

Installation, Operation and Maintenance Manual



Manual & Dry Contact Polymer Makedown Systems

Pulsafeeder Factory Service Policy

Should you experience a problem with your Polymer Makedown System, first consult the troubleshooting guide in this operation and maintenance manual, as well as the information in the manual for your Pulsatron pump. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Sales Representative or Distributor, or our Technical Services Department for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

Copyright ©2013 Pulsafeeder, Inc. All rights reserved.

Information in this document is subject to change without notice. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or any means electronic or mechanical, including photocopying and recording for any purpose other than the purchaser's personal use without the written permission of Pulsafeeder, Inc.

Table of Contents

<u>Topic</u>	<u>Page</u>
Introduction.....	4
Safety	5
Skid Layout and Component Descriptions	6
Systems Overview	7
Supply Side	7
Process Side	8
Installation	9
Owner Installed Piping/Tubing, & Electrical	9
Initial System Start	10
Initial Prime	11
Polymer Makedown Process.....	12

Introduction

Congratulations! With the Pulsafeeder Pre-Engineered Polymer Makedown System, you have the finest polymer makedown equipment platform available. This system includes the essential elements for successful installation and operation of your system(s). You are encouraged to:

READ THIS MANUAL!

Pulsafeeder Pre-Engineered Polymer Makedown Systems are designed to support multi-pump installations for injection. The skid components (valves, gauges, interconnecting piping, etc.) are furnished to meet your specified operational requirements. The Dosing Pump(s), per se, may be furnished separately, so installation, operation and maintenance instructions for pump(s) are located elsewhere.

Installation, Operation and Maintenance Manual

Safety

Your safety is of the utmost concern to Pulsafeeder. Dosing pumps and systems can handle harsh or toxic chemicals and exposure can lead to serious injury or death. Always wear appropriate protective clothing (for example, safety glasses, gloves, coveralls, etc.) and follow safe handling procedures. Pay attention to what you're doing and note safety advisories where they are shown throughout this manual. Some examples of safety issues and precautions for Pulsafeeder Pre-Engineered Polymer Makedown Systems are:

**WARNING**

Do NOT use Pulsafeeder Systems (or Pulsafeeder Pumps) for flammable liquids.

**WARNING**

Prior to working on any portion of the System, disconnect pump(s) from power supply, de-pressurize the system and drain chemicals from the lines.

**WARNING**

Inspect tubing regularly and replace as necessary.
When inspecting tubing, wear protective clothing and safety glasses.

**CAUTION**

If skid is exposed to sunlight, use UV-resistant tubing.

**CAUTION**

Follow directions and warnings provided with chemicals from the chemical manufacturer. User/owner is responsible for determining chemical compatibility with chemical feed pump(s) and system components.

**CAUTION**

Secure chemicals, metering pump(s) and system, making them inaccessible to children, pets and unauthorized personnel.

**WARNING**

Always wear protective clothing including gloves and safety goggles when working on or near chemical metering pumps and systems.

**CAUTION**

Installation and start-up of chemical dosing system will require both mechanical (plumbing) and electrical work. Only qualified and licensed plumbers and electricians should perform this.

Installation, Operation and Maintenance Manual

System Layout and Components

Figure 1, below, illustrates a static mixer polymer makedown system with integrated control. This system can be used for two different chemicals or for redundant pump operation with one chemical. Your skid system may be less complex than this. Note the various components and their descriptions as they apply to your system.



Never remove the Tank Cover without removing power to the Polymer Makedown System first. The tank mixer blades (inside the tank) can cause serious harm or even death if allowed to come in contact with a person during operation.

