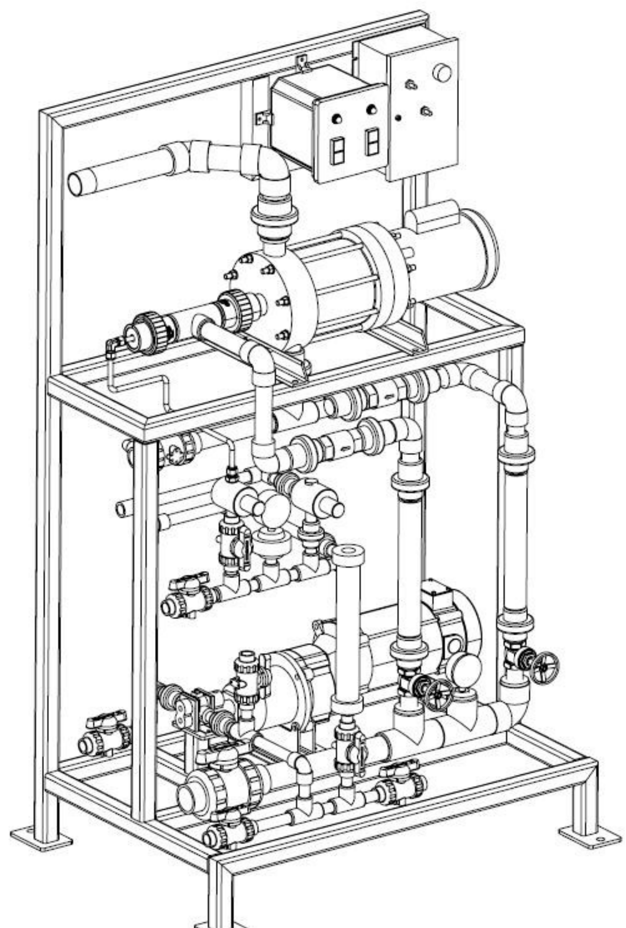
PULSAFEEDER®
A Unit of IDEX Corporation

POLYFEEDER®

Installation, Operation, & Maintenance Instruction



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PULSAFEEDER
A Unit of IDEX Corporation

Manufacturer of Quality Pumps, Controls, and Systems

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Pulsafeeder Factory Service Policy

Should you experience a problem with your POLYFEEDER© system, refer to the troubleshooting guide in your operation and maintenance manual, as well as the information in the separate manual for your neat polymer feed pump. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Sales Representative, 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 component to the factory for inspection and repair. All returns require a Return Authorization number (RMA #)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 that are returned as defective, and later determined not to be will be returned back freight collect. No credit can 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.

Safety Considerations:

1. Read and understand all related instructions and documentation before attempting to install or maintain this equipment
2. Observe all special instructions, notes, and cautions.
3. Act with care and exercise good common sense and judgment during all installation, adjustment, and maintenance procedures.
4. Ensure that all safety and work procedures and standards that are applicable to your company and facility are followed during the installation, maintenance, and operation of this equipment.

Revision History:

Rev A (4-08) Initial Release
Rev B (01-11)
Rev C (09-12) Corrected temperature range in paragraph 6.3.
Rev D (11-12) Added 100 mesh screen size to paragraph 6.3

Table of Contents

Introduction

The POLYFEEDER© is a reliable, efficient system for the make-down of polymer solutions. Versions are available with a variety of neat polymer feed equipment to suit the individual application, including solenoid, gear, and progressing cavity pump technology. Several control options are available as well, to best integrate the system into the user's facility.

2. Principle of Operation

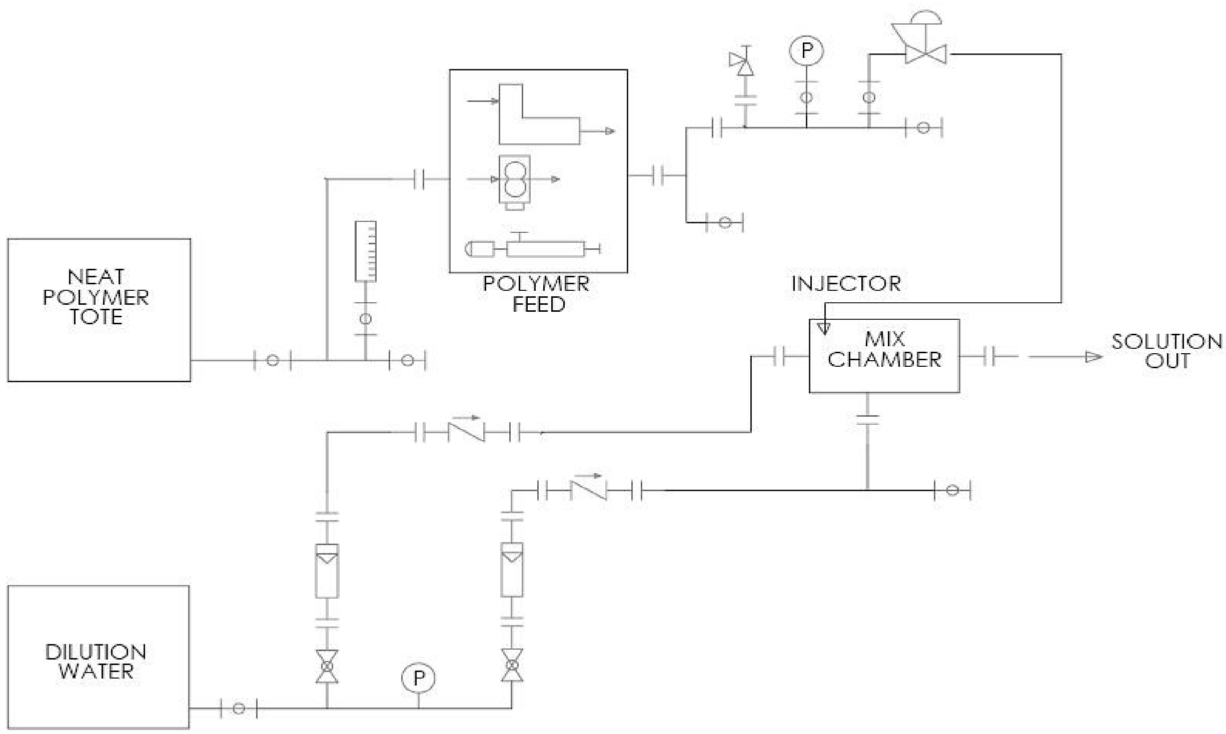


Figure 2-1 BASIC SYSTEM FLOW DIAGRAM

Dilution water is introduced to the system at the water inlet solenoid valve under pressure. T he water is then delivered to the mixing chamber in one or two individual streams, primary (required) and secondary (optional). The flow rate in each stream is regulated with a globe valve and flowmeter.

The primary dilution stream is directed into the center of the mixing chamber, where it is combined with neat polymer. Neat polymer is introduced to the system at the polymer inlet valve and pumped via the polymer feed pump to an anti-clog polymer injector (patent pending) located in the primary dilution water stream just prior to the mixing chamber. The injector design prevents polymer from interacting with the water before it is injected.

The mixing chamber incorporates a motorized dispersion blade that, in combination with the labyrinth design of the chamber itself, results in efficient and complete polymer make-down. The neat polymer and water mixture is subjected to an initial high shear mixing zone and then the mixing energy slowly diminishes until the solution exits the mixer.

The activated solution exits the system for immediate use or aging, depending on the needs of the user and/or process.

2.1 Dilution Water Supply

Dilution water must be supplied from a water supply system capable of meeting the maximum flow requirements of the system. For pipe connection sizes, see the table in ***Section 5.4.*** Supply water must be in the temperature range of 40F – 104F (4.4C - 40C). If using non-potable water, installation of a strainer is recommended to prevent particulate from accumulating in system components. Dilution water quality has a direct effect on polymer solution quality, which can result in higher than normal polymer usages.

2.2 Neat Polymer Supply

The neat polymer supply tank or tote must be positioned to provide a positive suction pressure (head) to the feed pump. Generally this requirement is satisfied as long as the lowest possible liquid level in the tank or tote is maintained above the center line of the pump and the suction line diameter is large enough to avoid excessive frictional losses in the piping or hose.

Ensure that no dilution water comes in contact with the neat polymer solution prior the polymer's entry into the mixing chamber. Neat polymers should also be within the appropriate viscosity range for the type of polymer feed pump being used for proper operation. Refer to Table 2-1 for polymer feed pump types and viscosity ranges

Polymer feed pump type	**Viscosity range**	**Maximum acceptable viscosity**
Solenoid	0 - 10,000 cps	3,000 cps
Gear	500 - 20,000 cps	7,000 cps
Progressing Cavity	500 - 20,000 cps	10,000 + cps

Table 2-2 Polymer Feed Pump Viscosity Ranges

2.3 Polymer Mixing Chamber

Neat polymer is combined with dilution water in the Polymer Mixing Chamber, beginning the actual polymer make-down process. The neat polymer is injected into the primary dilution stream at the inlet if the chamber, where it encounters the motorized dispersion disc which provides rapid dispersion and hydration of the polymer. The stream is then directed around a series of baffles which provide full expansion of the polymer molecules exiting the mixing chamber for use. It should be noted that although the system polymer is highly activated upon exiting the system, further activation is possible through tank aging. Aging is especially useful in high use or continuous use application as a means to reduce chemical usage and increase polymer efficiency.

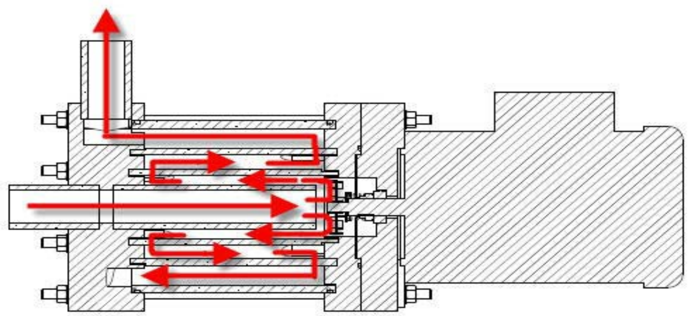


Figure 2-3 Polymer Mixing Chamber

2.4 System Controller options

2.4.1 Manual

The simplest option for small systems: make down on/off controlled at the system, polymer blend concentration adjusted manually via neat polymer pump control, dilution water adjusted with globe valves.

Once setup and calibrated, the system operates continuously supplying a constant flow of emulsified polymer solution at the desired concentration. Users must monitor the supply of neat polymer solution and refill the tank or change the tote as necessary. Water flow rate is indicated on the on-board rotometers.

2.4.2 Remote

A step up to control from an outside source: accepts a remote 4-20 mA signal to control polymer make-down concentration. Remote systems still permit manual operation, as described above. For remote operation, the system accepts a remote START/STOP (dry) contact closure, as well as a 4-20 mA loop signal. The loop signal controls the flow rate of the neat polymer feed pump and therefore the concentration of the finished polymer solution. Water flow rate, once set, remains constant.

3. PolyFeeder Controller Principles of Operation

Pulsafeeder Polyfeeder systems come in two general control categories:

- Manual (see Manual Polyfeeder IOM Publication)
- B and B++ series

Your Polyfeeder polymer mixing system will control polymer make down chamber and final solution concentrations either manually or automatically by controlling the ratio of polymer to primary and secondary water dilution streams.

3.1 B and B++ Series Automated Control

B-Series

B Series automatic control allows the user to set a known solution concentration after manually configuring the primary and secondary (total system) water flows. Once both water flows are established, the controller will attempt to provide a polymer flow rate that will provide the user a desired "solution" concentration. B-series controllers, upon the user entering primary and secondary water flows, will automatically adjust the pump speed to provide the current and future user requested solution concentration. If water flows change concentration errors will occur.

B++ Series

B++ Series controllers come equipped with both primary and secondary water flow rate monitoring. Having flow rate meters allows the system to automatically monitor and display both water flows. This monitoring of water flow automatically allows adjustment of the polymer flow rate. Water flow disturbances and flow deviations are sensed and concentration is continuously corrected by pump speed/flow adjustment, providing consistent real-time concentration control.

