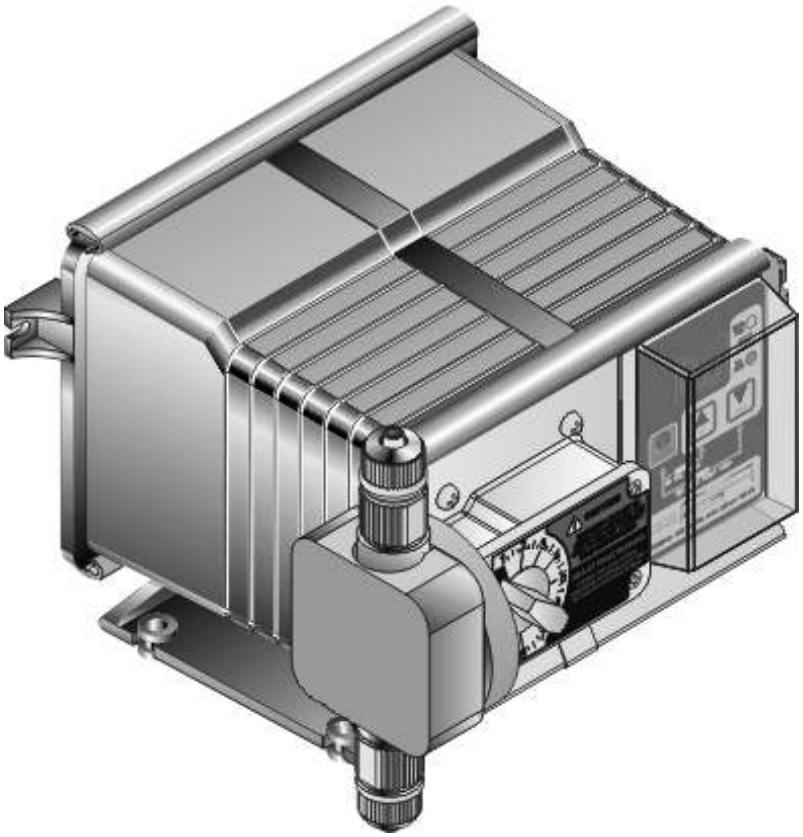
User's Guide



FPUDV1000 Series

VARIABLE SPEED
POSITIVE DISPLACEMENT INJECTOR PUMP
OPERATING MANUAL

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Internet e-mail
info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified
One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
E-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L5A1, Canada
TEL: (514) 856-6928 FAX: (514) 856-6886
E-mail: info@omega.ca

For immediate technical or application assistance:

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Mexico: En Espanol: (001) 203-359-7803 e-mail: espanol@omega.com
FAX: (001) 203-359-7807 info@omega.com.mx

Service Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
E-mail: sales@omega.fr

Czech Republic:
Frystatska 184, 733 01 Karvina, Czech Republic
Tel: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:
11, rue Jacques Cartier, 78280 Guyancourt, France
TEL: +33 (0)1 61 37 2900 FAX: +33 (0)1 30 57 5427
Toll Free in France: 0800 466 342
E-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
E-mail: info@omega.de

United Kingdom:
ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
TEL: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
E-mail: sales@omega.uk

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1.0 Introduction

Congratulations on purchasing the positive displacement metering pump. The pump is designed to inject chemicals into piping systems and is capable of injecting against a high system pressure up to 150 PSI (10.4 bar). In addition to the front mounted mechanical flow rate adjustment, the pump is equipped with an external input control circuitry which allows the pumps output to be externally controlled by either a 4-20mA input signal, a 0-10V DC input signal or a pulsed input signal.

2.0 Specifications

Maximum Working Pressure	150 psig / 10.4 bar*
Maximum Fluid Temperature	130° F / 54° C
Output Accuracy	+/- 10% of maximum (water @ 70° F, 0 psig, and 5' suction lift)
Ambient Temperature Range	14 to 110° F / -10 to 43° C
Duty Cycle	Continuous
Maximum Viscosity	1,000 Centipoise
Maximum Suction Lift	up to 10 ft. water
Power Requirements	115V60Hz 40 Watts
	220V50Hz 40 Watts
	230V60Hz 40 Watts
Signal Inputs	4-20 mA , 0-10 VDC
	TTL, CMOS pulses
	Hall Effect sensors, Open-collector transistors,
	Dry Contact switches (must withstand 12 VDC @ 2 mA)
Dimensions	6-1/4" high x 10" wide x 9-1/4" deep
	(159 MM x 254 MM x 235 MM)
Weight	14 lb. / 6.35 Kg

3.0 Features

- Double-ball ceramic check valves.
- PVDF (Kynar) valve assemblies.
- High grade Aflas and Viton O-rings.
- Large outlet flowrate up to 360 GPD / 1363 Liters per day.
- High outlet pressure capability of 150 PSIG / 10.4 Bar.*
- Easy access, front mounted mechanical feed rate adjustment.
- Ball bearing supported motor drive shaft.
- Permanently lubricated ball bearing motor.
- Digital electronic feed rate control.
- 400:1 adjustment turn down ratio.
- Pump output verification system.
- Pump service inspection warning timer.
- Corrosion resistant Valox housing.
- Easy servicing.
- Includes suction tube foot valve & strainer, suction tube weight, suction tubing, discharge tubing and injection fitting with internal back-flow check valve and mounting hardware.

* Most models

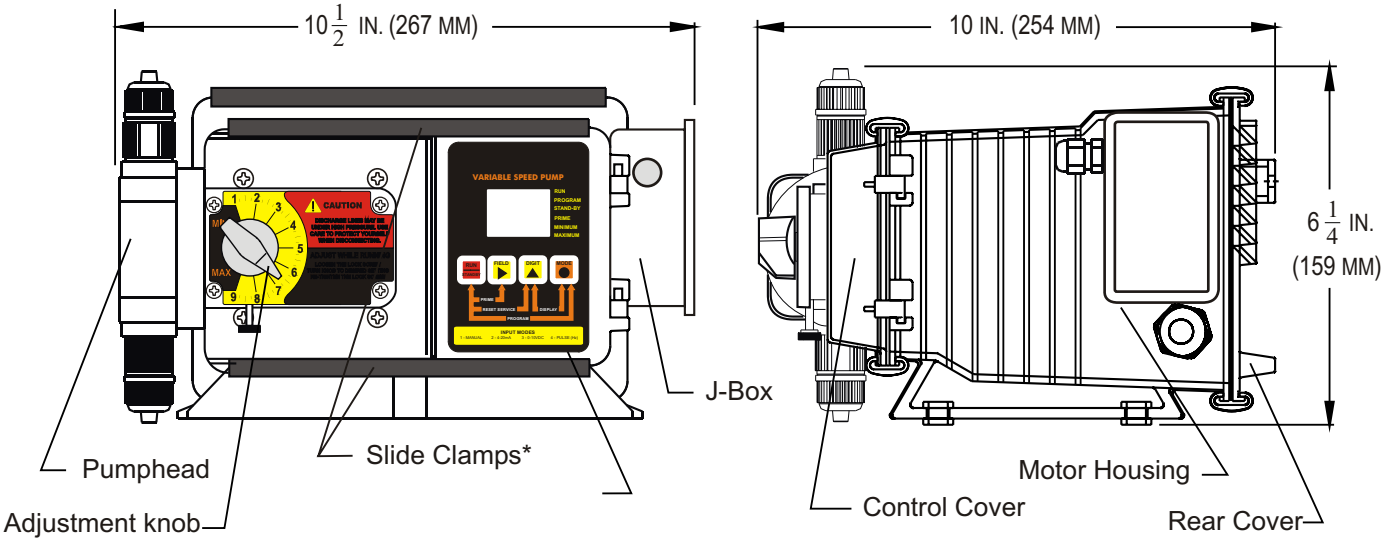


FIG. 3.0 PARTS LOCATOR DRAWING

* Slide both top & bottom clamps to the left only far enough to open the control cover.