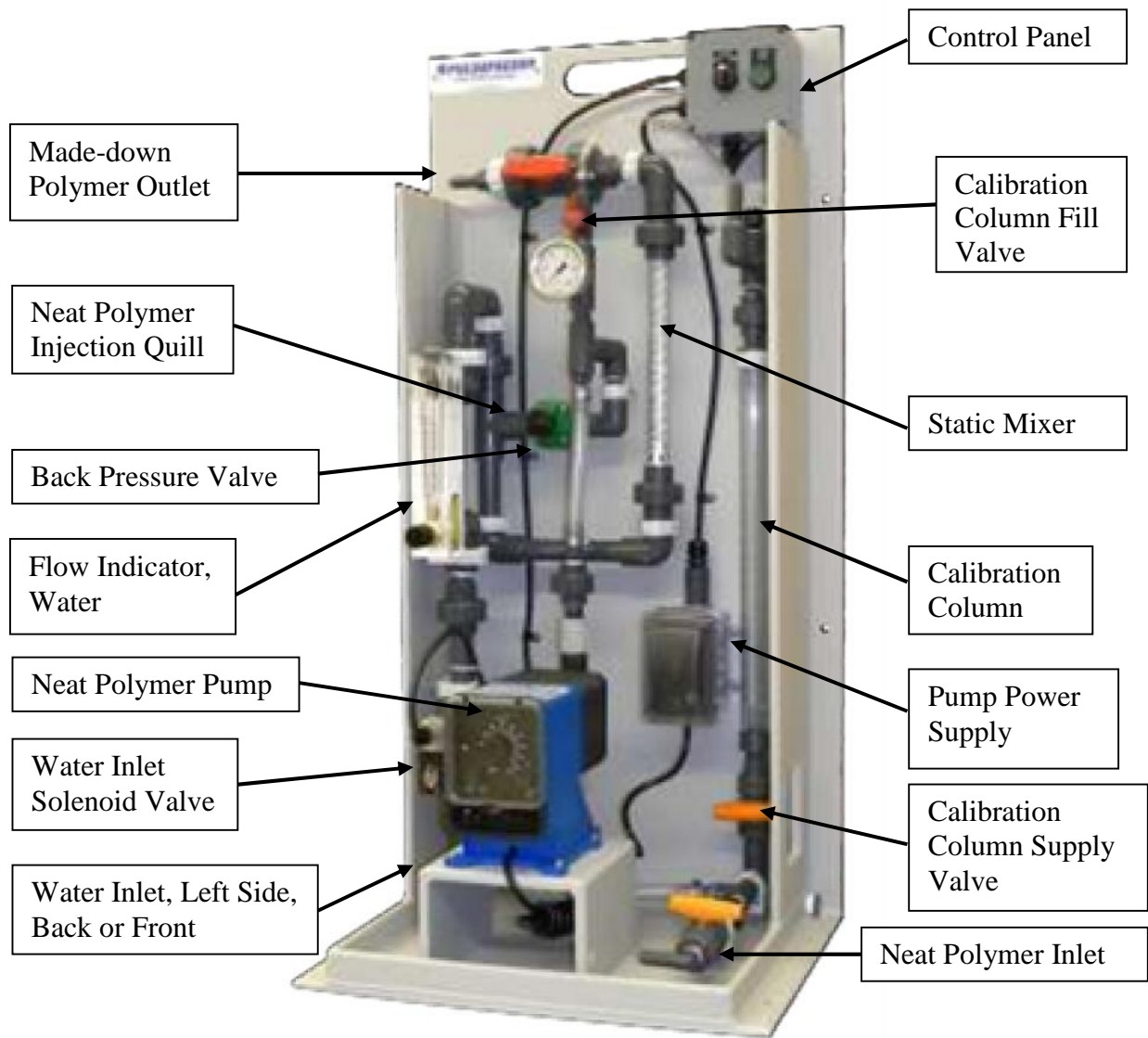


Figure 1

Installation, Operation and Maintenance Manual

Systems Overview

The Polymer Makedown System is designed to inject neat polymer into a clean water stream and to agitate this mixture through a static mixer causing the polymer strands to expand into a 'made-down' aqueous solution. The solution is stored in the polymer solution day-tank and mixed occasionally with the rotary mixer located in the tank. The tank outlet is typically connected to the dosing pump(s) which inject the solution into the process application. The dosing pump(s) are not provided with the Polymer Makedown System and are not powered by the System.

Supply Side

Dosing chemicals are usually sourced from a barrel or tote container. The source must be located above the centerline of the neat polymer pump which is referred to as a "flooded suction". Because Neat Polymer is a high viscosity fluid, the supply should never be located below the centerline of the pump(s) which is referred to as "suction lift." Connections to and from the Neat Polymer Tank are most commonly made with flexible hose or tubing although they may be made with hard piping. The Neat Polymer Tank should be covered to prevent contamination.