3.2 Polyfeeder B-Series Remote Controller General Description

The Polyfeeder B controller provides system level control, monitoring, system status indication, and programmability of the polymer make-down system. Control mechanisms include water supply activation, mixing chamber motor activation, and polymer pump speed/flow pacing via an internal PLC. The controller provides a control panel user interface allowing three modes of operation via a three way switch. These modes are: local, off, and remote. See section 6.2.1 for detail descriptions. The controller also provides monitoring functions via an LCD display and lamp indicators. Major system elements such as water valve status (open or closed), mixing chamber motor state (on/off) and polymer pump state (on/off) are indicated by red indicators. System alarming is indicated via yellow indicator and alarm reset is provided with a red push button. All programmability is performed via the UP, DOWN, and ENTER keys and the LCD text display. System local starting and stopping is provided using the green start stop.

4. Equipment Inspection

Check all equipment for completeness against the order and for any evidence of shipping damage. Shortages or damage must be reported immediately to the carrier and your authorized representative or distributor.

5. Storage

5.1 Short Term

Storage of your PolyFeeder® system for up to 12 months is considered short-term. The recommended short-term storage procedures are:

a) Flush the system with an oil to remove all neat polymer from the system. Do not introduce water into the neat polymer piping as it will cause clogging once neat polymer is reintroduced.
b) Remove all water from piping to avoid bursting of pipes in situations where the ambient temperature could drop to levels below which water freezes.
c) Store the system indoors at room temperature in a dry environment.

d) If required by the operating environment, take precautions to prevent entry of water, humid air, or chemical vapors into the system and control enclosures.

e) Prior to startup, perform a complete inspection and then start up in accordance with instructions in this manual.

5.2 Long Term

After twelve months of storage, Pulsafeeder's warranty cannot cover items that are subject to deterioration with age, such as seals, gaskets, and diaphragms. If the system has been in storage longer than 12 months it is recommended that these items be inspected and replaced as necessary prior to startup. Materials and labor to replace this class of item under this circumstance are the purchaser's responsibility. Consult your local Pulsafeeder representative for assistance in obtaining parts and service for your PolyFeeder system.

6. Installation/Start Up

6.1 Locating the Polyfeeder System

When selecting an installation site or designing a chemical feed system, consideration should be given to access for routine maintenance.

The PolyFeeder system is designed to operate indoors and outdoors, but it is desirable to provide a hood or covering for outdoor service. External heating is required if ambient temperatures below 0° C (32° F) are anticipated, especially if system will not be in continuous duty. Check with the factory if concerned with the suitability of the operating environment.

The system must be rigidly bolted to a solid and flat foundation to minimize vibration, which can loosen connections. When the system is bolted down, care must be taken to avoid distorting the base and affecting alignments. The PolyFeeder must be level within 5°. This will assure that all of the components can operate properly.

6.2 Piping System

1. Shutoff valves on suction and discharge piping are recommended. These valves will permit system inspection and maintenance without draining long runs of piping, making periodic maintenance and inspection easier.

   Shutoff valves should be of the same size as connecting pipe. Ball valves are preferred since they offer minimum flow restriction. All ball valves shall be of the "full port" design.
2. Suction systems should include an inlet strainer for the water to prevent solids and debris from entering and damaging the pump or mix chamber. The strainer should be located between the suction shutoff valve and the system inlet. It must be sized to accommodate the flow rate and the anticipated level of contamination. A 100 mesh screen size is generally recommended.
3. Vacuum/pressure gauges in the suction and discharge lines are helpful in order to check system operation. Gauges should be fitted with protective shutoff valves for isolation while not in use.
4. Piping weight must not be supported by the piping connections or other portions of the system, as the resulting stresses can cause leaks. If appropriate, provide for thermal expansion and contraction so that no excess force or moments are applied to the system fittings.
5. In piping assembly, use a sealing compound chemically compatible with the process material. Users of sealing tape are cautioned to ensure that the entering pipe thread ends are not taped, and that tape is removed from previously-used threads to the maximum practical extent prior to re-use.
6. Both new and existing piping should be cleaned, preferably by flushing with a clean liquid (compatible with process material) and blown out with air, prior to connection to the pump. Debris from the piping system that prevents proper check valve operation is a common startup issue.
7. Ensure that no water is present in any of the neat polymer piping prior to the connection of the neat polymer supply. Water mixing with the neat polymer solution prior to the membrane regulator and mix chamber will cause coagulation and clogging.

6.3 Inlet Water Pressure and Flow Requirements

The system has been designed to have a minimum of 30 psig water pressure (maximum of 80 psig) in order to operate correctly. If plant water pressure is higher, but fluctuates, it may be necessary to add a water pressure regulating valve to the suction of the system. If water pressure is not steady, the pressure fluctuations will cause water flow increases and decreases, which will cause concentration variations in manual systems.

Supply water must be in the temperature range of 40 – 104 F (4.4 C to 40 C). Water should be filtered as required to ensure that any particulate present is less than 5 microns in size, typically a 100 mesh screen is recommended. It should also be noted that extremely hard water with adversely affect polymer solution quality and increase usage of neat polymer.

6.3.1 Process Inlet/Outlet Connections

PolyFeeder process connections will vary depending on the maximum neat polymer flow rate of the system, requiring more or less water flow.

Neat polymer flow rate range	Dilution Water Inlet	Solution outlet	Neat Polymer Connection
Up to 3.0 GPH	1.0” FNPT	1.0” MNPT	0.5” FNPT
3.0 – 21 GPH	1.5” FNPT	1.5” MNPT	
Above 21 GPH	2.0” FNPT	2.0” MNPT	

Table 6-3-1 Process Water Inlet/Outlet for known Polymer Flow

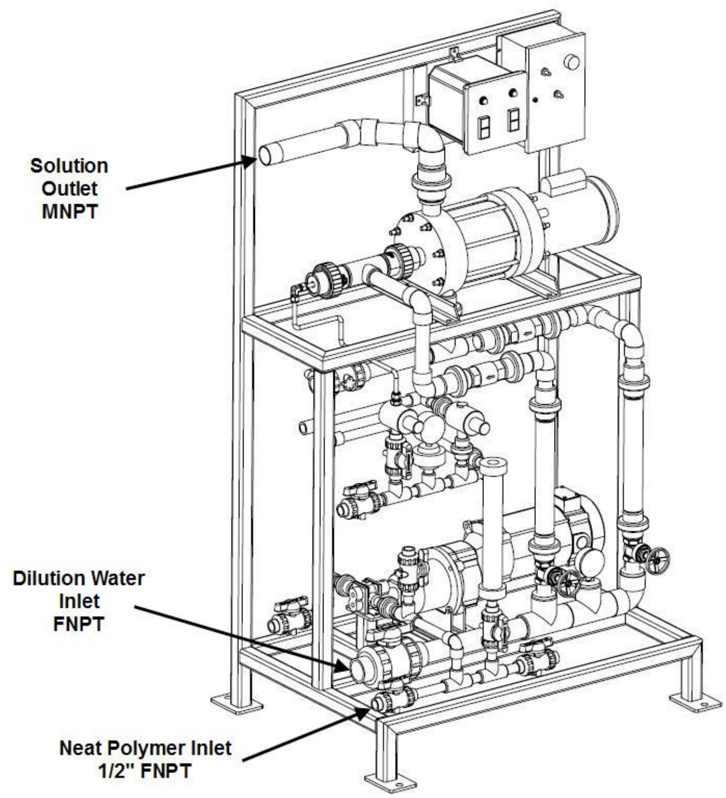


Figure 6-3 Process Inlet and Output Locations

6.4 Fastener and Fitting Inspection

All system fasteners should be checked prior to pump operation, and occasionally during use. This would include:

- The mix chamber tie-rods
- Motor mounting bolts
- Hardware that secures the pipe clamps to the frame
- All piping unions and connection points

Most hardware can be checked simply to ensure it is not loose. However, utilize the following values when checking the mix chamber hardware:

Mix Chamber Tie Rods	Fastener Torque		
	# Fasteners and size	N-m	In. - Lbs
	(16) 3/8-16 Hex Nut	3.4	30
Motor Bolts	(4) 3/8-16 x 1.75 SHCS	3.4	30

Table 6-4 Fastener Torques

6.5 CONNECTING, PRIMING, AND CALIBRATING THE POLYFEEDER SYSTEM

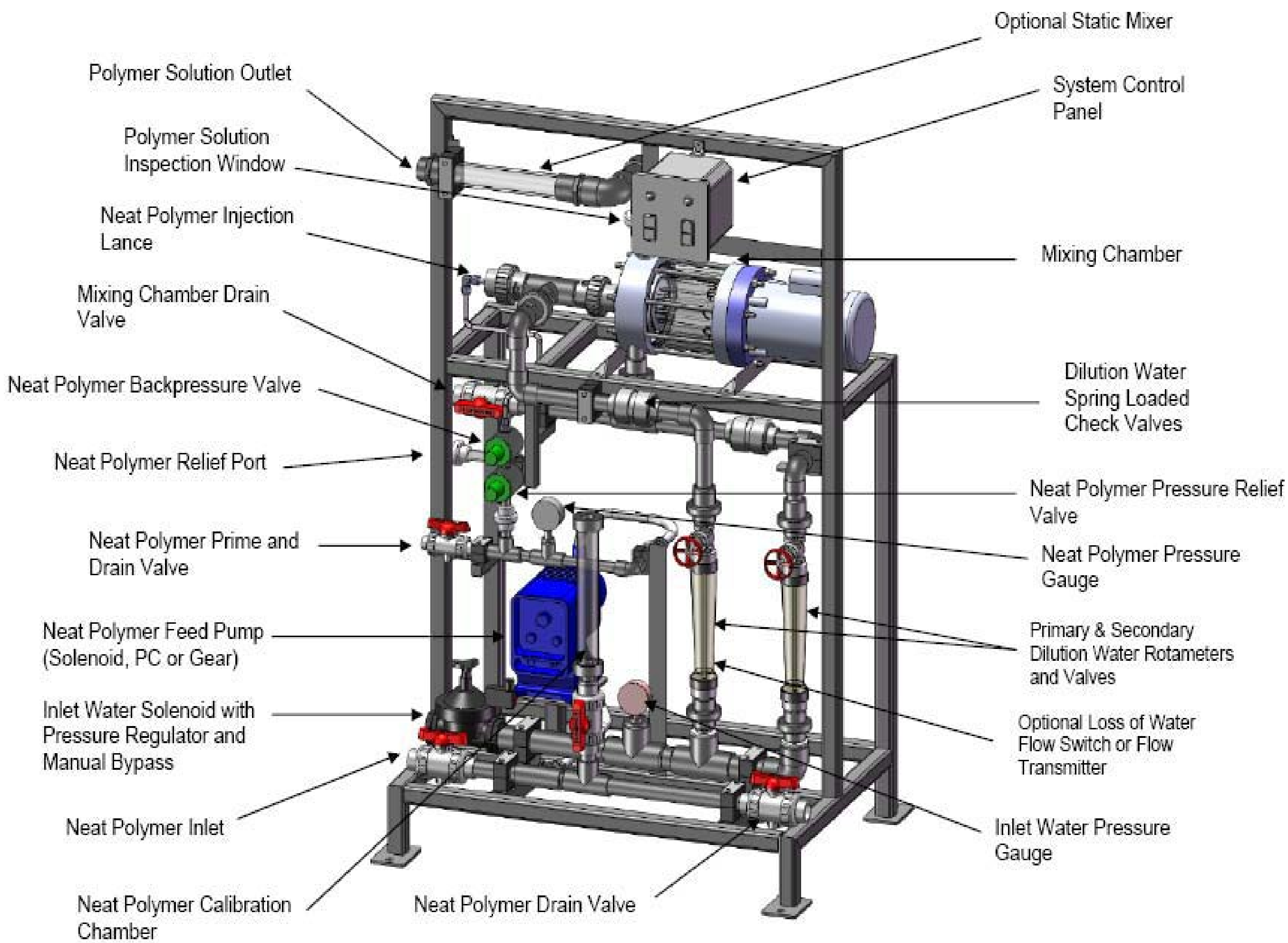


Figure 6-5 Polyfeeder(Solenoid Version) Showing Process Connection and Valving

NOTE: Do not run the system dry for any length of time as this will cause excessive wear of the polymer feed pump components and the Mixing chamber motor shaft seal. Momentary operation to verify power and shaft rotation is acceptable.

CAUTION! The Mixing chamber is rated for 150 PSI. Do not exceed this pressure – operation of the unit at pressures greater than 150 psi can cause injury or equipment damage.