4.0 How To Install the Pump

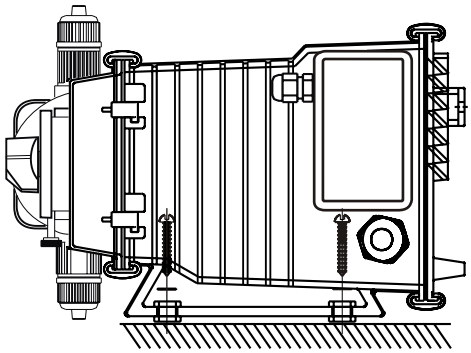
CAUTION: PROPER EYE AND SKIN PROTECTION MUST BE WORN WHEN INSTALLING AND SERVICING THE FPUDV1000

Note: *All diagrams are strictly for guideline purposes only. Always consult an expert before installing the pump into specialized systems.*
The pump should be ***serviced by qualified persons only.***

4.1 Mounting Location

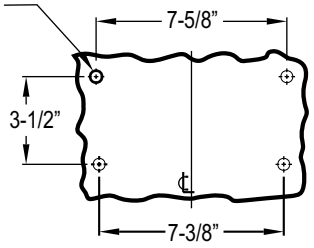
Choose an area located near the chemical supply tank, chemical injection point and electrical supply. Although the pump is designed to withstand outdoor conditions, a cool, dry, well ventilated location is recommended. Install the pump where it can be easily serviced.

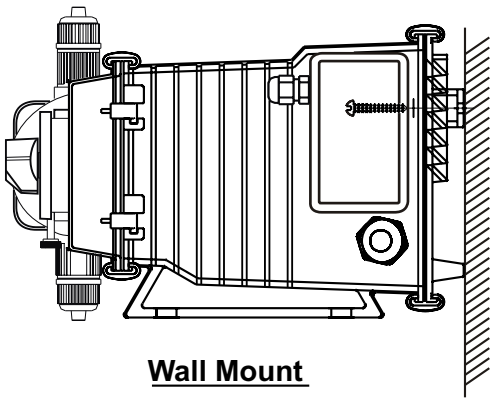
- Mount the pump to a secure surface or wall using the enclosed hardware. Wall mount to a solid surface only. Mounting to drywall with anchors is not recommended.
- Keep the outlet (discharge) tubing as short as possible. Longer tubing increases the back pressure at the pump tube.
- Do not mount the pump directly over your chemical container. Chemical fumes may damage the unit. Mount the pump off to the side or at a lower level than the chemical container.
- Mounting the pump lower than the chemical container will gravity feed the chemical into the pump. This “flooded suction” installation can reduce the time required to prime the pump. Install a shut-off valve, pinch clamp or other means to halt the gravity feed to the pump during servicing.
- Your solution tank should be sturdy. Keep the tank covered to reduce fumes.



Floor Mount

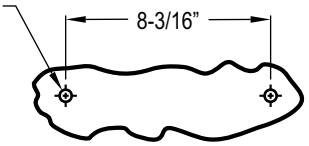
Drill .156 Dia. (5/32)
For Self-Tap Screw
#10 X 1" Phillips Steel
4 Places





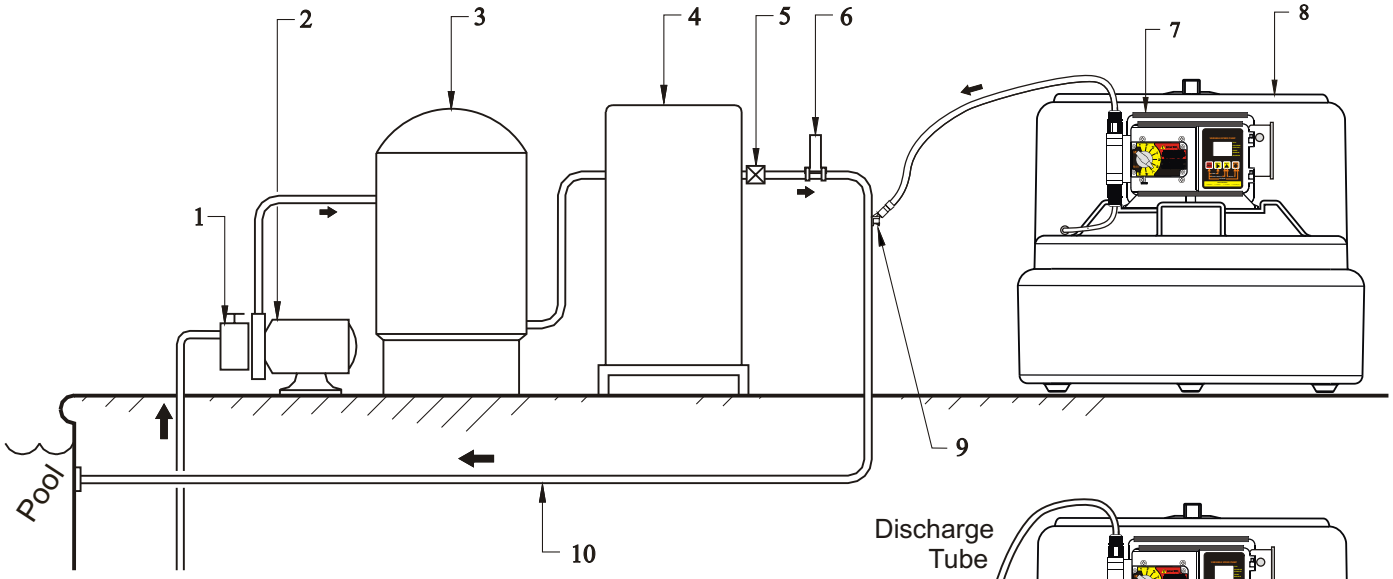
Wall Mount

Drill .156 Dia. (5/32)
For Self-Tap Screw
#10 X 1" Phillips Steel
2 Places



Note: For wall-mounting, recommend drill & thread into solid wood only.

FIG. 4.1 - INJECTOR MOUNTING



1. Strainer
2. Circulation Pump
3. Filter
4. Heater
5. Check Valve
6. Flowmeter
7. Injector
8. Solution Tank
9. Injection Fitting (FPU1000-IF)
10. Return Line

FIG. 4.2 - SWIMMING POOL INSTALLATION

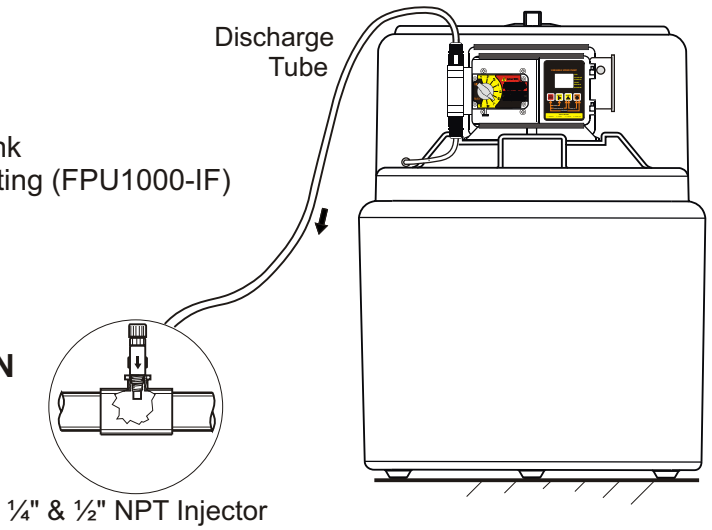


FIG. 4.3 - TYPICAL INSTALLATION

4.2 Electrical Connections

4.2.1 Input Power Connections -

Be certain to connect the pump to the proper supply voltage. Using the incorrect voltage will damage the pump and may result in injury. The voltage requirement is printed on the pump serial label.

WARNING-RISK OF ELECTRICAL SHOCK

Jumper pins on the circuit board are factory preset for the correct voltage. See Fig. 4.4, page 7 for details.

The pump is supplied with a ground wire conductor and a grounding type attachment plug (power cord). To reduce the risk of electric shock, be certain that the power cord is connected only to a properly grounded, grounding type receptacle.

