CHEM-FEED®

INJECTOR

MODEL C-1100  MODEL-V
VARIABLE SPEED
POSITIVE DISPLACEMENT INJECTOR PUMP
OPERATING MANUAL

Blue-White®
Industries, Ltd.

5300 Business Drive
Huntington Beach, CA 92649
USA
Phone: 714-893-8529  FAX: 714-894-9492
E mail: sales@blue-white.com or techsupport@blue-white.com
Website: www.blue-white.com
## TABLE OF CONTENTS

1. Introduction .......................................................................................3
2. Specifications .....................................................................................3
3. Features .............................................................................................3
4. Unpacking ..........................................................................................3
5. Installation ........................................................................................4
   5.1. Mounting location ....................................................................4
   5.2. Input power connections ...........................................................5
   5.3. External input signal connections ..............................................6
   5.4. How to install the tubing and fittings ........................................8
6. How to operate the Pump .................................................................10
   6.1. Description of pump output adjustment controls .......................10
   6.2. How to adjust the output - manual stroke adjustment ...............11
   6.3. Mode 1 - Manually Adjusting the output ...................................11
   6.4. Mode 2 - 4-20 mA input ............................................................12
   6.5. Mode 3 - 0-10 VDC input ..........................................................14
   6.6. Mode 4 - Frequency (Hz) input ...............................................16
   6.7. Measuring the pump output - Volumetric test ............................18
   6.8. FVS Flow Verification System ...................................................18
7. How to maintain the Pump ...............................................................20
   7.1. Routine inspection and cleaning .................................................20
   7.2. How to clean the pump .............................................................20
   7.3. 500 hour service warning timer ................................................20
   Pump head and Valve exploded view drawing ................................21
   Replacement parts drawing ..............................................................22
   Replacement parts list ........................................................................23
   Warranty information .........................................................................24
   Authorized service centers ..............................................................25
1.0 Introduction

Congratulations on purchasing the C-1100 Model-V Variable speed positive displacement metering pump. The C-1100 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 C-1100 Model-V unit 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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Working Pressure</td>
<td>150 psig / 10.4 bar (most models)</td>
</tr>
<tr>
<td>Maximum Fluid Temperature</td>
<td>130° F / 54°C</td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
<td>14 to 110°F / -10 to 43°C</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>Continuous</td>
</tr>
<tr>
<td>Maximum Viscosity</td>
<td>1,000 Centipoise</td>
</tr>
<tr>
<td>Maximum Suction Lift</td>
<td>up to 30 ft. water</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>108/130Vac 60Hz 40 Watts,</td>
</tr>
<tr>
<td></td>
<td>208/250Vac 40Hz 45 Watts</td>
</tr>
<tr>
<td>Dimensions</td>
<td>6-1/8” H x 10-1/8” W x 9” D</td>
</tr>
<tr>
<td>Weight</td>
<td>12 lb.</td>
</tr>
</tbody>
</table>

3.0 Features

- Double-ball, springless ceramic check valves with PVDF (Kynar) body, TFE/P (Aflas) and Viton o-ring seals.
- Easy access, front mounted mechanical feed rate adjustment.
- High outlet pressure capability of 150 psig (most models).
- 400:1 adjustment turn down ratio(speed and stroke combined).
- Digital electronic feed rate control.
- Corrosion proof Valox housing.
- Tamper resistant electronic control panel cover.

4.0 Unpacking

Your pump package should contain the following:
1 - Injector pump
1 - suction tube footvalve & strainer assembly
1 - ceramic tubing weight
1 - 5’ Length of clear PVC suction tubing
1 - 5’ Length of opaque LLDPE discharge tubing
1 - Injection fitting with internal back-flow check valve
1 - Mounting hardware kit
5.0 Installation

**CAUTION: Proper eye and skin protection must be worn when installing and servicing the pump.**

*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.*

5.1 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.
- Mount the pump close to the injection point. Keep the inlet (suction) and outlet (discharge) tubing as short as possible. Longer discharge tubing increases the back pressure at the pump tube.
- Your solution tank should be sturdy. Keep the tank covered to reduce fumes. Do not mount the pump directly over your tank. 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 will aid in priming the pump and will reduce output error due to increased suction lift. We recommended installing a shut-off valve, pinch clamp or other means to halt the gravity feed to the pump during servicing.
- Be sure your installation does not constitute a cross connection with the drinking water supply. Check your local plumbing codes.