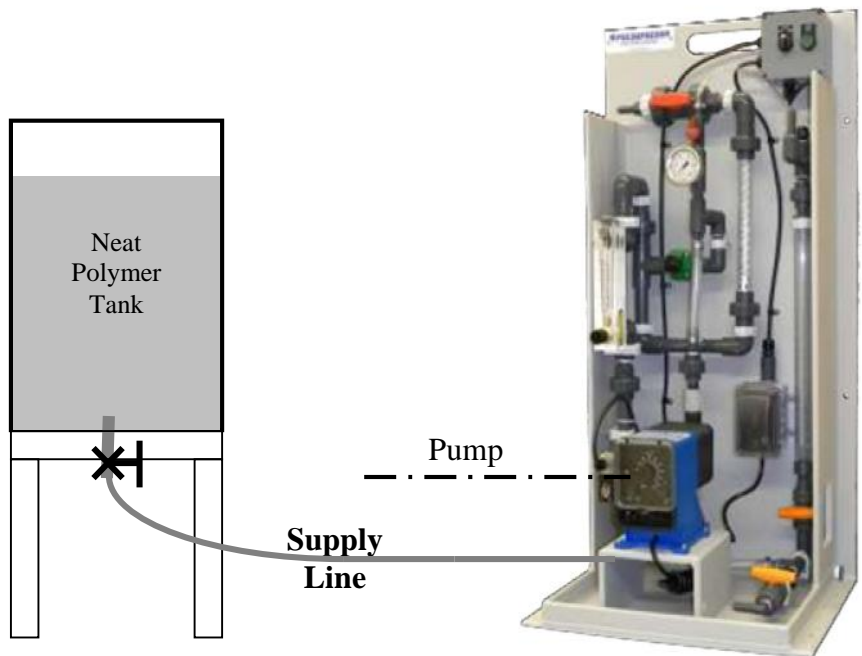
Flooded Suction

This is the most trouble free type of installation. Since the Supply Line tubing is filled with chemical, priming is accomplished quickly and the chance of losing prime is reduced.

Recommended for very low flow rate applications. e.g. 2 ml/hr, or where pumping solutions such as sodium hypochlorite or hydrogen peroxide which can form air bubbles.

Supply Line should gradually slope downward from the Solution Tank to the Skid Suction Connection.

It is strongly recommended to add a drain provision on the suction side to facilitate emptying and flushing of the system for maintenance.



*Figure 3
Flooded Suction*

Process side

The Polymer Makedown System is not equipped with backflow prevention to protect against process fluid flowing back into the municipal water supply should the process pressure become greater than the water supply pressure. Please refer to all local, state and national codes for the proper backflow prevention requirements based on your type of installation.

Installation, Operation and Maintenance Manual

Installation

Prior to attempting installation, familiarize yourself with the layout and components furnished with your Pulsafeeder Polymer Makedown System. These vary from system to system – review the documentation supplied with your order. Inspect your system for damage which may have occurred during transit. If damage is discovered, immediately file a claim with the carrier and contact your Pulsafeeder distributor for any required replacement parts or components.

All systems (and pumps) have been tested with water at the factory.



CAUTION

Some dosing chemicals will react with water, e.g., acids, polymers, etc. Check MSDS for the chemical to be handled. If adverse reaction with water is indicated, ensure that all portions of the skid piping, its components (and the pump) are free from water prior to filling skid system with chemical.

Polymer Makedown Systems are to be floor-mounted only. Mounting holes are provided on the skid for floor mounting. Securely attach skid and the day-tank to the floor, in a position to prevent falling or tipping.

Securely attach the provided 3/4" x 1/2" diameter x 10' long tubing from the system's Made-down Polymer Outlet to the Day-tank's Made-down Polymer Inlet, on the hose barbs with the hose clamps provided; refer to Figure 1 on page 6. It is best to cut this tubing to the desired length prior to installation, and be sure to support the tubing adequately over its length as its weight will increase when filled with made-down polymer.

Installation area should provide ease of access to skid components (and pumps) and the area should be kept free of clutter to enable safe operation and maintenance.

Note that pumps/motors are designed for ambient temperatures of 104°F (40°C) **maximum**. It is preferable that skid systems (and pumps) be located out of direct sunlight. If skid system is exposed to sunlight, provide protection for the pump/motor to prevent overheating and UV damage.



CAUTION

If skid is exposed to sunlight, use UV-resistant tubing.

Owner-Installed Piping/Tubing

The next series of steps are the connection of your piping/tubing which include the neat polymer supply line and tank outlet for made-down polymer supply to the system. These are your responsibility.



WARNING

Ensure that for all piping, tubing, fittings and other appurtenances, their materials are compatible with the liquid to be pumped and the design is suitable for the pressures and temperatures of the application. System design must ensure safety for operation and maintenance as well as for anyone who may be in proximity to the system. Failure to do so may result in damage to equipment, personal injury or death.

Installation, Operation and Maintenance Manual

Neat Polymer Supply Line

This line connects the source of the neat polymer to the Pulsafeeder Polymer Makedown System. Please refer to Figure 1 on page 6. The neat polymer source must be located above the centerline of the pump (flooded suction condition); ensure that the suction line has a gradual downward slope from the tank to the skid suction connection. The purpose of this is to prevent air pocket(s) in the suction line which could affect proper operation of the pump. Include whatever provisions you consider necessary to facilitate maintenance and operation such as isolation valve(s), drain and/or flush connections, etc., making sure that this sub-system enables **SAFE OPERATION**.