Note: *When in doubt regarding your electrical installation, contact a licensed electrician.*

4.2.2 External Input Signal Connections -

The pump will accept any one of three different types of external input signals; 4-20 mA, 0-10 VDC, or frequency. Two types of frequency inputs, AC sine waves (magnetic coils type outputs) and Digital Square waves (Hall Effect signals, contact closures), are acceptable. A jumper plug located on the circuit board is factory pre-set for AC sine wave signals, the jumper must be re-positioned when digital square wave signals are being used. (See Fig. 4.4, page 7, “Hz input jumper settings”)

All wiring connections are to be made inside of the junction box located on the side of the pump. A liquid-tite connector is supplied and should be used for the external signal cable. The signal input wires are color coded to the type of signal being used.

INPUT SIGNAL TYPE	POSITIVE WIRE COLOR	NEGATIVE WIRE COLOR
4-20 mA	BLUE	BLACK
0-10 V DC	ORANGE	BLACK
AC sine wave, Digital square wave	WHITE	BLACK

FIG. 4.3 WIRING CHART - INPUT SIGNAL WIRE COLORS

SIGNAL INPUT MODES / FUNCTIONS & WIRING COLOR CODES

INPUT MODE / FUNCTION	WIRES REQUIRED
MANUAL	NO CONNECTIONS
4-20 mA	**BLUE (+)** & **BLACK (-)**
0-10 VDC	**ORANGE (+)** & **BLACK (-)**
FREQUENCY	**WHITE (+)** & **BLACK (-)**
ALARM RELAY	**PURPLE** & **PURPLE**
FLOW VERIFICATION SENSOR (Digital square waves)	**RED (+** 20VDC) & **BLACK (-)** & **YELLOW** (signal)
MOTOR ON SIGNAL	**BROWN (+)** & **BLACK (-)**

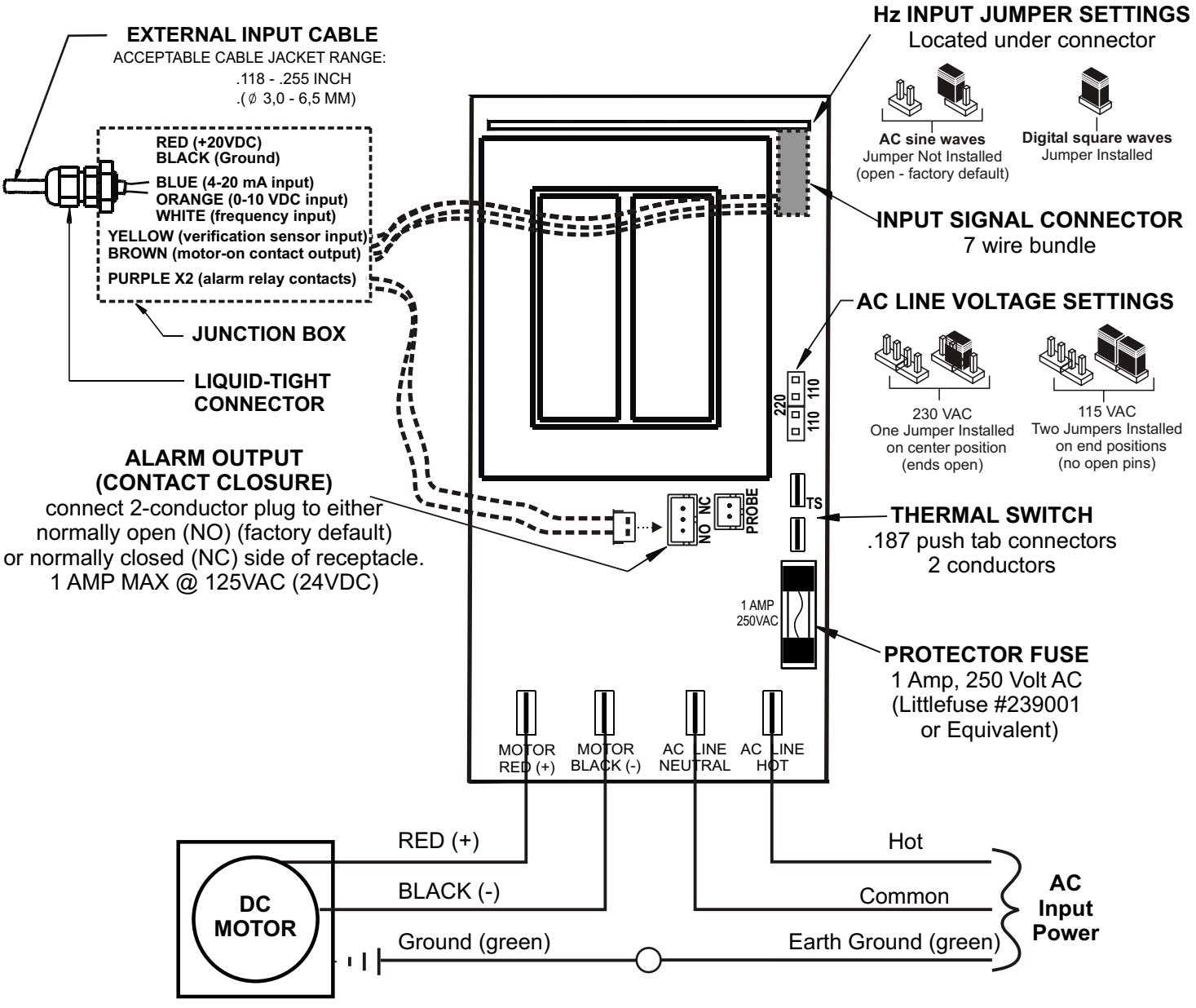


FIG. 4.4 WIRING DIAGRAM - CIRCUIT BOARD

4.3 How To Install the Tubing and Fittings

CAUTION: PROPER EYE AND SKIN PROTECTION MUST BE WORN WHEN INSTALLING AND SERVICING THE FPUDV1000

4.3.1 Inlet Tubing - Locate the inlet fitting of the pump head, see fig 4.9. Remove the tube nut. Push the clear PVC suction tubing onto the compression barb of the fitting. Use the tube nut to secure the tube. Hand tighten only.

4.3.2 Footvalve/Strainer -Trim the inlet end of the suction tubing so that the strainer will rest approximately one inche from the bottom of the solution tank. This will prevent sediment from clogging the strainer. Slip the ceramic weight over the end of the suction tube. Press the footvalve/strainer into the end of the tube. Secure the ceramic weight to the strainer. Drop the strainer into the solution tank.

4.3.3 Outlet Tubing - Locate the outlet fitting of the pump head, see fig 4.9. Remove the tube nut. Push the opaque outlet (discharge) tubing onto the compression barb of the fitting. Use the tube nut to secure the tube. Hand tighten only.

Trim the other end of the outlet tube leaving only enough slack to connect it to the Injection/Check valve Fitting (see below). Increasing the length of the outlet tube increases the back pressure at the pump head, particularly when pumping viscous fluids.