**INJECTOR MOUNTING**

- **Floor Mount**
  - Drill .156 Dia. (5/32) For Self-Tap Screw #10 X 1” Phillips Steel
  - 4 Places
  - 7-3/8” x 3-1/2” x 7-5/8”

- **Wall Mount**
  - Drill .156 Dia. (5/32) For Self-Tap Screw #10 X 1” Phillips Steel
  - 2 Places
  - 8-3/16” x 7-5/8”

*Note: For wall-mounting, drill & thread into solid wood only.*
5.2 Input Power Connections

**WARNING: Risk of electric shock.**

- 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.
- Removable resistors on the circuit board are factory preset for the correct voltage. See page 7 Circuit Board Connections diagram 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.*
5.3 External Input Signal Connections

The C-1100V will accept any one of three different types of external input signals; 4-20 mA, 0-10 VDC, or frequency. The 4-20mA and 0-10 VDC loops must be powered. 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 repositioned when digital square wave signals are being used. See page 7, “Hz input jumper settings”

All wiring connections are to be made inside of the junction box located on the side of the C-1100V. 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.

### SIGNAL INPUT/OUTPUT WIRE COLOR CODES

<table>
<thead>
<tr>
<th>INPUT TYPE</th>
<th>WIRE COLOR CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-20 mA</td>
<td>BLUE (+) (non-powered) &amp; BLACK (-)</td>
</tr>
<tr>
<td>0-10 VDC</td>
<td>ORANGE (+) (non-powered) &amp; BLACK (-)</td>
</tr>
<tr>
<td>AC sine wave, TTL, CMOS</td>
<td>WHITE (+) &amp; BLACK (-)</td>
</tr>
<tr>
<td>CONTACT (10v @ 2 mA max)</td>
<td>RED (+) &amp; WHITE (-)</td>
</tr>
<tr>
<td>HALL EFFECT, NPN</td>
<td>PURPLE &amp; PURPLE</td>
</tr>
<tr>
<td>ALARM RELAY connect 2-conductor plug to either normally open (NO) (factory default) or normally closed (NC) side of receptacle. 1 AMP MAX @ 125VAC (24VDC)</td>
<td>RED/WHITE (+ 20VDC) BLACK (-) YELLOW (signal)</td>
</tr>
<tr>
<td>FLOW VERIFICATION SENSOR</td>
<td></td>
</tr>
<tr>
<td>MOTOR ON SIGNAL 5-20V DC open collector output closed while motor is energized</td>
<td>BROWN (+) &amp; BLACK (-)</td>
</tr>
</tbody>
</table>

### PADDLEWHEEL SENSOR SIGNAL INPUT WIRING

<table>
<thead>
<tr>
<th>BLUE-WHITE PADDLEWHEEL SENSOR TYPE</th>
<th>PADDLEWHEEL SENSOR WIRE COLOR CODE</th>
<th>PUMP INPUT WIRE COLOR CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL FH HALL EFFECT SENSOR</td>
<td>RED (+) BLACK (-) BARE (signal)</td>
<td>RED (+ 20VDC) BLACK (-) WHITE (signal)</td>
</tr>
<tr>
<td>MODEL FC AC SINE WAVE SENSOR</td>
<td>RED (+) BLACK (-)</td>
<td>WHITE (+) BLACK (-)</td>
</tr>
</tbody>
</table>
CIRCUIT BOARD CONNECTIONS

EXTERNAL INPUT CABLE
ACCEPTABLE CABLE JACKET RANGE:
.118 - 255 INCH (.3 - 6.5 MM)

DC MOTOR
BLACK (-)
RED (+)
Ground (green)
Earth Ground (green)

AC LINE VOLTAGE SETTINGS
230 VAC
One Jumper Installed on center position (ends open)
230 VAC
Two Jumpers Installed on end positions (no open pins)
115 VAC

Hz INPUT JUMPER SETTINGS
Located under connector
AC sine waves
Jumper Not Installed (open - factory default)
Digital square waves
Jumper Installed

AC LINE PROTECTOR FUSE
1 Amp, 250 Volt AC
(Littlefuse #239001 or Equivalent)

PROBE INPUT
2 Grey wires pump head sensors.