Discharge Line

This line connects the Pulsafeeder Polymer Makedown System to your served process. Please refer to Figure 1 on page 6. If the injection point is below the dosing chemical source or if injecting into a low pressure area such as the suction of a pump, an anti-siphon/ back pressure valve should be located as close as possible to the injection point to prevent unwanted chemical feeding. Include whatever provisions you consider necessary to facilitate maintenance and operation such as isolation valve(s), drain and/or flush connections, etc., making sure that this sub-system enables **SAFE OPERATION**.

Electrical Connection

The control panel is provided with a standard plug for connection to 115V (+/-10%), 20A power to operate. Be sure that the selector switch is in the “OFF” position before power is connected.

Manual System



Dry Contact Control Option



Initial Prime

The neat polymer pump must be primed before it can function within the system. This will require an initial start of the pump. It is recommended that the system piping be filled with water before polymer is introduced to the system. Dry contact systems should have the Function selector switch in Manual.

1. Turn the Main Selector Switch to the “Flush” position (center) to initiate water flow.
2. Once water fills the system and begins to flow out of the system discharge, turn the Main Selector Switch to the “OFF” position to terminate water flow.
3. Open the Calibration Column Fill Valve; this aids in pump priming by providing a vent path to the calibration column, bypassing the Back Pressure Valve.
4. Depress the green “Prime” button to start the Neat Polymer Pump.
5. Observe polymer flow through the clear braided tubing connecting the pump discharge to the system piping; when present the pump is primed.
6. Release the “Prime” button to stop the Neat Polymer Pump.
7. Close the Calibration Column Fill Valve.
8. The system is now ready to operate.

Polymer Makedown Process – Manual System (without Dry-Contact input)

- **Process Start**

This polymer makedown system utilizes a continuous makedown process. The makedown process is started by moving the Main Selector Switch to the “Run” position. This will open the Inlet Water Solenoid Valve and energize the Neat Polymer Injection Pump to add polymer to the water flow. The system will produce made-down polymer continuously while in the “Run” mode.

- **System Adjustment – Refer to Figure 1**

- The Water Flow Meter can be adjusted to achieve the desired water flow rate by turning the adjustment knob until the indicator ball settles on the correct flow rate.
- Open the Calibration Column Fill Valve to divert neat polymer to the calibration column until full; close the fill valve. Simultaneously open the Calibration Column Supply Valve at the bottom of the column while closing the Neat Polymer Inlet Valve, and time the drawdown of polymer from the column for 30 seconds. Record the volume consumed and simultaneously close the Calibration Column Supply Valve at the bottom of the column while opening the Neat Polymer Inlet Valve.
- Calculate the actual flow rate of the pump and adjust to the desired rate. Repeat the calibration process to confirm.
- Adjust pump output as required and repeat calibration process to confirm adjustment.

- **System Operation for Polymer Makedown**

- Turn the Main Selector Switch to the ‘Run’ position; leave in this position for the time required to produce the made-down polymer required.
- When complete, turn the Main Selector Switch to the ‘Flush’ position for approximately 1 minute. This allows incoming water flow to clean the injector nozzle and the static mixer of residual polymer.

CAUTION: Failure to flush the system could result in significant fouling of the injector nozzle, static mixer and related piping as the made-down polymer solidifies over time before the next cycle.

- When the flush operation is complete, turn the Main Selector Switch to the ‘Off’ position.

Polymer Makedown Process – Dry Contact input Manual System

- **Process Start**

This polymer makedown system utilizes a continuous makedown process. The makedown process is started by moving the Main Selector Switch to the “Run” position and moving the Function Selector Switch to the ‘Ext’ or External Input position. When the dry contact input circuit is closed, the Inlet Water Solenoid Valve will open and energize the Neat Polymer Injection Pump to add polymer to the water flow. The system will produce made-down polymer continuously while in the “Run” mode with the dry contact input closed.

- **System Adjustment – Refer to Figure 1**

- The Water Flow Meter can be adjusted to achieve the desired water flow rate by turning the adjustment knob until the indicator ball settles on the correct flow rate.
- Open the Calibration Column Fill Valve to divert neat polymer to the calibration column until full; close the fill valve. Simultaneously open the Calibration Column Supply Valve at the bottom of the column while closing the Neat Polymer Inlet Valve, and time the drawdown of polymer from the column for 30 seconds. Record the volume consumed and simultaneously close the Calibration Column Supply Valve at the bottom of the column while opening the Neat Polymer Inlet Valve.
- Calculate the actual flow rate of the pump and adjust to the desired rate. Repeat the calibration process to confirm.
- Adjust pump output as required and repeat calibration process to confirm adjustment.