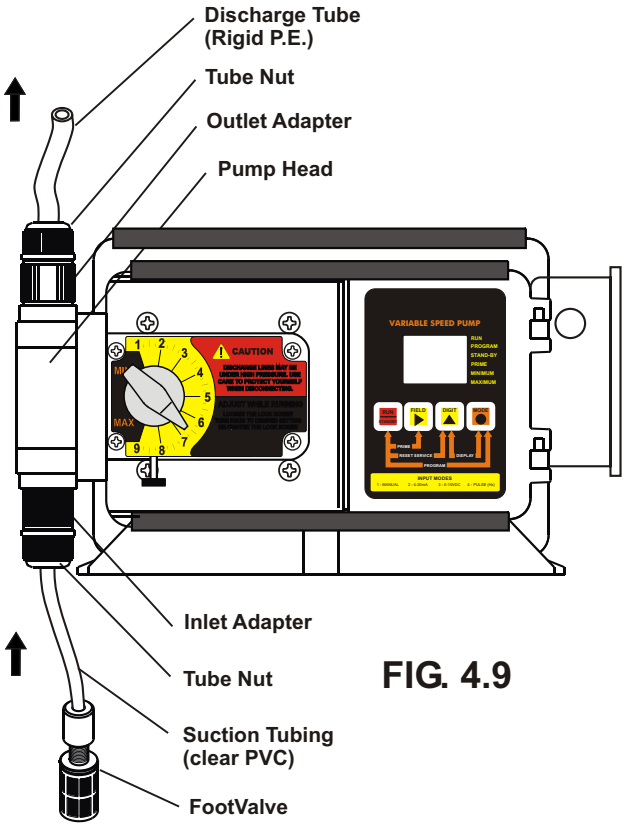


FIG. 4.9

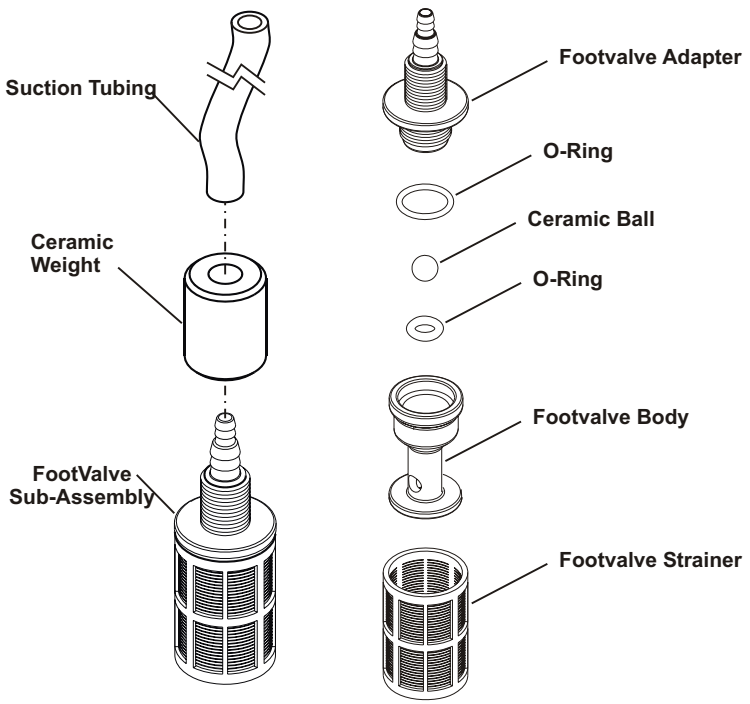
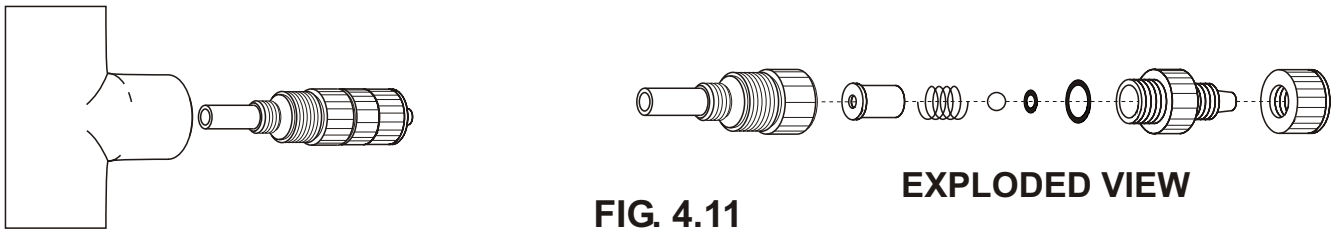


FIG. 4.10 FOOTVALVE ASSY.

4.3.4 Injection/Check Valve Fitting Installation - The Injection/Check valve fitting is designed to install directly into either 1/4” or 1/2” female pipe threads. This fitting will require periodic cleaning, especially when injecting fluids that calcify such as sodium hypochlorite. These lime deposits and other build ups can clog the fitting increasing the back pressure and interfering with the check valve operation. See section 6.0.

Install the Injection/Check valve directly into the piping system. Do not use a pipe stud with a tee for insertion of the injection valve. The solution must inject directly into the flow stream.

Use Teflon thread sealing tape on the pipe threads. Push the opaque outlet (discharge) tubing onto the compression barb of the Injection/Check valve fitting. Use the tube nut to secure the tube. Hand tighten only.



TEE INSTALLATION

EXPLODED VIEW

FIG. 4.11
INJECTION/CHECK VALVE
TEE INSTALLATION AND EXPLODED VIEW

5.0 How To Operate The Pump

5.1 How to adjust the output- Cam-Type Mechanism Adjustment (fig. 5.1) - The flow rate can be adjusted within a range of 5% -100% of maximum output (20:1 turndown ration) by means of a mechanical, cam type mechanism. The mechanism adjusts the pump’s stroke length to an infinite number of settings within the flow range. Because the pump’s output is reduced by increasing the pressure of the system being injected into, the amount of suction lift, and the viscosity of the fluid being injected, the pump must be over-sized to allow for these factors. Sizing the pump to allow adjustment within the midrange is preferred to maintain accuracy. Consult the factory for individual pump model output curve data.

To **adjust the pump’s output**:

1. With the pump running, loosen the lock screw.

2. Turn the adjustment knob to the desired setting.

3. Re-tighten the lock screw.

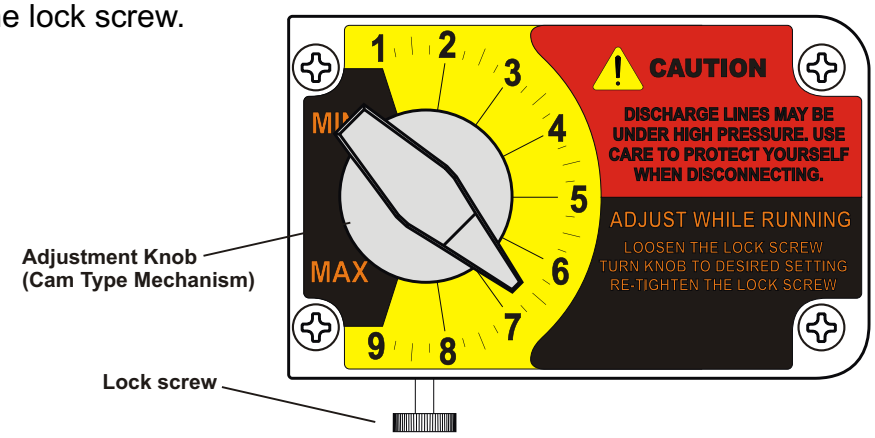


FIG. 5.1

5.2 Description of Electronic Adjustment Controls -

Open the control panel door by sliding the upper and lower slide clamps to the left. FIG. 5.2

- **RUN/STANDBY** Button -
  - Press to start and stop the pump. The ***ARROW*** next to the word RUN will light when in the run mode. The ***ARROW*** next to the word STAND-BY will blink when in the stand-by mode.
  - Press to clear ***ALARM.***
  - When pressed with the FIELD Button, initiates a 99 second prime cycle which temporarily overrides the mode setting and runs the pump motor at 100% speed. The ***ARROW*** next to the word PRIME will blink.
  - When pressed with the DIGIT button, resets the 500 hour service warning timer to zero.
  - When pressed with the MODE button, initiates the programming mode. The ***ARROW*** next to the word PROGRAM will blink.
- **FIELD** Button -
  - In the programming mode, selects the digit to be changed.
- **DIGIT** Button -
  - In the programming mode, increases the selected digit.
  - When pressed with the MODE Button, toggles the display from % motor speed to input signal value.
- **MODE** Button -
  - Used to select one of four operating modes.