ALARM OUTPUT (CONTACT CLOSURE)
normally open (NO)
(factory default)

THERMAL SWITCH
.T187 push tab connectors
2 conductors

INPUT SIGNAL CONNECTOR
7 wire bundle

JUNCTION BOX
LIQUID-TIGHT CONNECTOR

BLUE (4-20 mA input)
BLACK (Ground)
YELLOW (verification sensor input)
ORANGE (0-10 VDC input)
RED (+20VDC)
WHITE (frequency input)
BROWN (motor-on contact output)
PURPLE X2 (alarm relay contacts)

AC sine waves
Jumper Not Installed
(open - factory default)
Digital square waves
Jumper Installed

AC MOTOR
RED (+)
BLACK (-)
Common

AC Input Power

AC LINE NEUTRAL
AC LINE HOT
AC LINE VOLTAGE SETTINGS

ERIAL SWITCH
.T187 push tab connectors
2 conductors

PROTECTOR FUSE
1 Amp, 250 Volt AC
(Littlefuse #239001 or Equivalent)
5.4 How To Install the Tubing and Fittings

**CAUTION:** Proper eye and skin protection must be worn when installing and servicing the pump.

- **Inlet Tubing** - Locate the inlet fitting of the pump head. Remove the tube nut. Push the clear suction tubing through the tube nut and onto the fitting barb. Hand tighten the tube nut to secure the tubing.

- **Footvalve/Strainer** - Trim the inlet end of the suction tubing so that the strainer will rest approximately two inches 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 strainer’s barbed fitting into the end of the tube. Secure the ceramic weight to the strainer. Drop the strainer into the solution tank.

- **Outlet Tubing** - Locate the outlet fitting of the pump head. Remove the tube nut. Push the opaque discharge tubing through the tube nut and onto the compression barb of the fitting. Hand tighten the tube nut to secure the tubing.

**Keep outlet tube as short as possible.**

- **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. See section 7.0. Install the Injection/Check valve directly into the piping system. To prevent trapped gasses, install the fitting in an upward direction. Use Teflon thread sealing tape on the pipe threads. Push the opaque outlet (discharge) tubing through the tube nut and onto the compression barb of the Injection/Check valve fitting. Hand tighten the tube nut to secure the tubing.
Injection Check valve

Install upward

Tube Nut

Discharge Tube (Rigid P.E.)

Outlet Adapter

Pump Head

Inlet Adapter

Tube Nut

Suction Tubing (clear PVC)

Ceramic Weight

Footvalve

Manaul Stroke length

Adjustment knob

Lock Screw

Variable Speed Pump

% Speed

Mode

Input Modes

1-Manual
2-4-20mA
3-0-10VDC
4-Pulse (Hz)

Program

Reset Service

Display

1000

Alarm

mA Hz
6.0 How To Operate The C-1100V

6.1 Description of Pump Output

Adjustment Controls - Open the control panel door by sliding the upper and lower slide clamps to the left.

- **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.
  ✧ When pressed with the **DIGIT** button, initiates the Flow Verification Sensor feature and allows programming the alarm delay from 1-256 seconds.

- **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
6.3 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.

- **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.
6.4 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.
- 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.

**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 4**
- 4 mA = 20% OUTPUT
- 20 mA = 50% OUTPUT
6.5 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:

- **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.

- **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.

- **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.

- **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.
6.6 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:

- **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.

- **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 (to the nearest 10 Hz).** 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.

- **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.

- **Enter the maximum Hz input signal value (to the nearest 10 Hz).** 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.