- **System Operation for Polymer Makedown**

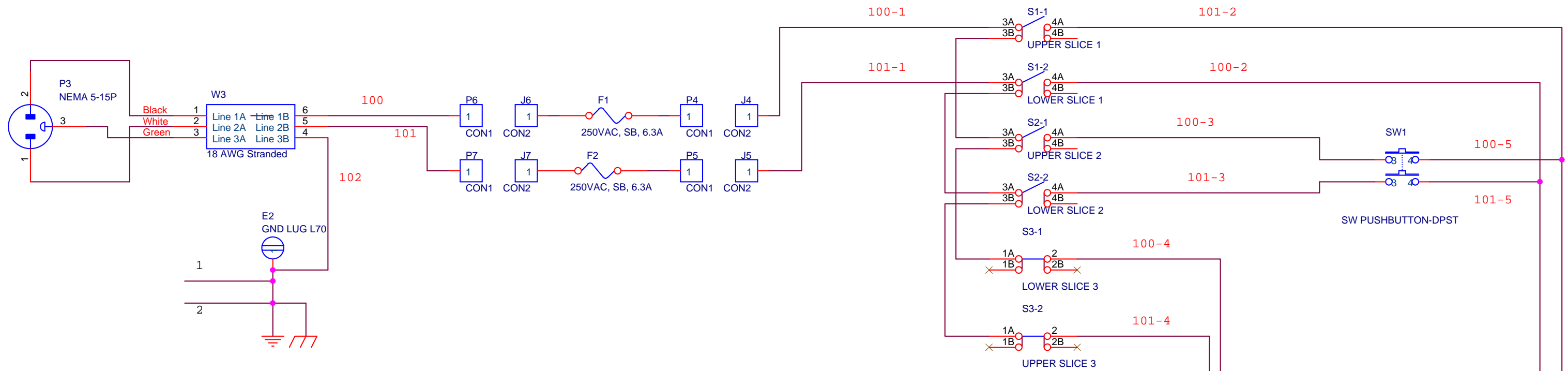
- Turn the Function Selector Switch to the ‘Ext’ position for External Input control, or to ‘Man’ for manual on/off control.
- Turn the Main Selector Switch to the ‘Run’ position; leave in this position to enable the external input for ‘Ext’ mode, or to start the system if in ‘Man’ mode.
- For ‘Ext’ mode, when the dry contact input circuit is closed, the system will produce made-down polymer.
- When the dry contact input circuit opens, the system will turn off the Neat Polymer Injection Pump and leave the Inlet Water Solenoid Valve open for 30 more seconds to flush the system. The system will automatically restart when the circuit is closed again.