Mode 1 - Manual Adjustment (external input disabled)
Mode 2 - 4-20mA input
Mode 3 - 0-10VDC input
Mode 4 - Frequency (Hz) input

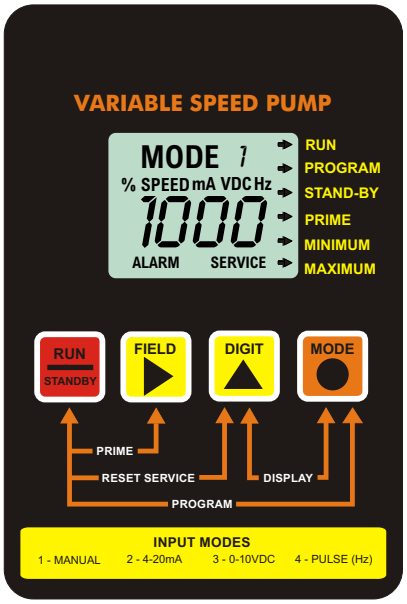


FIG. 5.1

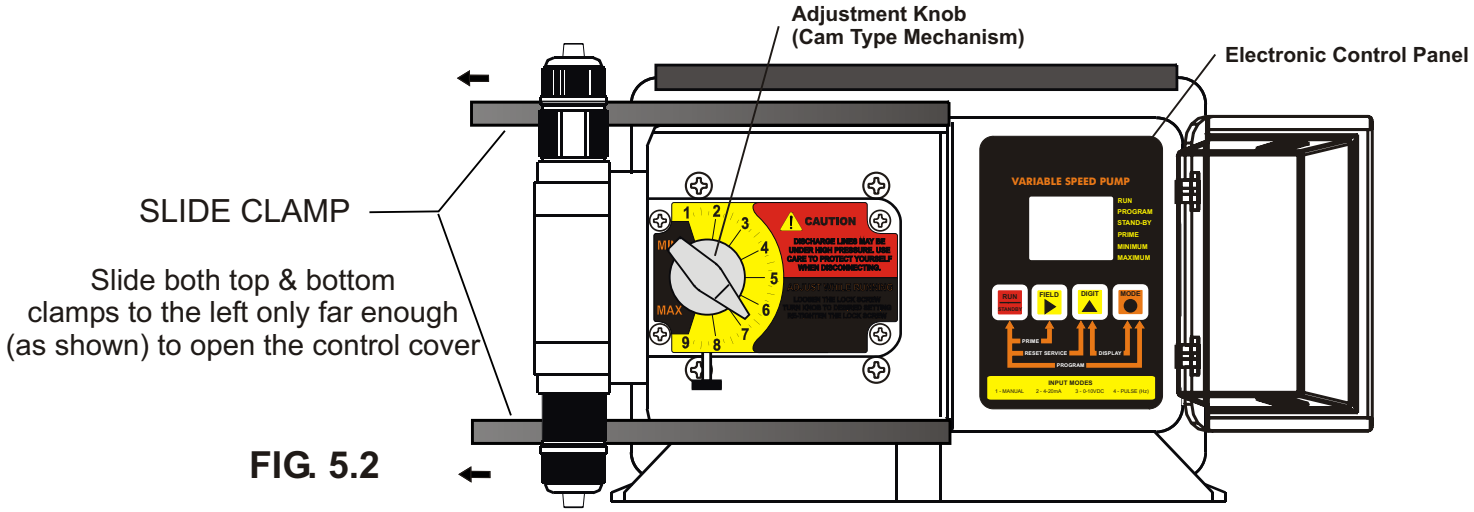


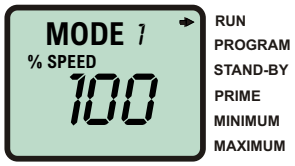
FIG. 5.2

5.3 OPERATING MODE 1 - Output adjusted manually -

In this mode, the pump's motor speed is adjusted manually using the front panel touch pad. The motor speed can be adjusted from 0-100%. To adjust the speed:

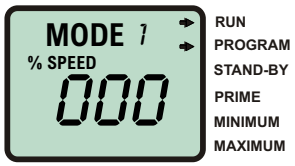
- ***Set the pump for mode 1***. Press the MODE button until ***MODE 1*** is shown on the LCD display. The ***%SPEED*** icon will light. The large ***3-DIGIT LCD*** will indicate the currently programmed percentage of speed.
- ***Enter the programming mode.*** At the same time, press the RUN/STANDBY button and the MODE button. A blinking ***ARROW*** will point to the word PROGRAM indicating the program mode has been activated.
- Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- To exit the programming mode, press the RUN/STANDBY button and the MODE button at the same time. The arrow next to the word PROGRAM will disappear.

RUN MODE 1



PROGRAM MODE 1

constant speed % setting



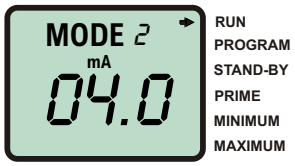
✓ **NOTE:** If while in the program mode no buttons are pressed within 20 seconds, the circuitry will automatically return to the run mode, without saving changes.

5.4 ✓ **OPERATING MODE 2 - Output adjusted by 4-20 mA input signal -**

In this mode, the pump's motor speed is adjusted automatically based on the value of the 4-20 mA input signal. Any motor speed can be assigned to either the minimum or maximum milliamp input values. However, **the programmed minimum mA value must be less than the programmed maximum mA value.** The **ALARM** and **SERVICE** icons will blink if the programming is in error. To assign the minimum and maximum motor speed and the minimum and maximum mA input signal values:

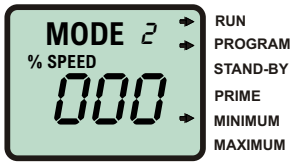
- ***Set the pump for mode 2***. Press the MODE button until ***MODE 2*** is shown on the LCD display. The ***%SPEED*** or ***mA*** icon will light depending on the current display setting. The large ***3-DIGIT LCD*** will indicate the current motor speed or the current mA input value.
- ***Enter the programming mode.*** At the same time, press the RUN/STANDBY and MODE buttons. A blinking ***ARROW*** will point to the word PROGRAM indicating the program mode is activated. A blinking ***ARROW*** will point to the word MINIMUM indicating the minimum value is ready to be programmed. The ***% SPEED*** icon will blink indicating the percentage of speed is ready to be programmed.
- ***Enter the motor speed at the minimum mA input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***mA*** icon will blink indicating the minimum mA value is ready to be programmed. The currently programmed minimum value is shown on the ***3-DIGIT LCD***.
- ***Enter the minimum mA input signal value.*** Note: this value must be less than the maximum mA input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***Ma*** icon will stop blinking and the ***% SPEED*** icon will blink. The ***ARROW*** next to the word MAXIMUM will blink indicating the maximum value is ready to be programmed. The currently programmed maximum motor speed value is shown on the ***3-DIGIT LCD***.
- ***Enter the motor speed at the maximum mA input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***mA*** icon will blink indicating the maximum mA value is ready to be programmed. The currently programmed maximum value is shown on the ***3-DIGIT LCD***.
- ***Enter the maximum mA input signal value.*** Note: this value must be greater than the minimum mA input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected..
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.

RUN MODE 2



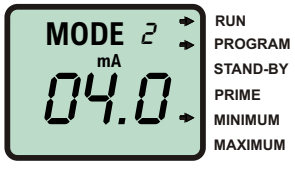
PROGRAM MODE 2

% speed at the minimum input



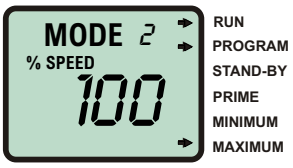
PROGRAM MODE 2

minimum input value

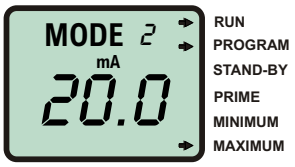


- Press the mode button. The ***Ma*** icon will stop blinking and the ***% SPEED*** icon will blink. The ***ARROW*** next to the word MAXIMUM will blink indicating the maximum value is ready to be programmed. The currently programmed maximum motor speed value is shown on the ***3-DIGIT LCD***.
- ***<u>Enter the motor speed at the maximum mA input signal value.</u>*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***mA*** icon will blink indicating the maximum mA value is ready to be programmed. The currently programmed maximum value is shown on the ***3-DIGIT LCD***.
- ***<u>Enter the maximum mA input signal value.</u>*** Note: this value must be greater than the minimum mA input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected..
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. Programming is complete.
- To exit the programming mode, press the RUN/STANDBY button and the MODE button at the same time. The PROGRAM arrow will disappear.

