUDED AS SEPARATE ITEMS OR AS COMPONENTS OF A PUMP STAND))

- A. The pump shall be mounted on a ((black, UV-protected polypropylene/304 stainless)) support stand suitable for wall, floor or top-of-tank mounting. A single chemical metering pump manufacturer shall be responsible for supplying and assembling all components of the skid, in addition to testing the skid-mounted metering system prior to shipment. The stand shall include the following accessories, pre-piped:
- Β. A foot valve and strainer, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- C. An injection valve, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- D. A universal control cable with 5-pole round plastic connector and 5-wire cable with loose ends shall be provided with each pump.
- E. A two stage float switch compatible with chemical to be used shall be provided with

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# **Solenoid Pump Specifications**

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each pump to monitor tank level.

- F. An adjustable discharge flow monitoring device, compatible with chemical to be used, shall be provided with each pump. The flow monitor shall be capable of signaling a fault condition to the pump.
- G. A diaphragm failure detector shall be provided to ((open/close)) a contact for alarm in the event of a diaphragm failure.
- H. An adjustable-pressure, diaphragm-type back pressure/anti-siphon valve, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- I. An in-line, adjustable-pressure, diaphragm-type pressure relief valve, constructed of materials compatible with chemical to be used, shall be provided with each pump.
- J. A pump-mounted, multi-function, fixed-spring pressure diaphragm-type valve for backpressure/anti-siphon protection, pressure relief, priming, and discharge line drain, constructed of PVDF, shall be provided with each pump.
- K. An air-charged, bladder-type pulsation dampener, constructed with materials compatible with chemical to be used, shall be provided with each pump. The pulsation dampener shall be sized to reduce pulsations by at least 90% at full pump capacity.
- L. A clear PVC calibration column with FNPT fitting on top and bottom shall be provided with each pump. The column shall be sized to provide at least 2 minutes draw down at maximum pump capacity.
- M. Fifteen feet of tubing compatible with chemical to be used shall be provided with each pump.

## 2.7 APPLICATION

- A. Quantity:
- B. Chemical Service:
- C. Capacity (US gph):
- D. Backpressure (psig):

## END OF SECTION

2/08/2008 - Solenoid Pump Specifications