Installation, Operation and Maintenance Manual

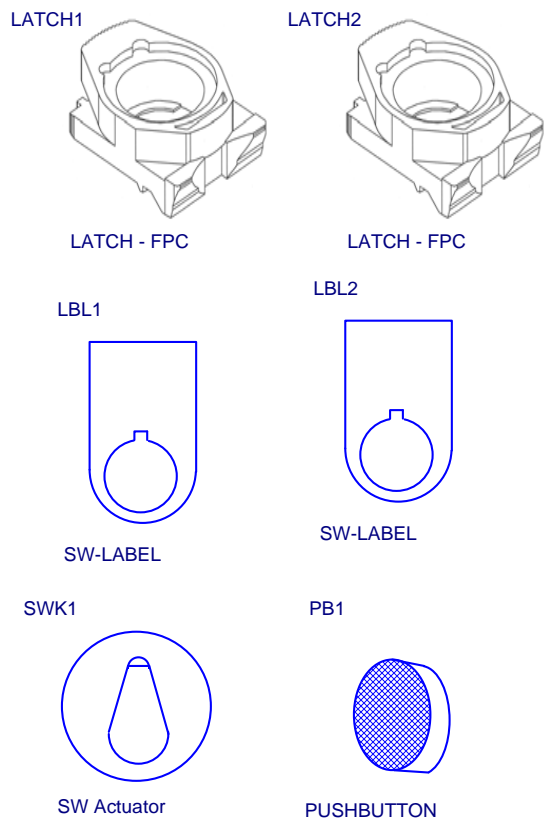
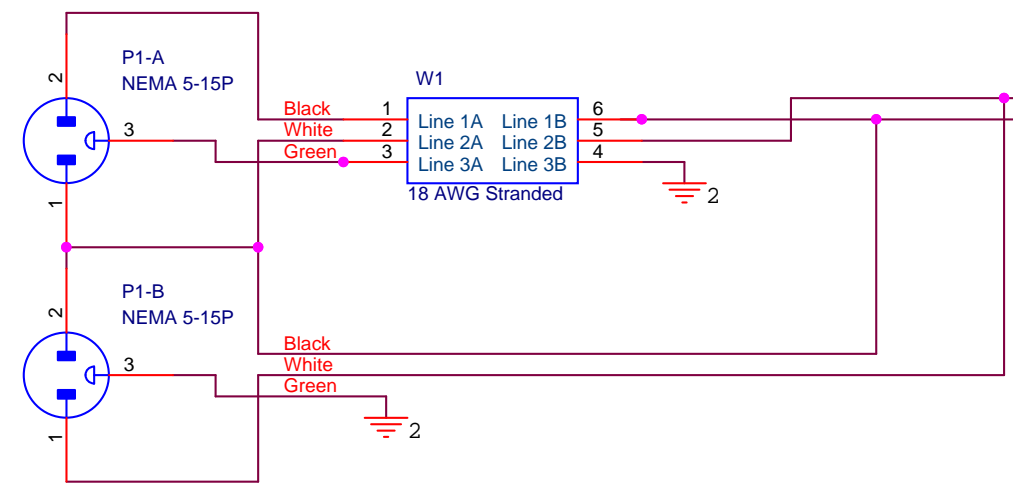
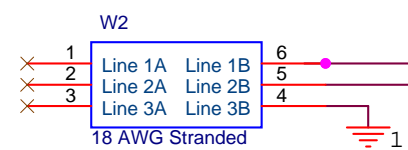
- If operating the system in manual mode, turn the Main Selector Switch to the 'Flush' position for approximately 30 seconds; this allows incoming water flow to clean the injector nozzle and the static mixer of residual polymer.

CAUTION: Failure to flush the system could result in significant fouling of the injector nozzle, static mixer and related piping as the made-down polymer solidifies over time before the next cycle.

- If in 'Man' mode, when the flush operation is complete, turn the Main Selector Switch to the 'Off' position.