PROGRAM MODE 2
% speed at the maximum input

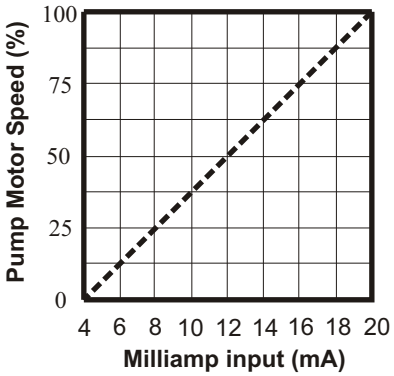


PROGRAM MODE 2
maximum input value

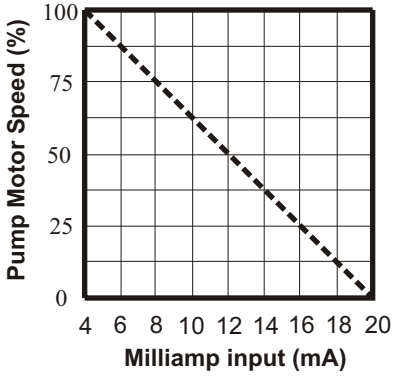


MODE 2 PROGRAMMING EXAMPLES

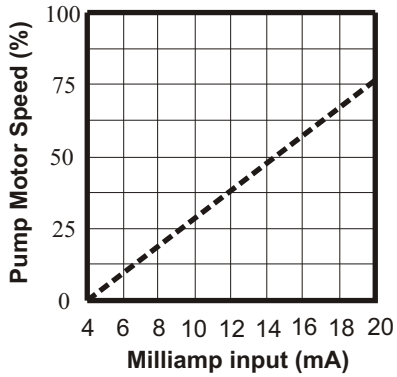
Example 1
4 mA = 0% OUTPUT
20 mA = 100% OUTPUT



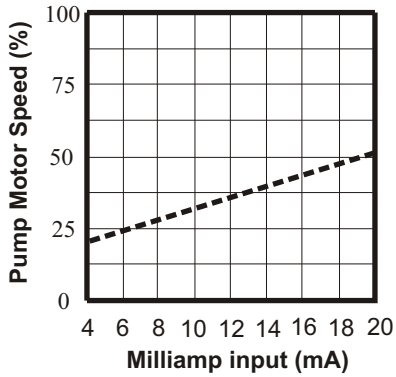
Example 2
4 mA = 100% OUTPUT
20 mA = 0% OUTPUT



Example 3
4 mA = 0% OUTPUT
20 mA = 75% OUTPUT



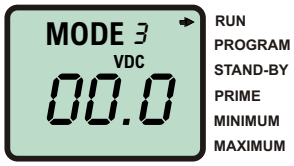
Example 4
4 mA = 20% OUTPUT
20 mA = 50% OUTPUT



5.5 OPERATING MODE 3 - Output adjusted by 0-10VDC input signal -

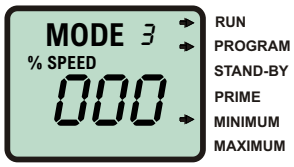
In this mode, the pump's motor speed is adjusted automatically based on the value of the 0-10VDC input signal. Any motor speed can be assigned to either the minimum or maximum DC input signal values. However, **the programmed minimum VDC value must be less than the programmed maximum VDC value.** The **ALARM** and **SERVICE** icons will blink if the programming is in error. To assign the minimum and maximum motor speed and the minimum and maximum VDC input signal values:

RUN MODE 3



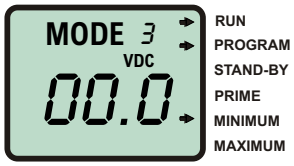
- ***Set the pump for mode 3***. Press the MODE button until ***MODE 3*** is shown on the LCD display. The ***% SPEED*** or ***VDC*** icon will light depending on the current display setting. The large ***3-DIGIT LCD*** will indicate the current motor speed or the VDC input value.
- ***Enter the programming mode.*** At the same time, press the RUN/STANDBY and MODE buttons. A blinking ***ARROW*** will point to the word PROGRAM indicating the program mode is activated. A blinking ***ARROW*** will point to the word MINIMUM indicating the minimum value is ready to be programmed. The ***% SPEED*** icon will blink indicating the percentage of speed is ready to be programmed.

PROGRAM MODE 3
% speed at the minimum input



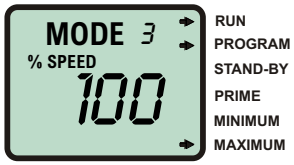
- ***Enter the motor speed at the minimum VDC input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***VDC*** icon will blink indicating the minimum VDC value is ready to be programmed. The currently programmed minimum value is shown on the ***3-DIGIT LCD***.
- ***Enter the minimum VDC input signal value.*** Note: this value must be less than the maximum VDC input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***VDC*** icon will stop blinking and the ***% SPEED*** icon will blink. The ***ARROW*** next to the word MAXIMUM will blink indicating the maximum value is ready to be programmed. The currently programmed maximum motor speed value is shown on the ***3-DIGIT LCD***.

PROGRAM MODE 3
minimum input value



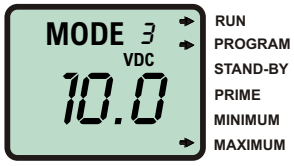
- ***Enter the motor speed at the maximum VDC input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***VDC*** icon will blink indicating the maximum VDC value is ready to be programmed. The currently programmed maximum value is shown on the ***3-DIGIT LCD***.

PROGRAM MODE 3
% speed at the maximum input



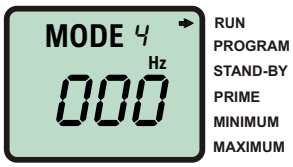
- ***Enter the maximum VDC input signal value.*** Note: this value must be greater than the minimum VDC input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. Programming is complete.
- To exit the programming mode, press the RUN/STANDBY button and the MODE button at the same time. The PROGRAM arrow will disappear.

PROGRAM MODE 3
maximum input value



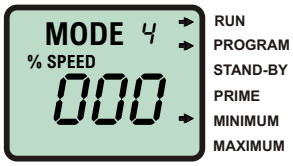
5.6 OPERATING MODE 4 - Output adjusted by frequency (Hz) input signal - In this mode, the pump's motor speed is adjusted automatically based on the frequency (Hz) of the input signal. Any motor speed can be assigned to either the minimum or maximum Hz input signals. However, **the programmed minimum Hz value must be less than the programmed maximum Hz value.** The **ALARM** and **SERVICE** icons will blink if the programming is in error. To assign the minimum and maximum motor speed and the minimum and maximum Hz input signal values:

RUN MODE 4



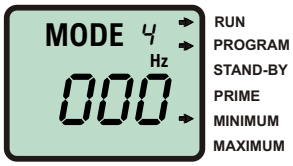
- ***Set the pump for mode 4***. Press the MODE button until ***MODE 4*** is shown on the LCD display. The ***% SPEED*** or ***Hz*** icon will light depending on the current display setting. The large ***3-DIGIT LCD*** will indicate the current motor speed or the Hz input value.
- ***Enter the programming mode.*** At the same time, press the RUN/STANDBY and MODE buttons. A blinking ***ARROW*** will point to the word PROGRAM indicating the program mode is activated. A blinking ***ARROW*** will point to the word MINIMUM indicating the minimum value is ready to be programmed. The ***% SPEED*** icon will blink indicating the percentage of speed is ready to be programmed.