### MODE 4 PROGRAMMING EXAMPLES

<table>
<thead>
<tr>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Hz = 0% OUTPUT</td>
<td>0 Hz = 100% OUTPUT</td>
<td>0 Hz = 10% OUTPUT</td>
</tr>
<tr>
<td>1000 Hz = 100% OUTPUT</td>
<td>1000 Hz = 0% OUTPUT</td>
<td>270 Hz = 75% OUTPUT</td>
</tr>
<tr>
<td><img src="chart1.png" alt="Graph" /></td>
<td><img src="chart2.png" alt="Graph" /></td>
<td><img src="chart3.png" alt="Graph" /></td>
</tr>
</tbody>
</table>
6.7 Measuring the Pump’s Output - Volumetric Test.

This volumetric test will take into account individual installation factors such as line pressure, fluid viscosity, suction lift, etc. This test is the most accurate for measuring the injector’s output in an individual installation.

1. Be sure the Injection Fitting and Footvalve/Strainer is clean and working properly.

2. Fill a large graduated cylinder with the solution to be injected.

3. With the pump installed under normal operating conditions, place the suction tubing with the Footvalve/Strainer installed in the graduated cylinder.

4. Run the pump until all air is removed from the suction line and the solution enters the discharge tubing. If the pump does not easily prime, remove the discharge tubing from injection fitting until the pump primes. Re-connect the discharge tubing to the injection fitting.

5. Remove the suction tubing from the graduated cylinder and refill the graduated cylinder if necessary. Note the amount of solution in the graduated cylinder.

6. Place suction tubing with the Footvalve/Strainer installed back into the graduated cylinder.

7. Run the injector for a measured amount of time. A longer testing time will produce more accurate results.

8. Remove the suction tubing from the graduated cylinder. Measure the amount of chemical injected.

6.8 FVS - Flow Verification System - (sensor sold separately) The C-1100V is equipped with a Flow Verification System which is designed to stop the pump and provide a contact closure output in the event the sensor does not detect chemical during pump operation. This could indicate a clogged injection fitting, empty chemical solution tank, loose tubing connection, etc.

To allow the pump to clear any gasses that may have accumulated during stopper operation (such as with chlorine), an alarm delay time value from 1-256 seconds must be programmed (An alarm delay value of 000 seconds disables the FVS system). The pump will stop, and the alarm mode activated, if no pulses are received by the pump and the alarm delay time period has ended. Press the STAND-BY button twice to clear the alarm and restart the pump. The Flow Verification Sensor is sold as an optional accessory.
Confirm the FVS flow range - The Flow Verification Sensor (FVS) will only function within its operating range. Sensor model FV-100-6V has an operating range of 30-300 ml/min (1-10 oz/min). If the pump’s output is less than 30 ml/min (0.5 ml/sec), the sensor will not detect chemical and a signal will not be sent to the pump.

<table>
<thead>
<tr>
<th>SENSOR MODEL NUMBER</th>
<th>OPERATING FLOW RANGE (ml/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FV-100-6V</td>
<td>30-300</td>
</tr>
<tr>
<td>FV-200-6V</td>
<td>100-1000</td>
</tr>
<tr>
<td>FV-300-6V</td>
<td>200-2000</td>
</tr>
<tr>
<td>FV-400-6V</td>
<td>300-3000</td>
</tr>
<tr>
<td>FV-500-6V</td>
<td>500-5000</td>
</tr>
<tr>
<td>FV-600-6V</td>
<td>700-7000</td>
</tr>
</tbody>
</table>

Install the FVS Flow Sensor - The Flow Verification Sensor (FVS) should be installed on the outlet (discharge) side of the pump head valve. The sensor includes a PVC tubing insert, located inside the sensor’s female thread connection, that is designed to seal the sensor onto the pump head inlet adapter. Thread the sensor onto the pump head until the tubing insert is snug against the pump head inlet fitting - do not over-tighten. Connect the red/white, black, and white wires from the sensor to the red, black, and yellow wires located in the pump’s junction box. See page 7.