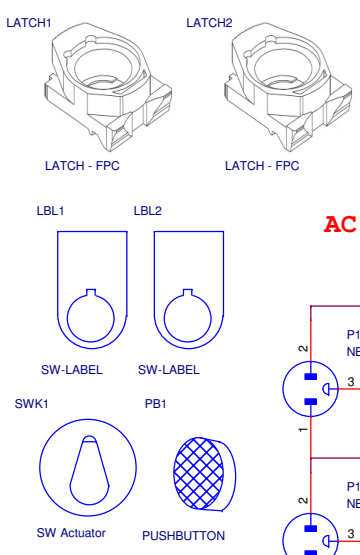
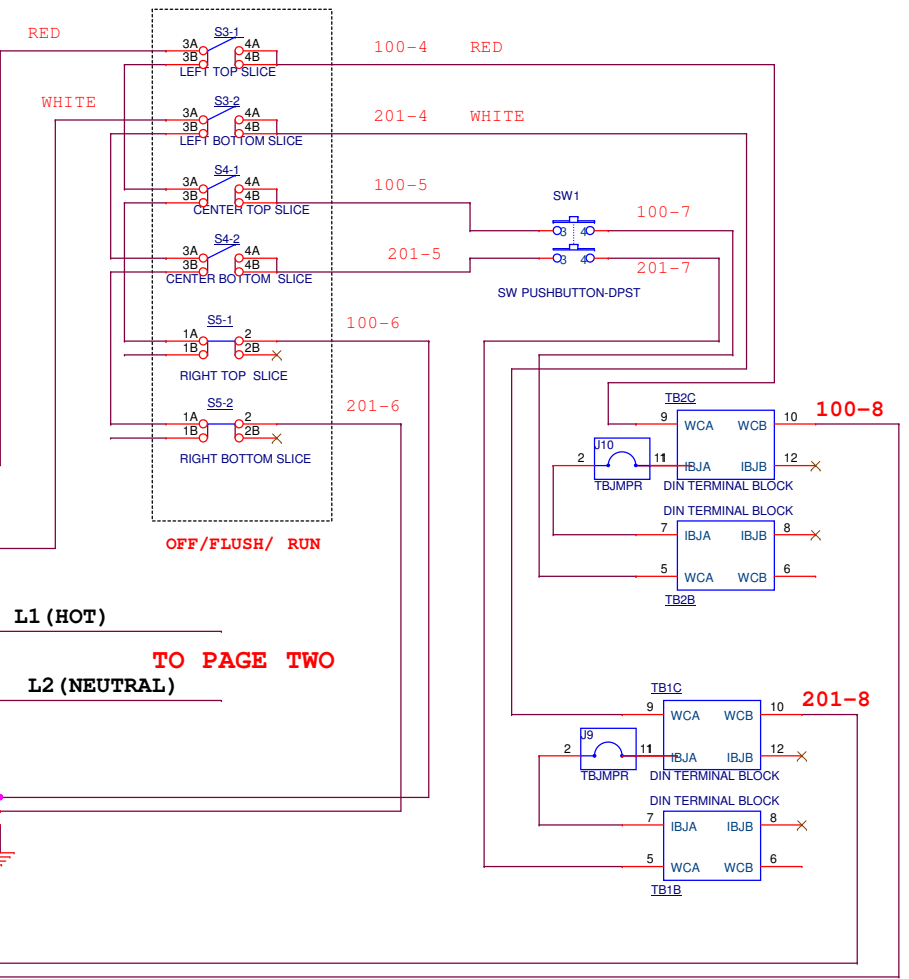
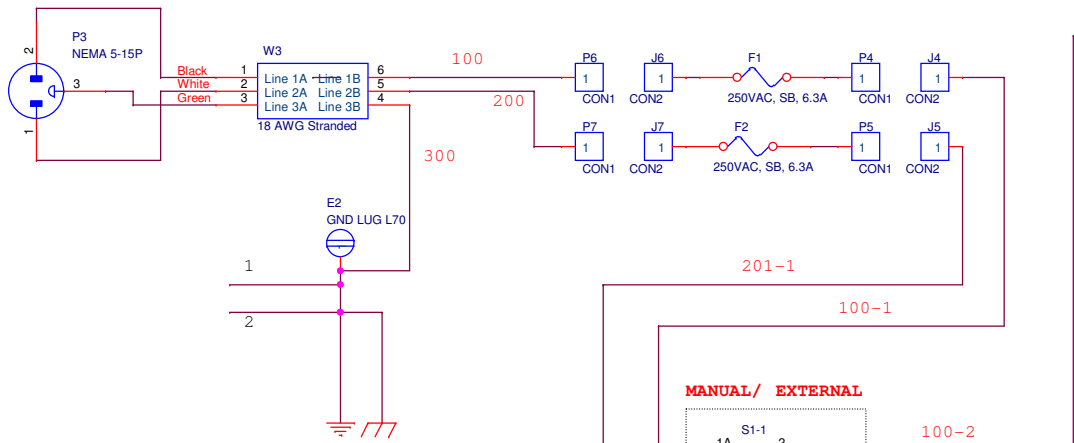


AC POWER LEADS TO THE WATER SOLENOID

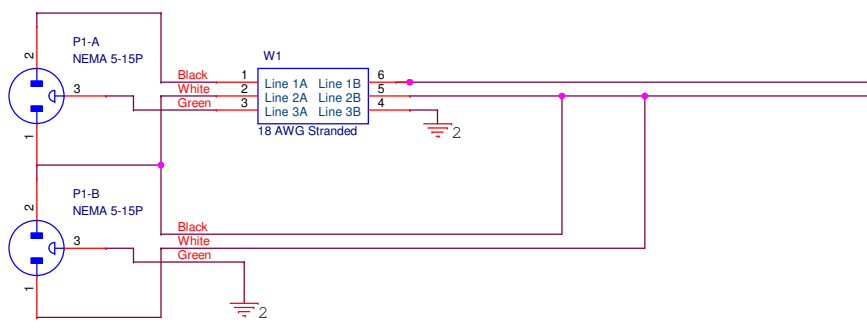


Proprietary Data: This document discloses information and data in which Pulsafeeder has proprietary rights. The right to reproduce, use or disclose in whole or in part except by written permission is prohibited.

Pulsafeeder, Inc. Standard Products Operation 27101 Airport Road Punta Gorda, FL 33982 http://www.pulsafeeder.com		
Title Manual PMDS MFG WIRING		
Size B	Document Number 16-899-01-1: SD0421	Rev A
Date: Monday, October 07, 2013	Sheet 1	of 1