PROGRAM MODE 4
% speed at the minimum input



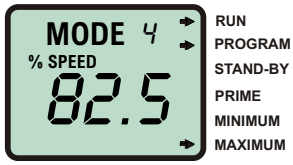
- ***Enter the motor speed at the minimum Hz input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***Hz*** icon will blink indicating the minimum Hz value is ready to be programmed. The currently programmed minimum value is shown on the ***3-DIGIT LCD***.
- ***Enter the minimum Hz input signal value.*** Note: this value must be less than the maximum Hz input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***Hz*** icon will stop blinking and the ***% SPEED*** icon will blink. The ***ARROW*** next to the word MAXIMUM will blink indicating the maximum value is ready to be programmed. The currently programmed maximum motor speed value is shown on the ***3-DIGIT LCD***.

PROGRAM MODE 4
minimum input value



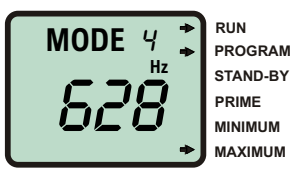
- ***Enter the motor speed at the maximum VDC input signal value.*** Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. The ***% SPEED*** icon will stop blinking and the ***Hz*** icon will blink indicating the maximum Hz value is ready to be programmed. The currently programmed maximum value is shown on the ***3-DIGIT LCD***.

PROGRAM MODE 4
% speed at the maximum input



- ***Enter the maximum Hz input signal value.*** Note: this value must be greater than the minimum Hz input signal value. Press the FIELD button to select the digit to program. The digit will blink when selected.
- Press the DIGIT button to change the selected digit.
- Repeat until all digits are programmed.
- Press the mode button. Programming is complete.
- To exit the programming mode, press the RUN/STANDBY button and the MODE button at the same time. The PROGRAM arrow will disappear.

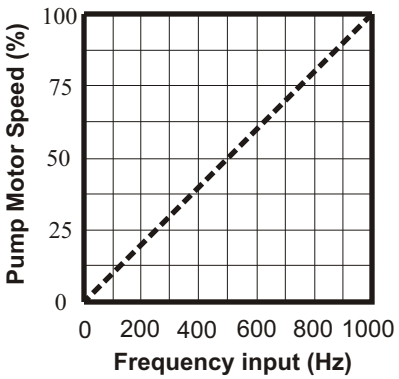
PROGRAM MODE 4
minimum input value



MODE 4 PROGRAMMING EXAMPLES

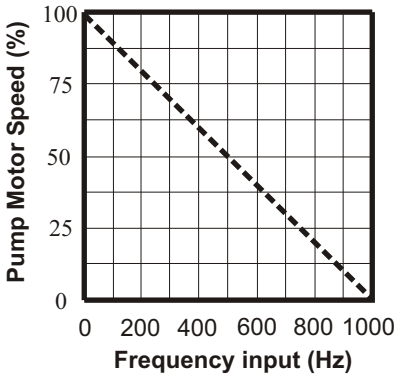
Example 1

0 Hz = 0% OUTPUT
1000 Hz = 100% OUTPUT



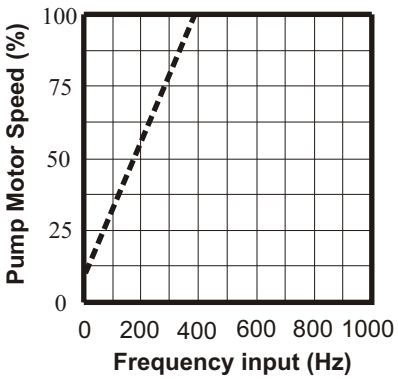
Example 2

0 Hz = 100% OUTPUT
1000 Hz = 0% OUTPUT



Example 3

0 Hz = 10% OUTPUT
275 Hz = 75% OUTPUT



6.0 How to Maintain the Pump

CAUTION: PROPER EYE AND SKIN PROTECTION MUST BE WORN WHEN INSTALLING AND SERVICING THE FPUDV1000

6.1 Routine Inspection and Maintenance

The pump requires very little maintenance. However, the pump and all accessories should be checked regularly. This is especially important when pumping chemicals. Inspect all components for signs of leaking, swelling, cracking, discoloration or corrosion. Replace worn or damaged components immediately.

Cracking, crazing, discoloration and the like during the first week of operation are signs of severe chemical attack. If this occurs, immediately remove the chemical from the pump. Determine which parts are being attacked and replace them with parts that have been manufactured using more suitable materials. The manufacturer does not assume responsibility for damage to the pump that has been caused by chemical attack.

6.2 500 Hour Service Warning Timer

The pump is equipped with a service warning timer. After 500 hours of accumulated running time, the ***SERVICE*** icon will light. This is a reminder that the pump should be inspected for service. *Your actual service period will depend on many factors such as the chemical used, back pressure, temperature, viscosity, and motor RPM.*

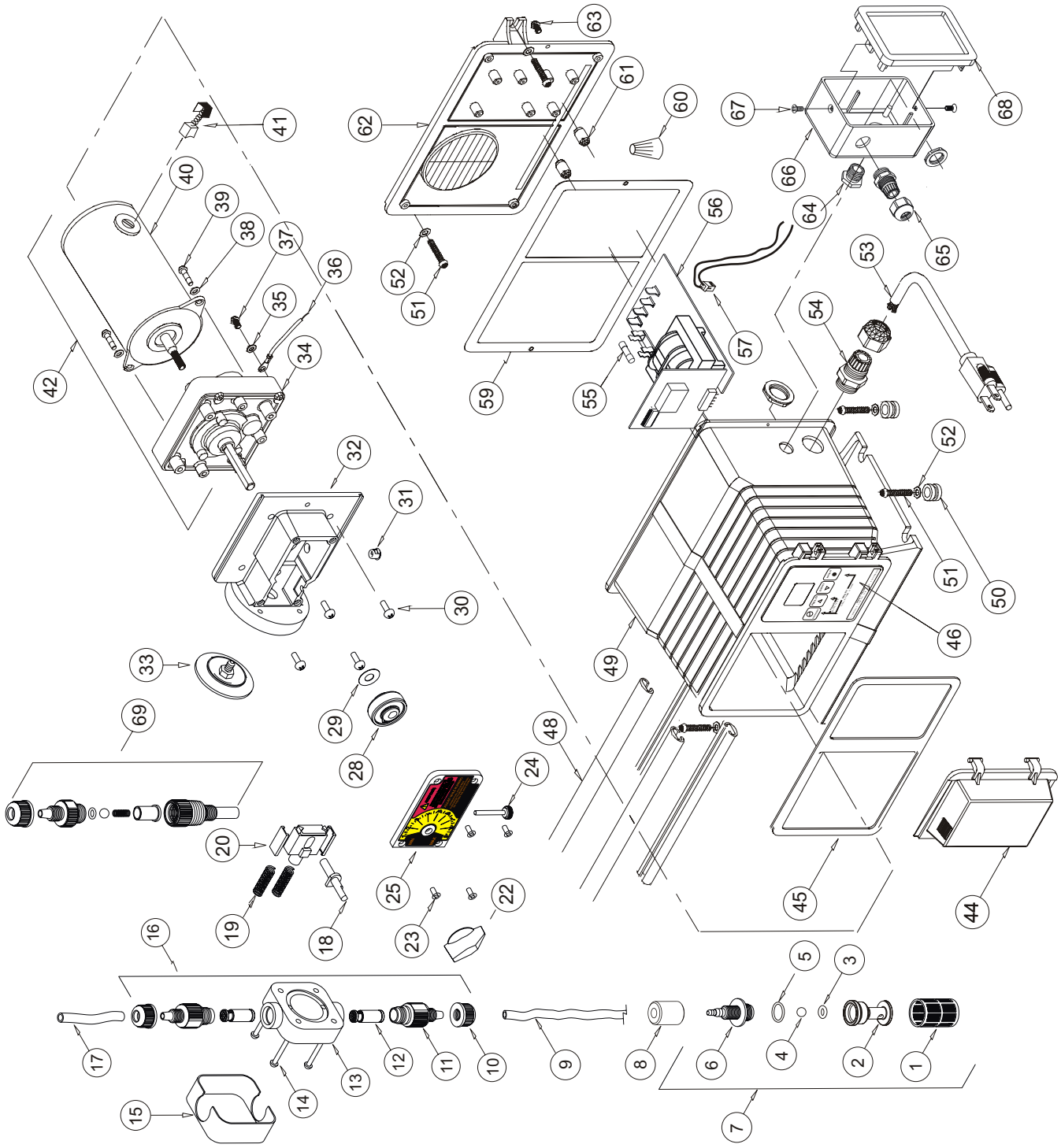
Simultaneously press the **RUN/STANDBY** and **DIGIT** buttons to reset the service timer to zero. **Note:** Pressing the **FIELD** and **DIGIT** buttons will display the currently accumulated time value.