Tools Required: Pipe Wrenches (for inlet/outlet connections)
Flat Bladed Screwdriver (for adjusting backpressure / relief valves)

Tools Recommended: Pocket Calculator & Stopwatch (for calibrating polymer flow rate)

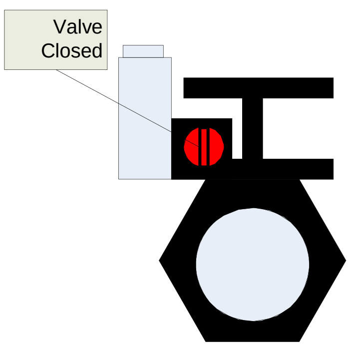
6.5.1 Connecting Inlet and Outlet Piping

6.5.1.1 Initial Valve Settings

It is highly recommended at this point that the system be electrically wired and power applied. Elements of startup require startups of the system.

First, close all inlet, outlet, bleed and isolation valves. Depending on system configuration, there can be up to eleven (11) of these valves in the system, and these are either ball valves or globe valves.

The input water regulator, located very close to the water inlet, needs to be turned fully clockwise looking at it from the top, in order to guarantee no water flow on initial start-up. Additionally, the manual solenoid valve pilot switch should be in the vertical position as shown to the left.



NOTE: The solenoid valve has a manual bypass switch allowing the user to manually control water flow.

Ball valves have a “T” shaped handle that rotates a ¼ turn. Ball valves are closed when the “T” handle is 90 degrees away (across) from its associated pipeline. Ball valves are open when the “T” handle is parallel (in-line) with its pipeline.

Globe valves have round hand wheels, and these are closed when the wheel is rotated fully clockwise (viewed from top of wheel). Globe valves are opened by rotating the hand wheel counter-clockwise.

6.5.1.2 Valve Identification

System valves are:

1.1	Input Water Solenoid Valve/Regulator
1.2	Primary Dilution Water – Globe
1.3	Secondary Dilution Water – Globe (note: not present in some configurations)
1.4	Mixing Chamber Drain – Ball
1.5	Neat Polymer Inlet – Ball
1.6	Neat Polymer suction side Drain – Ball
1.7	Neat Polymer suction side Bleed - Ball
1.8	Calibration Column Isolation – Ball
1.9	Neat Polymer discharge side Drain – Ball
1.10	Neat Polymer discharge side Bleed - Ball
1.11	Neat Polymer Isolation – Ball

6.5.1.3 Water Inlet Connection

Connect the pressurized water source to the dilution water inlet of the system. The water source must be able to support a minimum of the capacity that you wish to make of dilute polymer at 30 psig. If water pressure varies, installation of a water pressure regulator may be necessary to have reasonable control over the water flow.

6.5.1.4 Polymer Inlet Connection

Connect the neat polymer tote bin or bulk tank to the neat polymer inlet.

6.5.1.5 Polymer Solution Outlet Connection

Connect the discharge piping to the Solution outlet.

6.5.1.6 Polymer Pressure Relief Routing

It is recommended to run a line from the neat polymer pressure relief valve back to the neat polymer tote. This will avoid loss of polymer in the event of an over pressure condition.

6.5.1.7 Priming/Filling Dilution Stream Piping

Open the dilution water inlet valve. Make sure valve is completely open.

Note the reading on the dilution water pressure gage. This should be greater than 30 psi and MUST BE less than 100 psi.

Slowly open (by rotating the hand wheels counter-clockwise) the primary and (if present) secondary dilution globe valves. This will fill the dilution pipelines and polymer mixing chamber with water. Adjust valves until the floats on the primary and secondary rotameters indicate the desired solution output in gallons per minute.

Pulsafeeder recommends a primary to secondary flow ratio of 4:1 e.g. if you want 20 GPM of polymer solution, 20/5=4, run 4 GPM secondary dilution and 16 GPM of primary dilution.

Once the desired dilution water flowrate is established, the Dilution water inlet (ball) valve can either be closed temporarily to save water while the neat polymer feed pipeline is primed, or be left running.

6.5.1.8 Priming/Filling Polymer Delivery Piping

NOTE: It is not recommended to inject neat polymer into the mixing chamber when dilution water is not running or when the mixing chamber is empty.

6.5.1.8.1 Priming the Polymer Suction Side

Open the following valves:

- Neat Polymer discharge side Bleed Valve
- Calibration Column isolation Valve
- Neat Polymer suction side Drain Valve

Be mindful of the bleed and pressure relief ports when opening valves! Especially if the pipeline was previously under pressure. Wear protective clothing and goggles to prevent injury in the event of unanticipated chemical discharges.

NOTE: Depending on the level of neat polymer in the tote/ supply tank, the neat polymer suction side piping can fill very rapidly! Be prepared to close valves quickly!

Carefully open the neat polymer inlet valve. The suction piping will begin to fill with neat polymer.

Once polymer is observed coming out the suction side drain valve, close the drain valve.

Polymer will then start to fill the calibration column and the rest of the suction side pipeline.

When the column is nearly full, close the calibration column isolation valve.

NOTE: The neat polymer supply tote/tank must have sufficient polymer in it for the calibration column to fill itself. In the event of low polymer levels in the supply tank, the column can be filled manually via its top port.

Open the Neat Polymer suction side Bleed valve.

Once polymer is observed coming out the suction side bleed valve, close the (suction side) bleed valve. The suction side pipeline should now be full of neat polymer.

6.5.1.8.2 Discharge Side Polymer Priming

The polymer feed pump is not self-priming and will need to be operated in order to fill the discharge side of the polymer feed piping. If permissible, it is recommended that system water be allowed to flow during discharge side polymer priming in the event that polymer enters the mixing chamber.

If the dilution water inlet regulator or solenoid valve was manually closed previously, open them. Water should begin to flow and the polymer pump should start to generate system flow.

NOTE: At this point, power must be wired to the system. See Section 6.6 for details.

Enter into the Manual Pump Control Mode from the controller front panel by depressing ENTER and ALARM RESET push buttons simultaneously. Pressing ENTER and holding it depressed allows jogging of the polymer pump.

After a few moments of pump operation, Neat polymer will begin to flow into the discharge piping. When polymer begins to flow out of the discharge side bleed valve, close that valve and release the ENTER push button.

Immediately after closing the discharge bleed valve, open the neat polymer isolation valve.

Note the reading on the neat polymer inlet pressure valve, this should be 10-30 psi higher than the dilution water inlet pressure, **BUT MUST NOT EXCEED 120 PSI**.

6.5.1.8.3 Setting Polymer Backpressure and Pressure Relief Valves

NOTE: There are two (2) Griffco T-series valves set into the neat polymer discharge side pipeline.

These are PVC and/or Stainless steel cylinders with conical tops with black plastic caps on them. One valve is ported to atmosphere – this is the neat polymer pressure relief.

The other valve is connected to a length of 3/8” flexible tube with a compression fitting. This is the neat polymer backpressure valve.

If the setting of these valves needs adjustment, remove the black cap and insert a straight blade screwdriver into the slot. Twist clockwise to increase the pressure setting, counter-clockwise to reduce it.

Set the neat polymer backpressure valve to a setting 10-30 psi above the dilution water inlet pressure.

CAUTION! DO NOT EXCEED 120 PSI.

NOTE: While setting neat polymer backpressure, the pressure relief valve may open. Adjust the pressure relief valve if this occurs. Set the pressure relief valve to open at 120% of system pressure (e.g. 96 psi if neat polymer is at 80 psi, etc.)

Congratulations your system is primed and ready for calibration. See section

6.6 Electrical Installation

6.6.1 AC Power Input Requirements Wiring Details

All PolyFeeder systems require single phase power, and are rated for 115 VAC @ 20 Amp. Customer supplied wiring shall be 12 AWG, with an integral ground conductor. The system shall be wired and grounded accordingly to NEC code using UL listed or CSA approved wire. Minimum wire voltage rating shall be 600 V for all wiring entering or leaving the Polyfeeder control enclosure. Application of power to the system is provided by a GFI 20 Amp breaker CB-104 located near TB-1 for B-series controllers. See Figure 5-2.

6.6.1.1 B-Series Control Panel AC Power Wiring

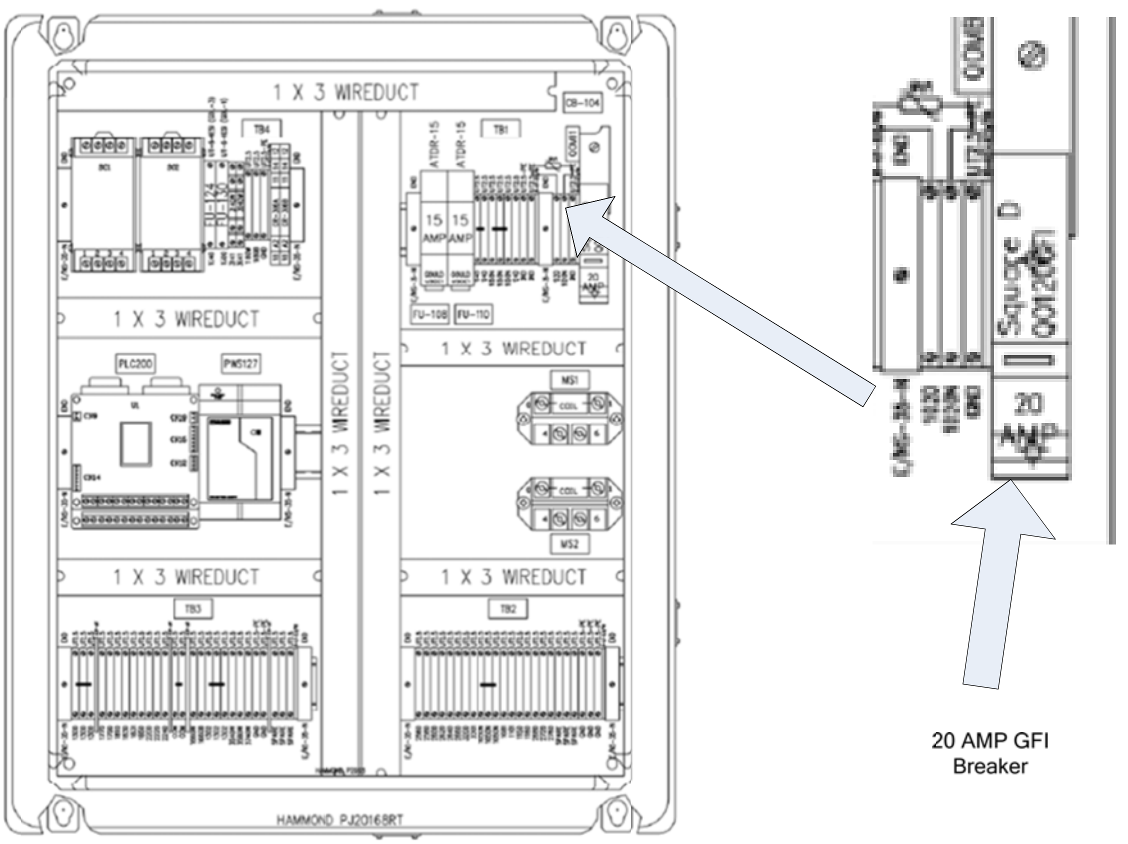


Figure 6-6 AC Input Wiring Location

Signal	Terminal Block Location
120VAC Line	TB1 – 1020 (Black)
120 VAC Nuetral	TB1 – 1020N (White)
Chassis Ground	GND (Green/Yellow)

Table 6-6-1-1 AC Input Wiring (B-Series Controller Only)

6.6.2 Control Input Requirements and Wiring Details

6.6.2.1 Remote Start Input Contact Requirements

The Polyfeeder may be started remotely via a PLC/SCADA system or a remote located start/stop switch. The user must provide a dry contact closure signaling the Polyfeeder to start (contact closed) or stop (contact open). The contact or switch must be rated for 24 VDC and 1 amp.

6.6.2.2 B-Series Remote Start Controller Wiring

Signal	Terminal Block Location
Contact Side A	TB3-1300
Contac Side B	TB3-1790

Table 6-6-2-1 B-series controller Remote Start Contact Wiring

6.6.2.3 Remote Analog Input Requirements

The Polyfeeder B-series controller provides remote polymer concentration control via a two-wire analog input. This analog input presents a 250 ohm impedance to the PLC/SCADA system. The PLC/SCADA system must provide 4-20mA. Current sources must be sourcing capable externally loop powered outputs. The analog control signal should be routed in a separate conduit and 20 AWG twisted pair w/shield is recommended. The shield shall be tied to the customer PLC/SCADA system ground.