Contact Closure Alarm Output - A contact closure output (relay) is provided with the FVS system. The relay can be configured for normally open (factory default) or normally closed operation by properly positioning the connector plug on the circuit board (see page 7).
7.0 How to Maintain the Pump

CAUTION: Proper eye and skin protection must be worn when installing and servicing the pump.

7.1 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.

7.2 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 page 8.

✔ Periodically clean the suction strainer. See page 8.

✔ Periodically inspect the air vents located under the motor housing and in the back on the rear housing cover. Clean if necessary.

7.3 500 Hour Service Warning Timer
   
The pump is equipped with a service warning timer. After approximately 500 hours of accumulated running time, the SERVICE icon will light. This is a reminder that the pump should be inspected and maintenance performed if necessary.
<table>
<thead>
<tr>
<th>Item</th>
<th>Part No</th>
<th>Description</th>
<th>Qty</th>
<th>Item</th>
<th>Part No</th>
<th>Description</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C-345S</td>
<td>Screen, FootValve, P.P.</td>
<td>1</td>
<td>C-618N-45</td>
<td>Gearbox, 45 RPM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>90002-214</td>
<td>Body, FootValve, PVDF</td>
<td>1</td>
<td>C-618N-60</td>
<td>Gearbox, 60 RPM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2-108A</td>
<td>O-ring, FootValve, Aflas</td>
<td>1</td>
<td>C-618N-125</td>
<td>Gearbox, 125 RPM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>C-385C</td>
<td>Ball, FootValve, Ceramic</td>
<td>1</td>
<td>C-618N-250</td>
<td>Gearbox, 250 RPM</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>90003-014</td>
<td>O-ring, FootValve, Viton</td>
<td>1</td>
<td>90011-078</td>
<td>Washer, Ground, #8 Star</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>90002-215</td>
<td>Adapter, FootValve, PVDF</td>
<td>1</td>
<td>90010-222</td>
<td>Lead Wire, ground, Green</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>C-340E</td>
<td>FootValve, C-340E, EP</td>
<td>1</td>
<td>90011-024</td>
<td>Screw, 8-32 x .25 SL ST</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>C-346</td>
<td>Ceramic weight, C-346</td>
<td>1</td>
<td>90011-074</td>
<td>Washer, #8 split-lock</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>C-334-6</td>
<td>Tubing Suction 3/8 x 5 FT</td>
<td>1</td>
<td>90011-023</td>
<td>Screw, motor, 8-32 x .50</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>C-330-6</td>
<td>Tube Nut, .37T, P.P.</td>
<td>2</td>
<td>90010-244</td>
<td>Motor, 24V DC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>C-560-6V</td>
<td>Adapter S/A .37T Viton</td>
<td>2</td>
<td>90010-191</td>
<td>Door, Controls Cover</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>C-560-6E</td>
<td>Adapter S/A .37T EP</td>
<td>2</td>
<td>90006-579</td>
<td>Gasket, Front, Neoprene</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>K-568-4A</td>
<td>Cartridge Valve S/A</td>
<td>2</td>
<td>90012-245</td>
<td>Label Timer w/ Ext. Input</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>C-535</td>
<td>P/Head Noir Molded, P.P.</td>
<td>1</td>
<td>76000-999</td>
<td>Slide Clamp, Front</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>C-504HD</td>
<td>Screw 10-32 x 1.25</td>
<td>4</td>
<td>76001-000</td>
<td>Slide Clamp, Rear</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>C-535FC</td>
<td>Cover P/Head</td>
<td>1</td>
<td>76001-253</td>
<td>Enclosure, w/ Ext. Input</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>C-334-6-10</td>
<td>Tubing D/Charge, 3/8 x 10'</td>
<td>1</td>
<td>76000-559</td>
<td>Mounting Feet, Rubber</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>C-150ST</td>
<td>Offset Cam #1 .125''</td>
<td>1</td>
<td>90011-091</td>
<td>Screw, #10 X 1.0'' Phil</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>C-150T</td>
<td>Offset Cam #2 .055''</td>
<td>1</td>
<td>90011-094</td>
<td>Washer, #10 Stainless</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>C-150N3</td>
<td>Offset Cam #3 .187''</td>
<td>1</td>
<td>90010-246</td>
<td>Wire set w/plug, alarm relay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>C-150N4</td>
<td>Offset Cam #4 .100''</td>
<td>1</td>
<td>70000-589</td>
<td>Connector Liq-tite .375</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>C-150S</td>
<td>Screen, FootValve, P.P.</td>
<td>1</td>
<td>90010-235</td>
<td>Fuse, 1A, 250VAC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>90011-168</td>
<td>Screw #6 x .62 PH oval 'A'</td>
<td>4</td>
<td>90006-580</td>
<td>Gasket, Back Plate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>C-1519N</td>
<td>Screw 6-32 x 1.125</td>
<td>1</td>
<td>90010-036</td>
<td>Wire Nut, Blue</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>71000-363</td>
<td>Cover Cam S/A C-1100</td>
<td>1</td>
<td>90011-044</td>
<td>Screw 6-32 x .37</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>C-150T7</td>
<td>Drive Cam S/A #1 .125''</td>
<td>1</td>
<td>71000-489</td>
<td>Enclosure Back w/Gasket</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>C-150T8</td>
<td>Drive Cam S/A #2 .055''</td>
<td>1</td>
<td>71000-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>C-150T9</td>
<td>Drive Cam S/A #3 .187''</td>
<td>1</td>
<td>81000-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>C-150T4</td>
<td>Drive Cam S/A #4 .100''</td>
<td>1</td>
<td>81000-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>A-031</td>
<td>Spacer, Rotor</td>
<td>1</td>
<td>81000-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>C-624N</td>
<td>Screw 10-32 x .50 PHL</td>
<td>4</td>
<td>90007-515</td>
<td>Bushing, J-Box, Alum.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>90008-138</td>
<td>Plug .312 Hole Black</td>
<td>1</td>
<td>90008-199</td>
<td>Connector Liq-tite .187</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>76001-183</td>
<td>Motor Mount, Large Dia</td>
<td>1</td>
<td>76001-254</td>
<td>Junction Box, Input, Valox</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>C-406VT-15N</td>
<td>Diaphragm 2.0 Vit/TFE</td>
<td>1</td>
<td>66010-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>C-618N-14</td>
<td>Gearbox, 14 RPM</td>
<td>1</td>
<td>66010-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>C-618N-30</td>
<td>Gearbox, 30 RPM</td>
<td>1</td>
<td>66010-129</td>
<td>Screw, 6-32 X .25 SS</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
LIMITED WARRANTY