6.3 How to Clean the Pump

The pump will require occasional cleaning, especially the Injection fitting, the Footvalve/Strainer, and the pump head valves. The frequency will depend on the type and severity of service.

- ☑ Inspect and replace the pumphead valves as required.
- ☑ When changing the diaphragm, the pump head chamber and pump head cover should be wiped free of any dirt and debris.
- ☑ Periodically clean the injection/check valve assembly, especially when injecting fluids that calcify such as sodium hypochlorite. These lime deposits and other build ups can clog the fitting, increase the back pressure and interfere with the check valve operation. See section 4.3.4. Fig. 4.11.
- ☑ Periodically clean the suction strainer. Fig.4.10
- ☑ Periodically inspect the air vents located under the motor housing and in the back on the rear housing cover. Clean if necessary.

Replacement Parts Drawing



FPUDV 1000 SERIES PARTS LIST

Item	Part No	Description	
1	C-345S	Screen, FootValve, P.P.	1
2	90002-214	Body, FootValve, PVDF	1
3	2-108A	O-ring Seat, FootValve, Aflas	1
	2-108E	O-ring Seat, FootValve, E.P.	1
4	C-385C	Ball, FootValve, Ceramic	1
5	90003-014	O-ring, FootValve, Viton	1
	90003-015	O-ring, FootValve, E.P.	1
6	90002-215	Adapter, FootValve, PVDF	1
7	FPUSV-E	FootValve S/A, C-340E, EP	1
	FPUSV-V	FootValve S/A, C-340V, Viton/Aflas	1
8	C-346	Ceramic weight, C-346	1
9	C-334-6	Tubing Suction 3/8 x 5 FT	1
10	C-330-6	Tube Nut, .37T, P.P.	2
11	C-560-6V	Adapter S/A Bullet .37T Viton	2
	C-560-6E	Adapter S/A Bullet .37T EP	2
	C-560-6S	Adapter S/A Bullet .37T Silicon	2
12	FPUD1000-BC	Cartridge Bullet Valve S/A, Double-Ball	2
13	C-535	P/Head Noir Molded, P.P.	1
14	C-504HD	Screw 10-32 x 1.25	4
15	C-535FW	Cover P/Head,	1
16	C-535A6-6	Kit P/Head, HDN 37T Viton/Aflas, P-P	1
	C-535A6-6E	Kit P/Head, HDN 37T E.P. P-P	1
17	C-334-6-10	Tubing D/Charge, 3/8 x 10 FT	1
18	C-1505N	Offset Cam #1 .125”	1
	R-1505N	Offset Cam #2 .055”	1
	C-1505N-3	Offset Cam #3 .187”	1
	C-1505N-4	Offset Cam #4 .100”	1
19	C-1514N	Return Spring	2
20	C-1513N	Stirrup with slide bearings	1
22	C-1502	Dial Knob	1
23	90011-168	Screw #6 x .62 PH oval ‘A’	4
24	C-1519N	Thumb Screw 6-32 x 1.125	1
25	71000-363	Cover Cam S/A C-1100	1
28	C-1507A	Drive Cam S/A #1 .125”	1
	R-1507A	Drive Cam S/A #2 .055”	1
	C-1507-3A	Drive Cam S/A #3 .187”	1
	C-1507-4A	Drive Cam S/A #4 .100”	1
29	A-031	Spacer, Rotor	1
30	C-624N	Screw 10-32 x .50 PHL PAN	4
31	90008-138	Plug .312 Hole Black	1
32	76001-183	Motor Mount, Large Diaphragm	1
33	C-406VT-15N	Diaphragm S/A 2.0 15N, Viton/TFE	1
	FPUD1000-15N	Diaphragm S/A 2.015NEP/TFE	1

Item	Part No	Description	
34	C-618N-14	Gearbox, 14 RPM	1
	C-618N-30	Gearbox, 30 RPM	1
	C-618N-45	Gearbox, 45 RPM	1
	C-618N-60	Gearbox, 60 RPM	1
	C-618N-125	Gearbox, 125 RPM	1
	C-618N-250	Gearbox, 250 RPM	1
35	90011-078	Washer, Ground Screw, #8 Intrl/Star	1
36	90010-222	Lead Wire, ground, Green	1
37	90011-024	Ground Screw 8-32 x .25 Hex SL ST	1
38	90011-074	Washer, motor, #8 split-lock	2
39	90011-023	Screw, motor, 8-32 x .50	2
40	90010-244	Motor, 24V DC	1
41	FPUD1000-BK	Motor brush kit, (2 pc.) 24V DC	1
42	70002-255	Gearmotor, 14 Rpm, 24 VDC	1
	70002-256	Gearmotor, 30 Rpm, 24 VDC	1
	70002-257	Gearmotor, 45 Rpm, 24 VDC	1
	70002-258	Gearmotor, 60 Rpm, 24 VDC	1
	70002-259	Gearmotor, 125 Rpm, 24 VDC	1
	70002-260	Gearmotor, 250 Rpm, 24 VDC	1
44	90002-191	Door, Electronic Controls Cover	1
45	90006-579	Gasket, Enclosure Front, Neoprene	1
46	90012-245	Label Digital Timer w/ Ext. Input	1
47	76000-999	Slide Clamp, Enclosure Front	2
48	76001-000	Slide Clamp, Enclosure Rear	2
49	76001-253	Enclosure, Digital w/ Ext. Input	1
50	90003-559	Mounting Feet, Rubber	4
51	90011-091	Mounting Screw, #10 X 1.0” PhillipsSteel	6
52	90011-094	Washer, Mounting, #10 Stainless	6
53	71000-175	Power Cord, 115v60hz, Digital Models	1
	71000-176	Power Cord, 220v50hz, Digital Models	1
	71000-177	Power Cord, 230v60hz, Digital Models	1
54	70000-589	Connector Liq-tite w/ nut .375	1
55	90010-235	Fuse, 1A, 250VAC	1
56	A-023N-V-115	Circuit board, 115V	1
	A-023N-V-230	Circuit board, 220V/230V	1
57	90010-246	Wire set W/plug, alarm relay	1
59	90006-580	Gasket, Enclosure Back Plate,Neoprene	1
60	90010-036	Wire Nut, Blue	2
61	76001-001	Tubing Spacer, Digital Circuit Board	2
62	71000-489	Enclosure Back Plate with Gasket, Valox	1
63	90011-044	Screw 6-32 x .37 Swag Form	2
64	90007-515	Bushing, Junction Box Connector, Alum.	1
65	90008-199	Connector Liq-tite w/ nut .187	1

Item	Part No	Description	Qty
66	76001-254	Junction Box, Ext. Input, Valox	1
67	90011-129	Screw, 6-32 X .25 Phil Pan SS Black	2
68	71000-133	Cover, J-Box with Gasket and Label	1
69	FPU1000-1F	Inj. Valve .50-.25 Mpt X .37od, ½ lb	1
	FPURV4	Inj. Valve .50-.25 Mpt X .37od, 6lb	1

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2. **Model and serial number of the product under warranty, and**
3. **Repair Instructions and/or specific Problems relative to the Product.**

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1. **P.O. Number to cover the COAST of the repair/ calibration.**
2. **Model and serial number of product, and**
3. **Repair instructions and/or specific Problems relative to the product**

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