The wiring connection for this signal is listed below

Signal	**Terminal Block Location**
Positive	TB3-3740W
Negative (Common)	TB3-1302

Table 6-6-2-3 Analog Polymer Demand input

6.6.2.4 Programmable Contact Output Requirements

The Polyfeeder B-series controller provides 3 programmable normally open dry contact output connections capable of 5A @ 250VAC or 5A @ 30VDC. These outputs are programmable to allow the user to signal the following system conditions:

1. SYSTEM RUNNING/STOPPED
2. LOCAL_REMOTE (Control Mode)
3. LOW POLYMER FLOW
4. LOW WATER FLOW

16 AWG wiring is recommended with 600 volt insulation rating.

6.6.2.5 Programmable Contact Output Controller Wiring

Signal	Terminal Block Location
Programmable Relay 1 (N.O.)	TB2-2640
Programmable Relay 1 (COM)	TB2-2660
Programmable Relay 2 (N.O.)	TB2-2600
Programmable Relay 2 (COM)	TB2-2620
Programmable Relay 3 (N.O.)	TB2-2560
Programmable Relay 3 (COM)	TB2-2580

Table 6-6-2-5 Programmable Relay Outputs Wiring (B-Series Only)

6.6.2.6 System In-Remote Contact Output Requirements

Polyfeeder B Series controllers provide an additional dry contact output that is closed when the system is placed in the REMOTE position on the mode selection switch. This contact output is rated for 5 amps at 250 VAC or 30 VDC. The contact is a normally open contact.

Signal	Terminal Block Location
In Remote Dry Contact (N.O.)	TB3-1830
In Remote Dry Contact (COM)	TB3-1831

Table 6-6-2-6 Remote Contact Output Locations

6.6.2.7 Generic Alarm Contact Output Requirements

Polyfeeder B-Series provides a generic alarm dry contact output that is closed for low polymer flow, low water flow, and concentration limits exceeded. This contact output is rated for 5 Amps at 250 VAC or 30VDC. The contact is a normally open contact, with any alarm providing contact closure.

Signal	Terminal Block Location
Generic Alarm Relay (N.O.)	TB2-3200
Generic Alarm Relay (COM)	TB2-3201

Table 6-6-2-7 Generic Alarm Contact Wiring

6.6.3 Analog Output Requirements

Polyfeeder B series controllers allow the system to report the polymer flow rate to a remote location. An analog output current loop is provided that uses a 4-20mA signal. The effective input impedance presented by the remotely located PLC or SCADA system to this current source must not exceed 500 ohms.

Signal	Terminal Block Location
Positive Output	TB3-1660W
Negative Return (COM)	TB3- 1660B

Table 6-6-3 Analog Output Wiring

6.6.4 Field Wiring Summary

USER I/O

Field Signal	Signal Type	User I/O	Description	Terminal Strip
AC Power (120VAC)	Power Input	User Input	Line Neutral	TB1-1020 TB1-1020N
Chassis Ground	Protective Earth	User Input	Ground	TB1-GND
Start/Stop Contact	Dry Contact Input	User Input	24 VDC 24 VDC Input	TB3-1300 TB3-1790
Analog Input Polymer Pacing	Analog Input	User Input	4-20 mA pos 4-20 mA neg Shield	TB3- 3740W TB3- 1302 GND
Programmable Relay 1	Dry Contact Output	User Output	AC or DC	TB2-2640 TB2-2660
Programmable Relay 2	Dry Contact Output	User Output	AC or DC	TB2-2620 TB2-2600
Programmable Relay 3	Dry Contact Output	User Output	AC or DC	TB2-2580 TB2-2560
In Remote Contact	Dry Contact Output	User Output	AC or DC	TB2-1830 TB2-1831
Analog Output Poly	Analog Output	User Output	4-20mA pos 4-20mA neg Shield	TB3-1660W TB3-1660B GND
Generic Alarm	Dry Contact Ouput	User Output	AC or DC	TB2-3200 TB2-3201

System I/O

Field Signal	Signal Type	User I/O	Description	Terminal Strip
Analog Input Primary H20 Flow	Analog Input	System Input	4-20 mA pos 4-20 mA neg Shield	TB3- 3540W TB3- 1300 GND
Analog Input Secondary H20 Flow	Analog Input	System Input	4-20 mA pos 4-20 mA neg Shield	TB3- 3580W TB3- 1300 GND
Primary Water Flow Switch[2]	Contact Input	System Input	24 VDC Sensor Input	TB3-1300 TB3-2200
Polymer Flow Switch[2]	Wetted Contact Input	System Input	24 VDC 24 VDC Common Sensor Input	TB3-1300 TB3-1302 TB3-2220
Mixer Motor Start	Contact Output	System Output	Line Neutral GND	TB2-1081 TB2-1050N GND
Polymer Pump Start	AC Supply Contact	System Output	Line Neutral GND	TB2-1101 TB2-1050N TB2-GND
Solenoid Pump/External DC Drive Control[1]	Analog Output	System Output	4-20mA pos 4-20mA neg Shield	TB4-1180W TB4-1180B GND

Water Solenoid Valve	Starter Contact	System Output	Line Neutral	TB2-2760 TB2-1050N

Table 6-6-4 Field Connection Terminal Mapping

1 Optional for Solenoid Pump Only
2 Wiring dependent on system options ordered

6.7 Initial Power Up and System Operation

Upon initial power application to the polymer mixing system the controller LCD will report the basic start-up screen sequence. The sequence show is when the system mode selector switch is in the local position. Once the start-up sequence has been completed and electrical installation completed, system configurability via the programming interface can occur.

Figure 6-7 Polyfeeder Controller Start Up Screen Sequence

6.7.1 Polyfeeder B and B ++ Modes of Operation

6.7.1.1 Local Mode

The first operational mode is "Local Only." All functions related to the system are controlled and adjusted from the "Local" control panel interface via operator input. The System start/stop push button and placing the mode selector switch to PUMP OFF are the two ways to start/stop the system in this mode.

6.7.1.2 Remote Start/Stop Mode

The second controller operational mode, remote start stop, allows the user to start or stop the polymer blending system from a remotely located PLC/SCADA or remote switch. In this mode, the concentration setpoint is set locally and used when remotely started. The analog input must be de-activated to enable this mode of operation.

6.7.1.3 Remote Start/Stop Mode with Analog Concentration Control

The third controller operational mode is Remote Start Stop Mode with Analog control . While in this mode, the polymer mixing system is started and stopped from a remote location using a dry contact input.

By providing a remote analog input signal, the Remote Start/Stop mode can automatically control the polymer concentration (polymer pump pacing). While in this mode, the user's SCADA/PLC system can be provided an analog feedback proportional to polymer flow rate.

For safety purposes the system may be shut down locally, using the PUMP OFF mode selection switch. All operating parameters, such as dilution water flow rate, both primary and secondary and setup parameters are still changed locally at the control panel interface.

6.7.2 User Interface Description and System Operation

The following table, used with Figure 6-7-2, describes where and how to perform system operations and the necessary key press sequences to provide functionality.

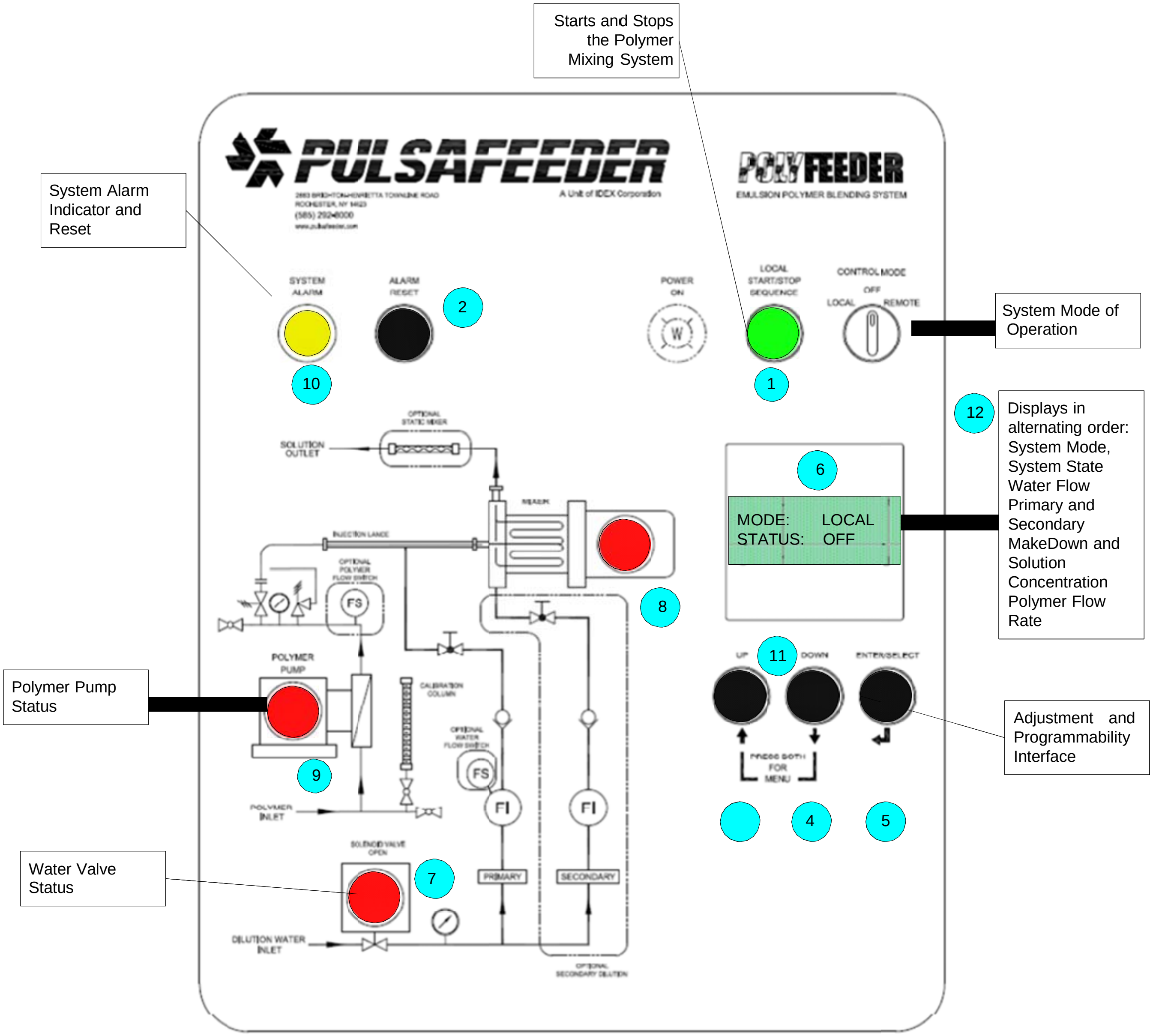


Figure 6-7-2 Polyfeeder Controller User Interface

Diagram Key#	Key/Indicator/ LCD	Function	Description
1	System Start/Stop Key	Start or Stop Polymer Mixing System	If system stopped, then pressing this key begins the system startup sequence. If the system is running, pressing this key stops the system using a user programmed system shutdown sequence
2	Alarm Reset Key	Reset system alarms	If system alarms for low water or low polymer then pressing this key will reset the alarm state.
3	Up Key	Increase or Select	In program mode this key increases

		Programming Parameter	the parameter being edited or moves to the next selection.
4	Down Key	Decrease or Select Programming Parameter	In program mode this key decreases the parameter being edited.
5	Enter Key	Enter key button that saves the parameter being edited or moves to next step.	In programming mode this key allow's the user to enter a parameter or move to the next step in a sequence.
6	LCD	Liquid Crystal Display (2 line by 16 character) Displays current operational mode, operational parameters, or programming mode parameter.	In Stop Mode: Shows concentration, Operational Mode, and Water and Polymer Flow Rates. In Running: Shows Water and Polymer Flow Rates
7	Water Valve Open Indicator	Water Valve Open (Red) LED indicator	On when water valve is open, delivery primary and secondary water dilution streams
8	Mixer Running Indicator	Mixer Motor Running (green) LED indicator	On when mixing chamber motor is running.
9	Polymer Pump Running Indicator	Polymer Pump Running (green) LED indicator	On when polymer pump is running, delivering polymer.
10	Alarm Active Indicator	System Alarm (red) LED indicator	A system alarm has occurred. Low water, Low Polymer, Concentration Range, etc
11	Up and Down	Programming Mode	UP and DOWN in combination allow the user to enter PROGRAMMING MODE. (see programming section for details)
12	Local, OFF, Remote Switch	Determines operational mode of polymer mixing system	

Table 6-7-2 Controller User Interface Keys and Functional Description

6.7.2.1 LCD Display - Operational Mode

The following four screens, that alternatively cycle, tell the user the mode of operation (the diagram below shows the system operating in local mode), the system status, the mixing concentration to be provided, and the water & polymer flow rates.