Your new pump is a quality product and is warranted to be free of defects as set down in this policy. All parts, including rubberized goods, and labor are covered under warranty for 90 days from the date of purchase. Used peristaltic pump tube assemblies are not warranted. Parts, excluding rubberized goods, are covered under warranty for 12 months from the date of purchase. Warranty coverage does not include damage to the pump that results from misuse, carelessness, abuse or alteration. Only the repair or the replacement of the pump is covered. Blue-White Industries does not assume responsibility for any other loss or damage.

Warranty status is determined by the pump’s serial label and the sales invoice or receipt. The serial label must be on the pump and the pump must be accompanied by the sales invoice or receipt to obtain warranty coverage. The warranty status of the pump will be verified by Blue-White or a factory authorized service center.

Please be advised; injection and metering devices are not intended as a means of treating water to render it suitable for human consumption. When used as hypochlorinators, they are meant to destroy bacteria and algae contamination, before it’s removal by filtration. Acid and soda injectors are used for PH control (balance). Blue-White injectors are factory tested with water only for pressure and performance.

Installers and operators of these devices must be well informed and aware of the precautions to be taken when injecting various chemicals -especially those considered hazardous or dangerous.

Should it become necessary to return an injector for repair or service, you must attach information regarding the chemical used as some residue may be present within the unit which could be a hazard to service personnel. Blue-White Industries will not be liable for any damage that may result by the use of chemicals with their injectors and it’s components. Thank you.