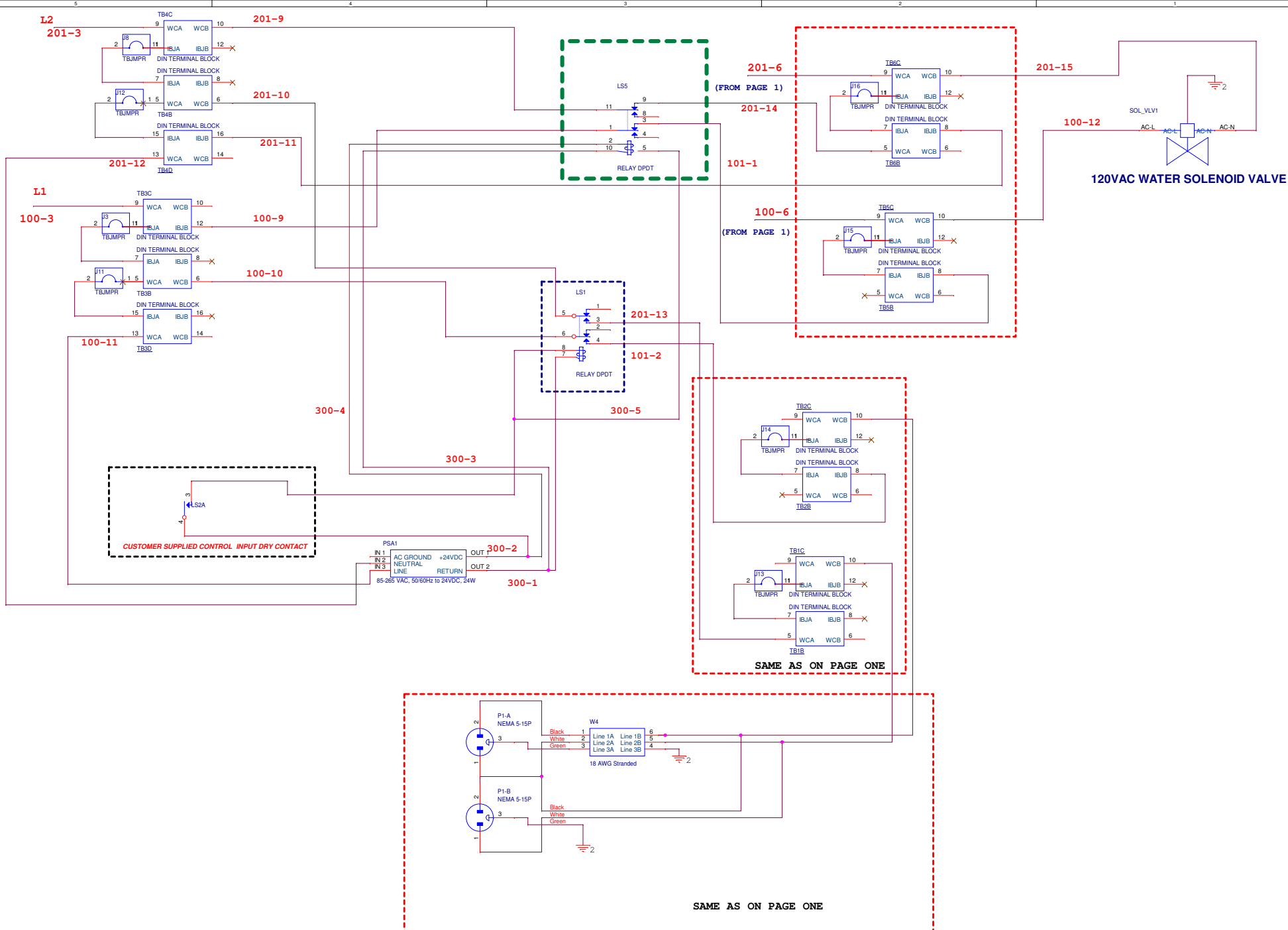


AC POWER LEADS TO THE WATER SOLENOID



Proprietary Data: This document discloses information and data in which Pulsafeeder has proprietary rights. The right to reproduce, use or disclose in whole or in part except by written permission is prohibited.

Pulsafeeder, Inc. <i>Standard Products Operation</i> 27101 Airport Road Punta Gorda, FL 33982 http://www.pulsafeeder.com		
Title SEMI-AUTOMATIC PMDS MFG WIRING		
Size B	Document Number SD0430	Rev A
Date: Tuesday, January 06, 2015	Sheet 1	of 1



Proprietary Data: This document discloses information and data in which Pulsafeeder has proprietary rights. The right to reproduce, use or disclose in whole or in part except by written permission is prohibited.

Pulsafeeder, Inc. Standard Products Operation 27101 Airport Road Punta Gorda, FL 33982 http://www.pulsafeeder.com		
Title SEMI-AUTOMATIC PMDS MFG WIRING		
Size C	Document Number SD0430	Rev A
Date: Tuesday, January 06, 2015	Sheet 1	of 1