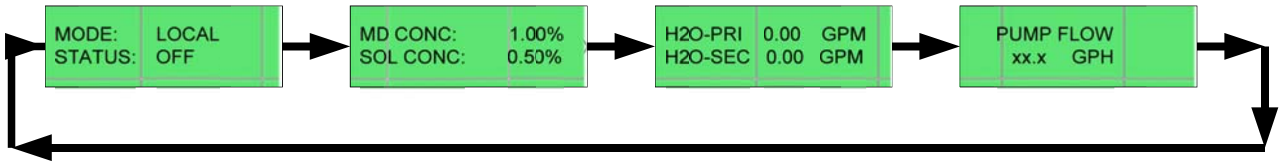
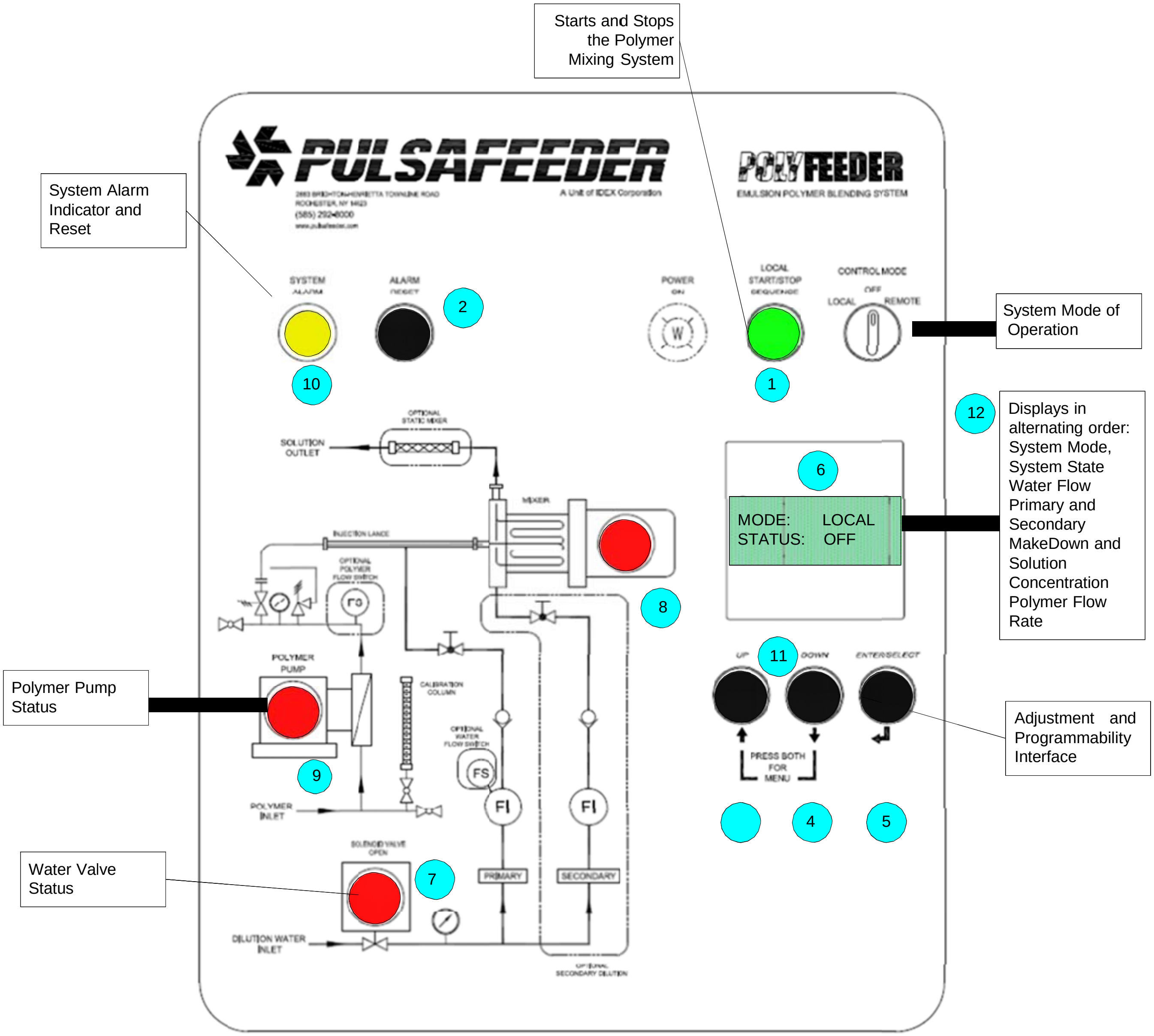


Figure 6-7-2-1 Operational Mode Screen Display

6.7.2.1.1 LCD Scrolling Lock

While in operational mode the scrolling mechanism can be stopped on any of the 4 screens by pressing the ENTER key while on the screen of interest. This allows for easy system setup and monitoring of water flow primary and secondary, make-down and total solution concentration.

Shown below is the User Interface (UI) front panel to the Polymer Mixing System. The UI allows the operator the ability to control the Polymer Mixing System locally, set operational parameters, and view system status.


Starts and Stops the Polymer Mixing System
System Alarm Indicator and Reset
System Mode of Operation
Displays in alternating order: System Mode, System State Water Flow Primary and Secondary MakeDown and Solution Concentration Polymer Flow Rate
Polymer Pump Status
Adjustment and Programmability Interface
Water Valve Status
PULSAFEEDER
POLYFEEDER
EMULSION POLYMER BLENDING SYSTEM
A Unit of IDEX Corporation
SYSTEM ALARM
ALARM RESET
POWER ON
LOCAL START/STOP SEQUENCE
CONTROL MODE
OFF
LOCAL
REMOTE
MODE: LOCAL
STATUS: OFF
SOLUTION OUTLET
OPTIONAL STATIC MIXER
MIXER
INJECTION LANCE
POLYMER PUMP
CALIBRATION COLUMN
POLYMER INLET
SOLENOID VALVE OPEN
DILUTION WATER INLET
PRIMARY
SECONDARY
UP
DOWN
ENTER/SELECT
PRESS BOTH FOR MENU
1
2
4
5
6
7
8
9
10
11
12

6.7.2.2 Operating the Polymer Mixing System

6.7.2.2.1 Starting/Stopping the Polymer Mixing System

The Polymer Mixing system has a fully programmable start up and shutdown sequence. System delays may be put into the system to provide for system start lags and system self flushing timings.

<WARNING> -- in the case of emergency the system provides for a fast stop mode that will de-energize the system components simultaneously by placing the operational mode switch into the pump off position.

6.7.2.2.2 Starting the Polymer Mixing System

The polymer start sequence is initiated by pushing the “SYSTEM START/STOP” button (local control mode) or upon closure of the remote start/stop contact (remote control mode). Upon receiving either signal, the system will proceed through a fixed series of actions with programmable delays. The startup sequence provided by the controller is as follows:

1. The water valve, supplying primary and secondary dilution, is opened providing system flow. The system then looks for primary water flow to occur via flow sensor or flow switch. If no flow, the system shuts down.
2. Waits a user adjustable delay Water on time (0-255) seconds
3. Starts the mixing chamber AC motor/impeller.
4. Waits a adjustable mixer on delay time (0-255) seconds
5. Starts the polymer delivery pump.
6. Waits for an “Alarm Delay” time where alarms are ignored until the time elapses.
7. Proceeds to “RUN” status, displaying the current polymer flow setpoint and water flow set point.

The start-up sequence can be pictorially represented as:

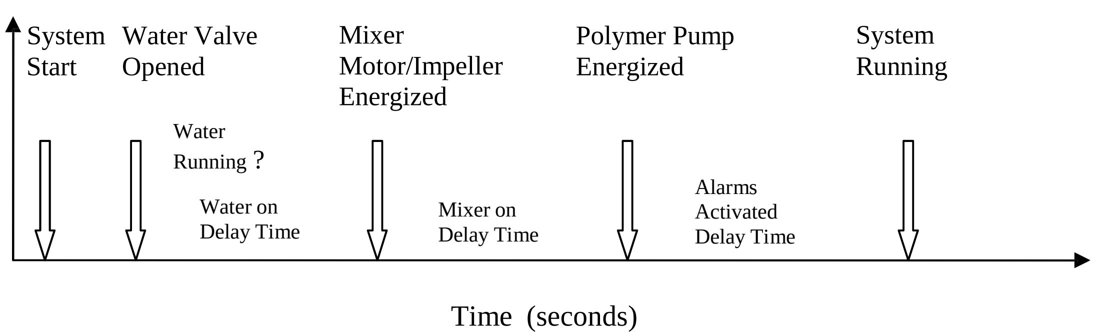


Figure 6-7-2-2-2 START UP SEQUENCE--POLYMER MIXING SYSTEM

6.7.2.2.3 Stopping the Polymer Mixing System

The polymer mixing stop sequence is initiated by pushing the "SYSTEM START/STOP" button or upon opening of the remote start/stop contact, while in the run state. Upon receiving either signal, the system will proceed through a fixed series of actions with programmable delays. The shutdown sequence provided by the controller is as follows:

1. Stops the polymer delivery pump.
2. Waits a user adjustable delivery pump off wait time (provides flushing).
3. Stops the mixing chamber AC motor/impeller.
4. Waits a adjustable mixer off delay time (0-255) seconds (provides rinse)
5. Shuts the water valve, supplying primary and secondary dilution. (rinse completed)

The stop sequence can be pictorially represented as:

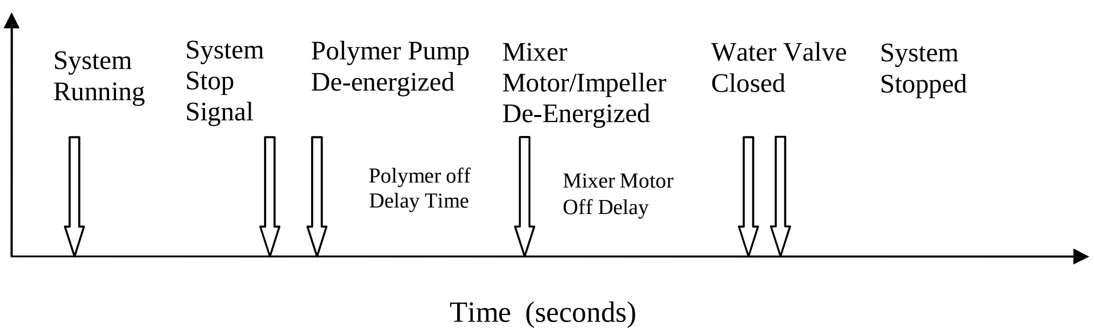


Figure 6-7-2-2-3 STOP/SHUTDOWN SEQUENCE --POLYMER MIXING SYSTEM

6.7.2.3 Programming the Polymer Mixing System

In order to change any of the systems settings or parameter values the user must enter programming mode. To enter into programming mode, the operator must press the UP and DOWN keys simultaneously until the display reads "PROGRAMMING MODE". The system will ask the user to confirm entry into programming mode. Press ENTER to confirm and enter the menu system. Use the UP, DOWN & ENTER keys to move through the MENUS, SUB-MENUS and adjust PARAMETERS. All submenus and parameters are shown below in the parameter table with their default values, ranges and units.