PROCEDURE FOR IN WARRANTY REPAIR

Carefully pack the pump to be repaired, include the foot strainer and injection/check valve fitting. Enclose a brief description of the problem as well as the original invoice or sales receipt showing the date of purchase. The receipt will be returned with the unit. Prepay all shipping costs. COD shipments will not be accepted. Warranty service must be performed by the factory or an authorized service center. Damage caused by improper packaging is the responsibility of the sender.
<table>
<thead>
<tr>
<th>State</th>
<th>Company</th>
<th>Address</th>
<th>City, State</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARKANSAS</td>
<td>American Pump</td>
<td>7580-A W. Tennessee St. Tallahassee, FL 32304</td>
<td>Tallahassee, FL 32304</td>
<td>904-575-9618</td>
</tr>
<tr>
<td></td>
<td>Del Ray Electric</td>
<td>11 N.E. 2nd Avenue</td>
<td>Del Ray Beach, FL 33444</td>
<td>407-278-3976</td>
</tr>
<tr>
<td></td>
<td>Jerry Lee Chemical Co.</td>
<td>3407 W. Old Fairfield Drive Pensacola, FL 32505</td>
<td>Pensacola, FL 32505</td>
<td>904-432-9929</td>
</tr>
<tr>
<td></td>
<td>Picard Chemical</td>
<td>1670 S. Congress Avenue</td>
<td>West Palm Beach, FL 33406</td>
<td>407-965-3434</td>
</tr>
<tr>
<td></td>
<td>V.J. Mini &amp; Son, Inc.</td>
<td>1581 N. Dixie Highway</td>
<td>Pompano Beach, FL 33060</td>
<td>305-946-0920</td>
</tr>
<tr>
<td></td>
<td>Mullarkey Associates</td>
<td>12346 S. Keeler Ave.</td>
<td>Alsip, IL 60658</td>
<td>708-597-5558</td>
</tr>
<tr>
<td></td>
<td>Century Pool Service, Inc</td>
<td>5020 Nicholson Court #201</td>
<td>Kensington, MD 20895</td>
<td>301-231-8999</td>
</tr>
<tr>
<td></td>
<td>Swim-In Enterprises, Inc.</td>
<td>1314 S. Main Street</td>
<td>Las Vegas, NV 89104</td>
<td>702-384-4223</td>
</tr>
<tr>
<td></td>
<td>Sherwood Specialties, Inc.</td>
<td>412 Smith Street</td>
<td>Rochester, NY 14608</td>
<td>716-546-1211</td>
</tr>
<tr>
<td>NORTH CAROLINA</td>
<td>Southern Industrial Sales</td>
<td>1903 Herring Avenue</td>
<td>Wilson, NC 27893</td>
<td>919-237-2500</td>
</tr>
<tr>
<td>PENNSYLVANIA</td>
<td>Armor Electric, Inc.</td>
<td>1425 Selinger Avenue</td>
<td>Erie, PA 16505</td>
<td>814-838-2034</td>
</tr>
<tr>
<td>SOUTH DAKOTA</td>
<td>Son-Aqua Distributing</td>
<td>2447 W. Main Street</td>
<td>Rapid City, SD 57702</td>
<td>605-343-7716</td>
</tr>
<tr>
<td>TENNESSEE</td>
<td>Rock City Machine</td>
<td>307 3rd Avenue South</td>
<td>Nashville, TN 37201</td>
<td>615-244-1371</td>
</tr>
<tr>
<td>TEXAS</td>
<td>Alamo Water Refiners</td>
<td>13700 Hwy. 90 West</td>
<td>San Antonio, TX 78245</td>
<td>512-677-8400</td>
</tr>
<tr>
<td></td>
<td>EGCO Industries</td>
<td>8505 Director Row</td>
<td>Dallas, TX 75247</td>
<td>214-631-6885</td>
</tr>
<tr>
<td></td>
<td>Miracle Water Cond. Co.</td>
<td>1011 Oakmead Drive</td>
<td>Arlington, TX 76011</td>
<td>817-640-6188</td>
</tr>
<tr>
<td>MARYLAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONNECTICUT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLORADO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FLORIDA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This page blank