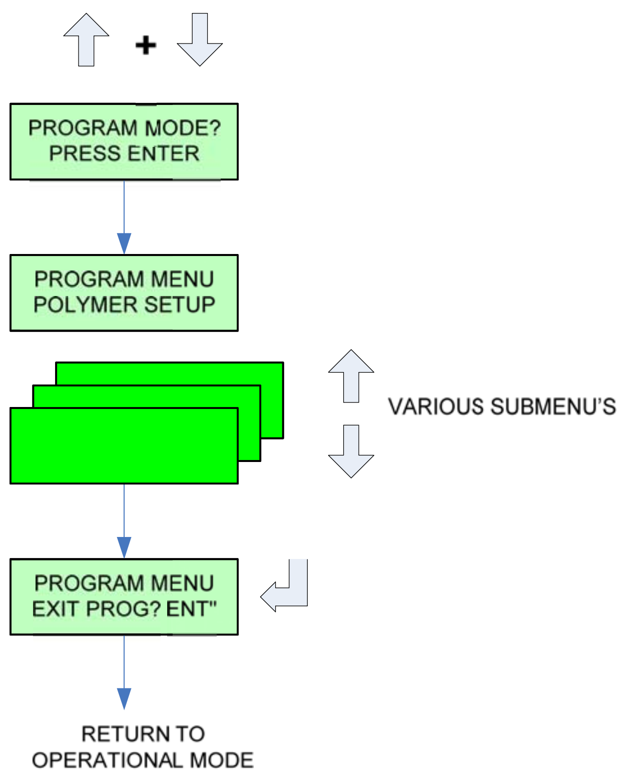


Figure 6-7-2-3 Entering Programming Mode

In order to leave programming mode the user must move to the submenu as shown above and press enter.

6.7.2.3.1 Parameter Menu

Sub-Menu	Parameter Name	Description	Default Value	Min	Max	Units
WATER MENU (B Series)	WATER FLOW	NUMBER FROM 2 TO 200 USING UP AND DOWN ARROWS. ENTER TO FINISH	10.0 2.0		200.0	GPM
SOLUTION MENU	SOLUTION CONCENTRATION	NUMBER FROM 0.1 TO 3.0 USING UP AND DOWN ARROWS. ENTER TO FINISH	0.250% 0.000		3.000	%

POLYMER MENU	POLY START DELAY	NUMBER FROM 0 TO 255 USING UP AND DOWN ARROWS. ENTER TO FINISH	2 0		255	Seconds
POLYMER MENU	PUMP STOP DELAY	NUMBER FROM 0 TO 255 USING UP AND DOWN ARROWS. ENTER TO FINISH	0 0		255	Seconds
MIXER MENU	MIX START DELAY	NUMBER FROM 0 TO 255 USING UP AND DOWN ARROWS. ENTER TO FINISH	2 0		255	Seconds
MIXER MENU	MIX STOP DELAY	NUMBER FROM 0 TO 255 USING UP AND DOWN ARROWS. ENTER TO FINISH	2 0		255	Seconds
ALARM MENU	ALARM DELAY TIME	TIME THE SYSTEM WILL OPERATE PRIOR TO RECOGNIZING A PENDING ALARM. NUMBER FROM 0 TO 255 USING UP AND DOWN ARROWS. ENTER TO FINISH	10 0		255	Seconds
RELAY OUTPUTS	RELAY 1 CONFIG	OPTIONS: Run/Stop Indication, Local Remote Status, Low Water, Low Polymer	Run/Stop N/A		N/A	N/A
RELAY OUTPUTS	RELAY 2 CONFIG	OPTIONS: Run/Stop Indication, Local Remote Status, Low Water, Low Polymer	Local /Remote	N/A N/A		N/A
RELAY OUTPUTS	RELAY 3 CONFIG	OPTIONS: Run/Stop Indication, Local Remote Status, Low Water, Low Polymer	Low Water	N/A	N/A	N/A
SENSOR INPUTS	POLY FLOW SWITCH	Inactive, Normally Open, Normally Closed	Inactive N/A		N/A	N/A
SENSOR INPUTS	WATER FLOW SWITCH	Inactive, Normally Open, Normally Closed	Normally Open	N/A	N/A	N/A
POLY CALIBRAT-ION	CALIBRATION ROUTINE	IMPLEMENTS ROUTINE TO CALIBRATE THE POLYMER PUMP. NO PARAMETERS TO CHANGE OTHER THAN CAPACITIES AT 25%, 50%, 75% & 100%	64,140,219,280	NA	NA	CC/min
ANALOG IN	0% LEVEL	ONLY THE ENTER BUTTON IS ACTIVE. MINIMUM PROCESS SIGNAL NEEDS TO BE SENT INTO THE SYSTEM	201 NA		NA	Counts
ANALOG IN	100% LEVEL	ONLY THE ENTER BUTTON IS ACTIVE. MAXIMUM PROCESS SIGNAL NEEDS TO BE SENT INTO THE SYSTEM	1012 NA		NA	

ANALOG OUT	0%, 25%, 50%, 75%, 100%, Custom	SETS THE ANALOG OUTPUT TO THE PRESCRIBED VALUE	NA		NA	
RESET DEFAULT?		ENTER TO SET FACTORY DEFAULT PROGRAMMING	ENT		ENT	

Table 6-7-2-3-1 Controller Parameter Description and Defaults

6.7.2.3.2 Parameter Description

6.7.2.3.2.1 Configuring Polyfeeder Sensors

Polyfeeder systems can be provided with two system monitoring sensors, one for water flow, and one for polymer flow. These sensors can be made active or inactive. Once activated, there is a event duration time that must seen in order for the event, low water flow or low polymer flow to be recognized. These durations allow for temporary water and polymer flow upsets, reducing false alarms. For example setting the low water flow event duration to 3 seconds requires that the flow switch be active for the duration of 3 seconds prior to performing a system shutdown and providing the user and alarm indication.

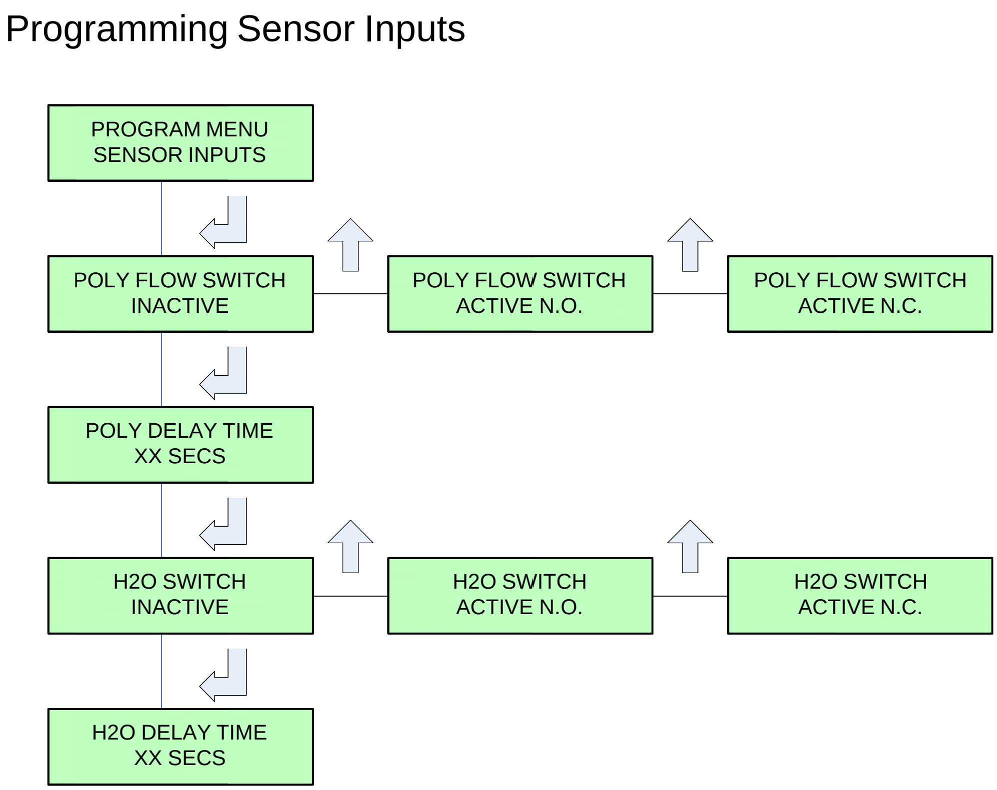


Figure 6-7-2-3-2-1 Programming Sensor Inputs

6.7.2.3.2.2 Setting the Water Flow (BSeries only)

The Polyfeeder B-series must be programmed with the current primary and secondary (total dilution streams) system water flow. These flows are read from the system's rotameters in order to provide pump pacing for B-series controllers. Setting the water flow rate may be accomplished by pressing the DOWN ARROW while running.

6.7.2.3.2.3 Setting the Water Flow Alarm Threshold Level and Recognition Time

The B/B++ series controllers allow the user to activate the water flow alarm and then set an appropriate alarm threshold for low water conditions.

6.7.2.3.2.4 B series Threshold

The B Series controller platform uses water flow switches that are set during factory installation at ~20 percent of the maximum flow allowed in the primary water stream. The flow switch is located on the left hand side of the rotatmeter in the primary H20 flow path. The flow alarm threshold may be increased by loosening the hex nut located on the sensor. Sliding the sensor up or down the rotameter body allows the user to set the desired alarm for low flow. Be sure to retighten the hex screw when adjustment is complete.

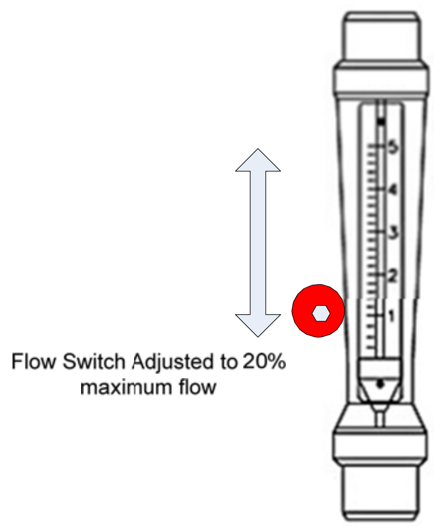


Figure 6-7-2-3-2-4 B-Series Controller Adjustment of Water Flow Alarm Threshold

6.7.2.3.2.5 B++ Series Threshold

The B++ series controller platform has a flow meter in the primary path that allows the system to set the threshold programmatically through the user interface.

6.7.2.3.2.6 Setting the Low Polymer Alarm Threshold and Recognition Time

The Polyfeeder Low Polymer threshold is factory set based upon the maximum and minimum flows of your polymer pump and needs no threshold adjustment. The threshold recognition time is the time that the polymer flow switch is active, prior to recognizing an alarm. As an example, a polymer low flow event duration of one second will cause an alarm if flow in the polymer path is under the threshold of the sensor for more than the one second interval. This allows for momentary flow disruptions without nuisance shutdown.

6.7.2.3.2.7 Setting the Polyfeeder Relay Outputs

The Polyfeeder Relay controlled Normally Open Contact outputs may be programmed to give indication of system run status, low water flow, low polymer flow, and remote/local status. To set the relay output events, enter programming mode (UP and DOWN simultaneously) and use up arrow until you find the RELAY OUTPUT SubMenu. (See Below to set Event)

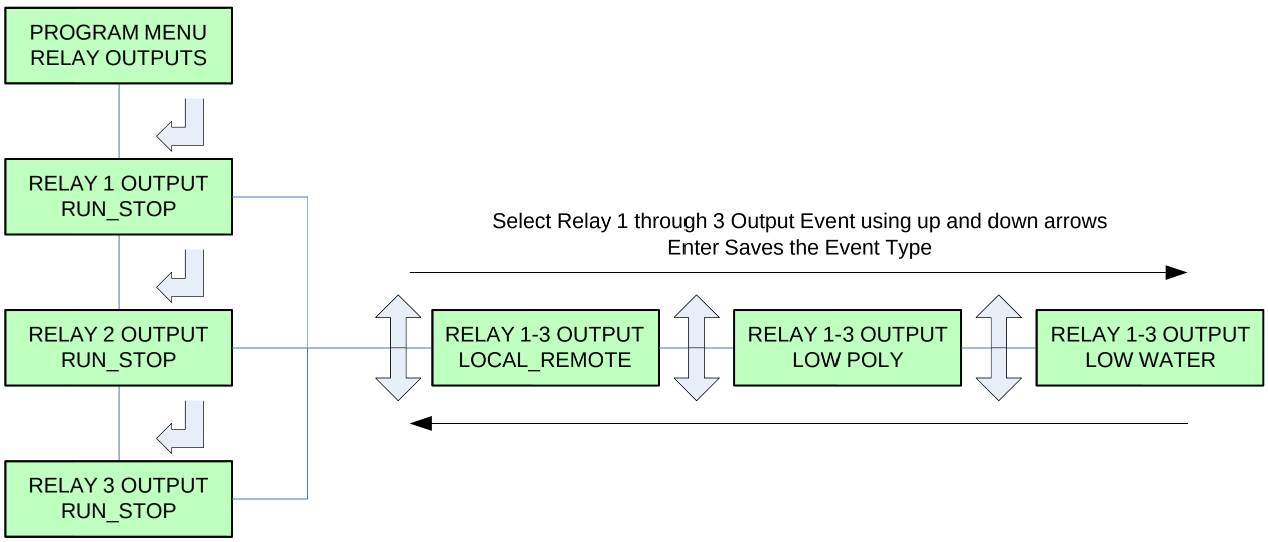


Figure 6-7-2-3-2-7 Programming the Relay Outputs

6.7.2.3.2.8 Calibrating the Polyfeeder Concentration Input

Note : The system comes calibrated from the factory.

Your Polyfeeder controller can accept an analog signal that will control concentration in the range of 0.1% to 3.0% if system flow conditions allow. This occurs by pacing the polymer pump for the given system water flow. Refer to section 6.5.2.3 for wiring in your analog input signal prior to calibration. For B series controllers this input is controlling solution concentration and for B++ series it is controlling make-down chamber concentration.

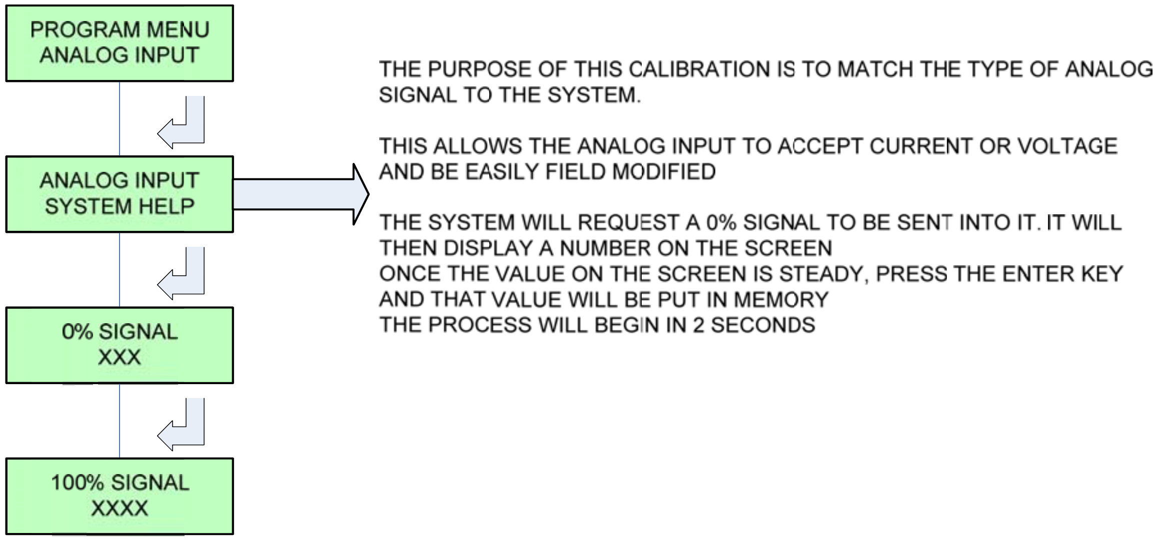


Figure 6-1 Programming the Analog Concentration Input

As an example suppose you are using a 4-20mA signal to represent system concentration range of 0.1 and 3.0% respectively. Apply 4.0mA from you calibration source

6.7.2.3.2.9 Setting the Polyfeeder System Start-up/Shut-down Delays

Your Polyfeeder system provides system element delays to suit individual system needs. Delays for the water flow (pre-flush/post flush), mixing, and polymer pump delivery are all settable. Many times system defaults are acceptable. If your system needs delays prior to water delivery or an extended pre-flush of process piping , then setting the mixer start delay and water stop delay will be useful.

See Figure 6-5 and 6-6 for the start-up and shut-down sequences, respectively.

In order to set these delay the user must enter programming mode and set them. See menu navigation below.

6.7.2.3.2.9.1 WATER DELAYS

The water start delay occurs after receiving the system start command whether locally or remotely. Water stop delay is the amount of time the water will continue to flow after the mixer stops. This can be thought of as the post flush "water only" timeframe.

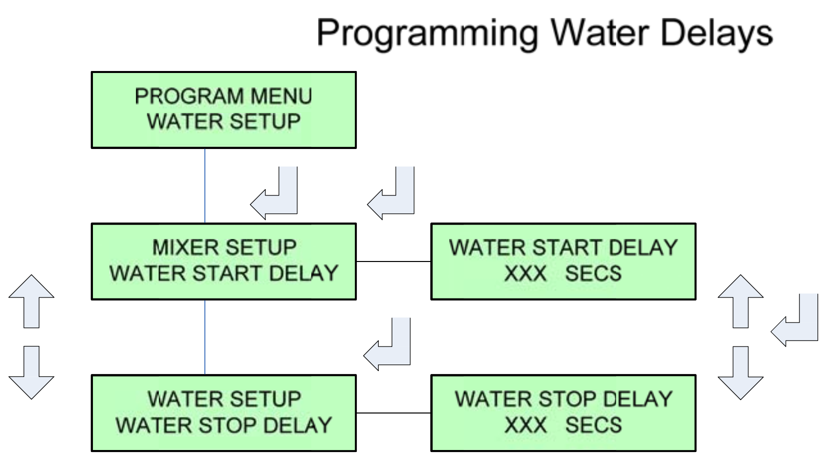


Figure 6-7-2-3-2-9-1 Programming Water Start-Up/Shut-Down Delays

6.7.2.3.2.9.2 MIXER DELAYS

The mixer start delay is the time between the water valve opening and the AC mixer motor being activated. This can be considered as part of the pre-flush sequence without mixer agitation. The mixer stop time, occurring during the shutdown sequence, is the timeframe after the polymer pump stops. During this timeframe the mixer remains on with water flow providing mixing chamber post-flush agitation.

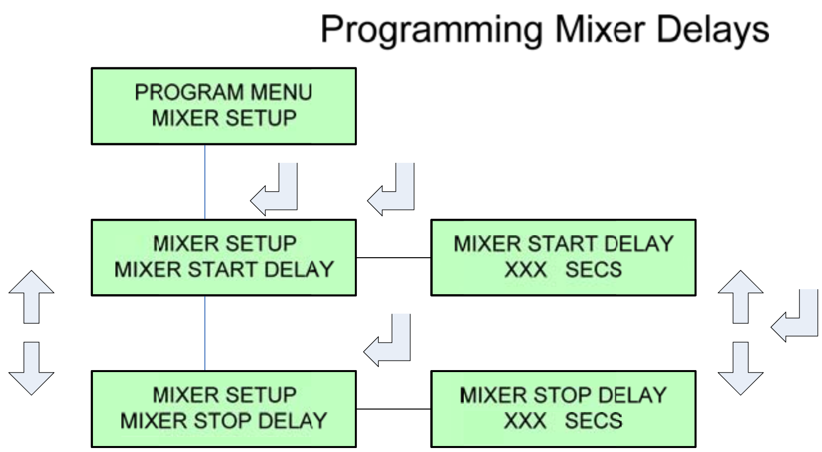


Figure 6-7-2-3-2-9-2 Programming Mixer Start-Up/Shut-Down Delays

6.7.2.3.2.9.3 POLYMER PUMP DELAYS

The polymer pump start delay is the time between the mixer starting and the actual starting of polymer pump to initiate flow. This can be considered part of the pre-flush sequence. After this period, the system is delivering the polymer solution at the requested solution concentration.   The polymer stop delay occurs after receiving a stop command, whether locally or remotely. After this time has expired the polymer pump will shut down and the flush part of the shutdown sequence will begin.

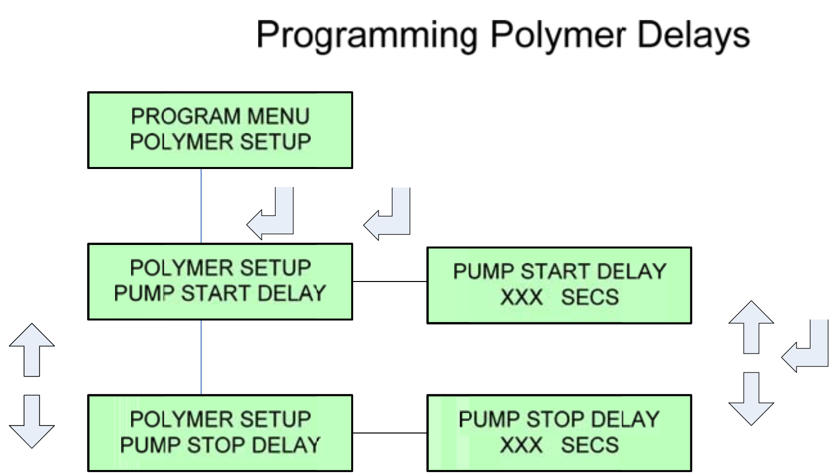


Figure 6-7-2-3-2-9-3 Programming Polymer Pump Start-Up/Shut-Down Delays

6.7.2.3.2.10 Calibrating the Polyfeeder Pump Flow

Your Polyfeeder system requires a 4-point calibration at 25, 50, 75, and 100% pump speed. This calibration is required in order for the polymer mixing system to provide concentration control.

6.7.2.3.2.11 Calibrating the Polyfeeder Analog Output

6.7.2.3.2.12 Loading System Default Settings

CAUTION ***Resetting to Factory Defaults will require significant reprogramming!***

In order to reset your Polyfeeder to its system defaults, as defined in Table 6-9, the user must use the following menu. Be warned that resetting to system defaults invalidates all system calibrations.

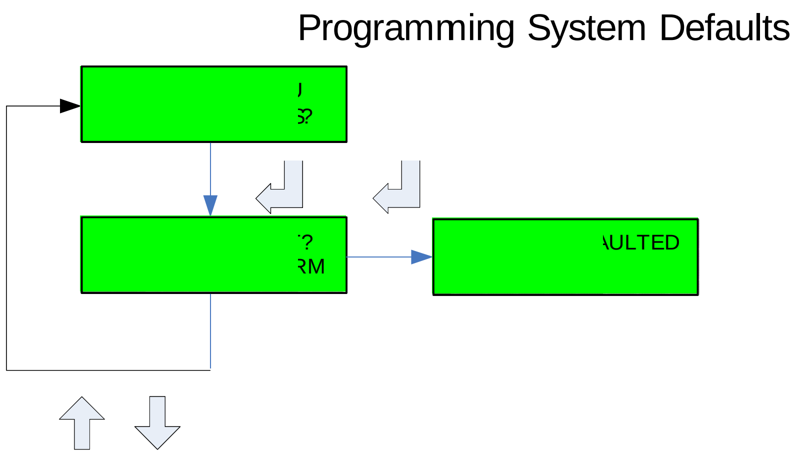


Figure 6-7-2-3-2-12 Resetting to System Defaults

6.7.2.3.3 Polymer Mixing System Alarms

The Polyfeeder Polymer Mixing System will notify the user via an alarm when a system condition exists that does not allow maintaining of user requested concentration levels. The system displays the system alarm condition by energizing the YELLOW Alarm indicator continuously. These conditions are continuously monitored after the programmable alarm delay timeout has occurred on a start sequence. The following are the conditions monitored and the corresponding alarm message shown on the LCD.

Condition	Cause	LCD Message	System Action
Low Water Flow	Water flow has fallen below ~ 10% of full system flow.	**SYSTEM ALARM** LOW H2O FLOW	Immediate shutdown of mixing chamber motor and polymer pump
Low Polymer Flow	Polymer flow has fallen to ~ less than 10% of maximum flow	**SYSTEM ALARM** LOW POLY FLOW	
Concentration Error	Polymer pump speed/flow can not go high enough to meet concentration demand	**CONC MAXIMUM** "LOWER H20 FLOW"	

Table 6-7-2-3-3 System Alarm Causes, Message, and System Response

6.7.2.3.3.1 SYSTEM ALARM DELAY TIME

The System alarm delay time is defined as the time during the startup sequence after the polymer has started and the time the alarms within the system, described above become active.

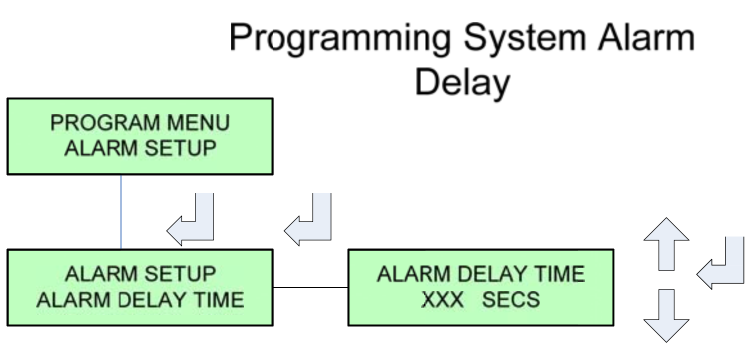


Figure 6-7-2-3-3-1 Programming the System Alarm Delay Time

6.7.2.3.3.2 CALIBRATING THE POLYFEEDER SYSTEM

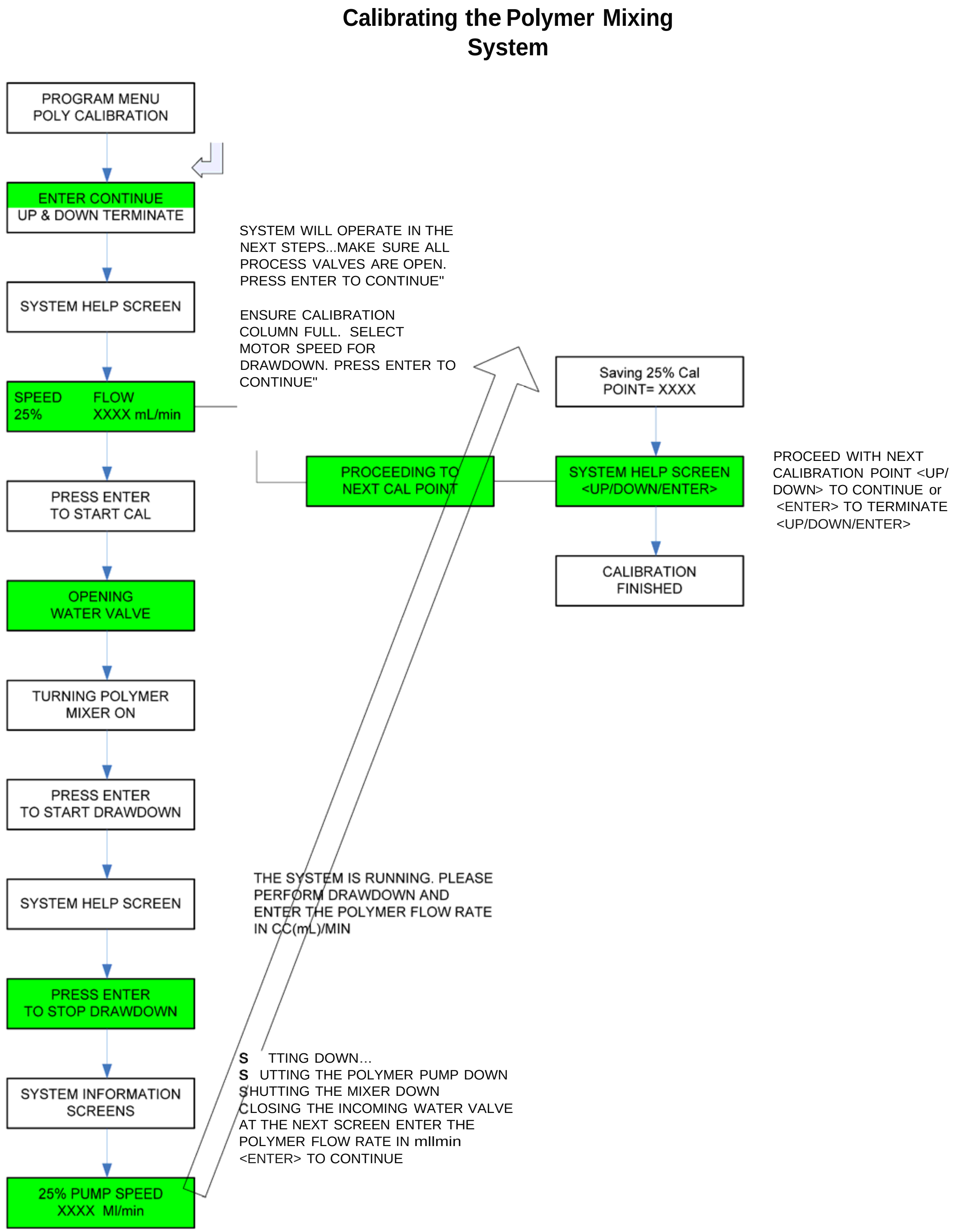


Figure 6-7-2-3-3-2Performing 4 Point System Calibration

7. MAINTENANCE

WARNING

BEFORE PERFORMING ANY MAINTENANCE REQUIRING DISASSEMBLY OF THE WETTED PARTS, BE SURE TO RELIEVE PRESSURE FROM THE PIPING SYSTEM AND, WHERE HAZARDOUS PROCESS MATERIALS ARE INVOLVED, RENDER THE PUMP SAFE TO PERSONNEL AND THE ENVIRONMENT BY CLEANING AND CHEMICALLY NEUTRALIZING AS APPROPRIATE. WEAR PROTECTIVE CLOTHING AND EQUIPMENT AS APPROPRIATE.

Accurate records from the early stages of PolyFeeder system operation will indicate the type and levels of required maintenance. A preventative maintenance program based on such records will minimize operational problems. It is not possible to forecast the lives of wetted parts such as diaphragms and check valves. Since corrosion rates and operational conditions affect functional material life, each metering pump must be considered according to its particular service conditions.

Common maintenance points for the system will include:

Polymer Feed Pump	Maintain as per pump IOM, dependent on pump type
Mixing chamber Motor shaft seal	Observe for signs of leaks, replace as required
Polymer Injector w/ Valve	Keep clean, replace sleeve as required
Piping system	Observe for signs of leaks, loose fittings, damage
Mixing chamber	Clean as required
Rotameters	Clean as required

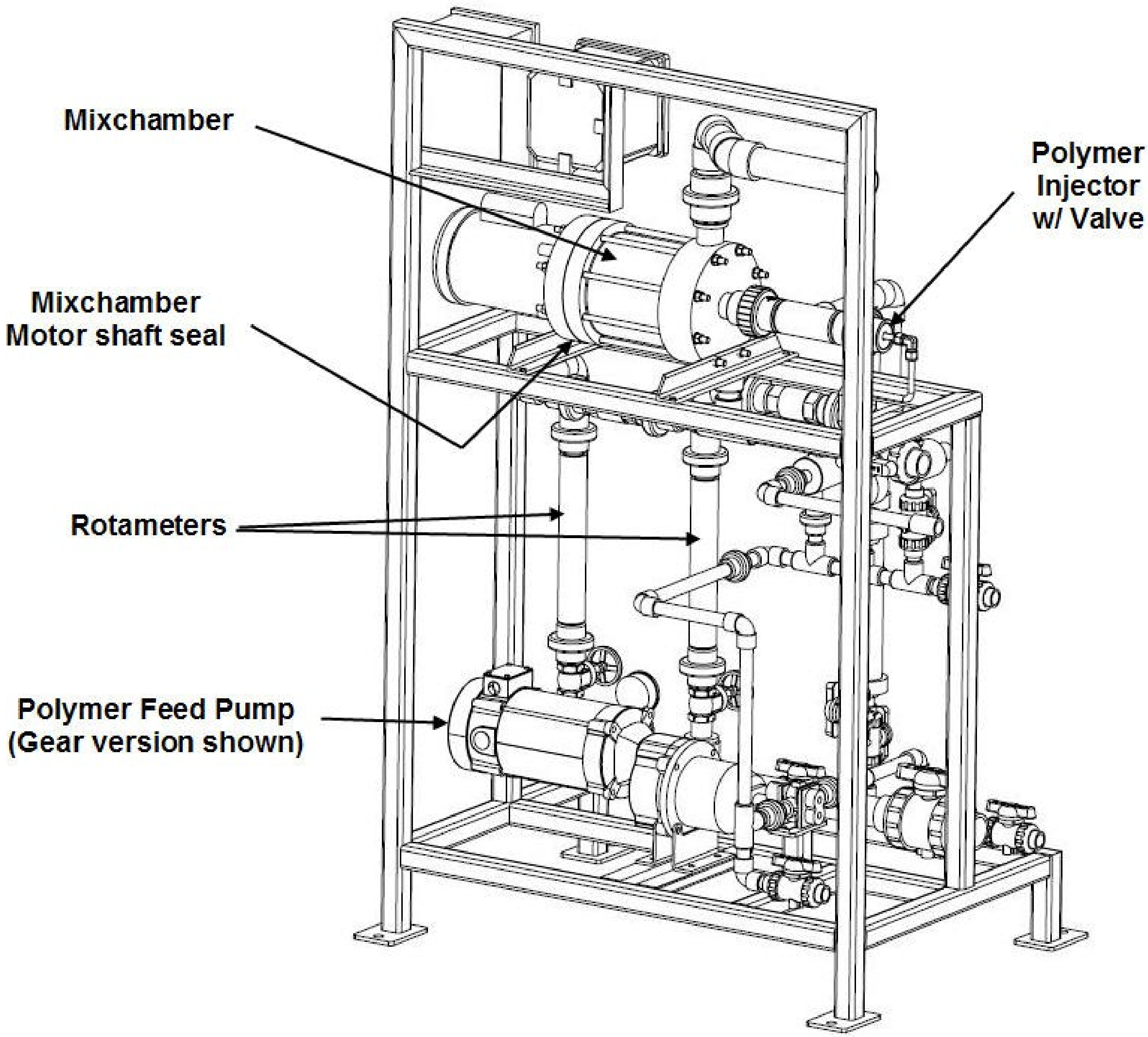


Figure 7-1, Common Maintenance Points

7.1 Neat Polymer Feed Pump

Refer to the attached manual for the neat polymer feed pump supplied with your PolyFeeder system. Follow the operation and maintenance guidelines within.

Pump Technology	**Flow Rate Range**	**Manufacturer**	**Model(s) Available**
Solenoid Diaphragm	0.5 – 10 GPH	Pulsafeeder (Pulsatron)	LVB, LVF, LVG, LVH
Gear		Pulsafeeder (Eco)	GMC1, GC2, GC4
Progressing Cavity		Seepex	5-24 MD, 15-24 MD, 3-12 MD 6-12 MD, 12-12 MD

7.2 Mix Chamber Motor Shaft Seal

Check the slot area between the mix chamber motor and the mix chamber. If there is evidence of excessive product leakage in this area, the seal should be replaced.

If the mix chamber motor shaft seal needs replacement, follow these steps:

1. Shut off the polymer pump and mix chamber motor at the main control panel and lock out the power.
2. Close the dilution water inlet valve.
3. Drain the mix chamber by opening the Mix chamber drain valve.
4. Unbolt the motor side chamber mounting bracket from the skid frame (2 bolts).
5. Unbolt the motor from the rear of the mix chamber by removing the 8 hex nuts from the mix chamber tie rods.
6. If desired, the motor could be unwired at its conduit box and be taken to a bench, or tipped onto its fan cover and worked on at the skid location without requiring electrical disconnection (provided power is off/ locked out and some means of securing the motor from dropping off the skid is present).
7. The seal is held in place by the mixing impeller and a hex nut threaded on the end of the motor shaft.
8. Unbolt the mixing impeller from the motor shaft (there is a slot in the back of the motor shaft to hold it from turning – alternately one can get an open end wrench onto the hex nut underneath the impeller and hold it that way.
9. Unbolt the hex nut under the impeller
10. Remove the spring retainer and seal spring

NOTE: It is recommended to replace the ENTIRE seal (head and seat) as an assembly, rather than merely a head or seat alone.

11. Remove the seal head
12. Remove the seal seat (TEFC Motor plate can be unbolted from motor to facilitate this, simply remove the four (4) 3/8” socket head motor mounting screws)
13. Inspect motor shaft for damage, repair/ replace if necessary.
14. Carefully replace the seal seat and head with new ones. Take particular care when installing the new seal head - and its elastomeric sleeve – over the threaded end and shoulder of the motor shaft.
15. Reassemble the mix chamber in reverse order from how it was disassembled – Please note that the motor capacitor should be “up” and the slot between the mix chamber and the motor should be “down” when finished.

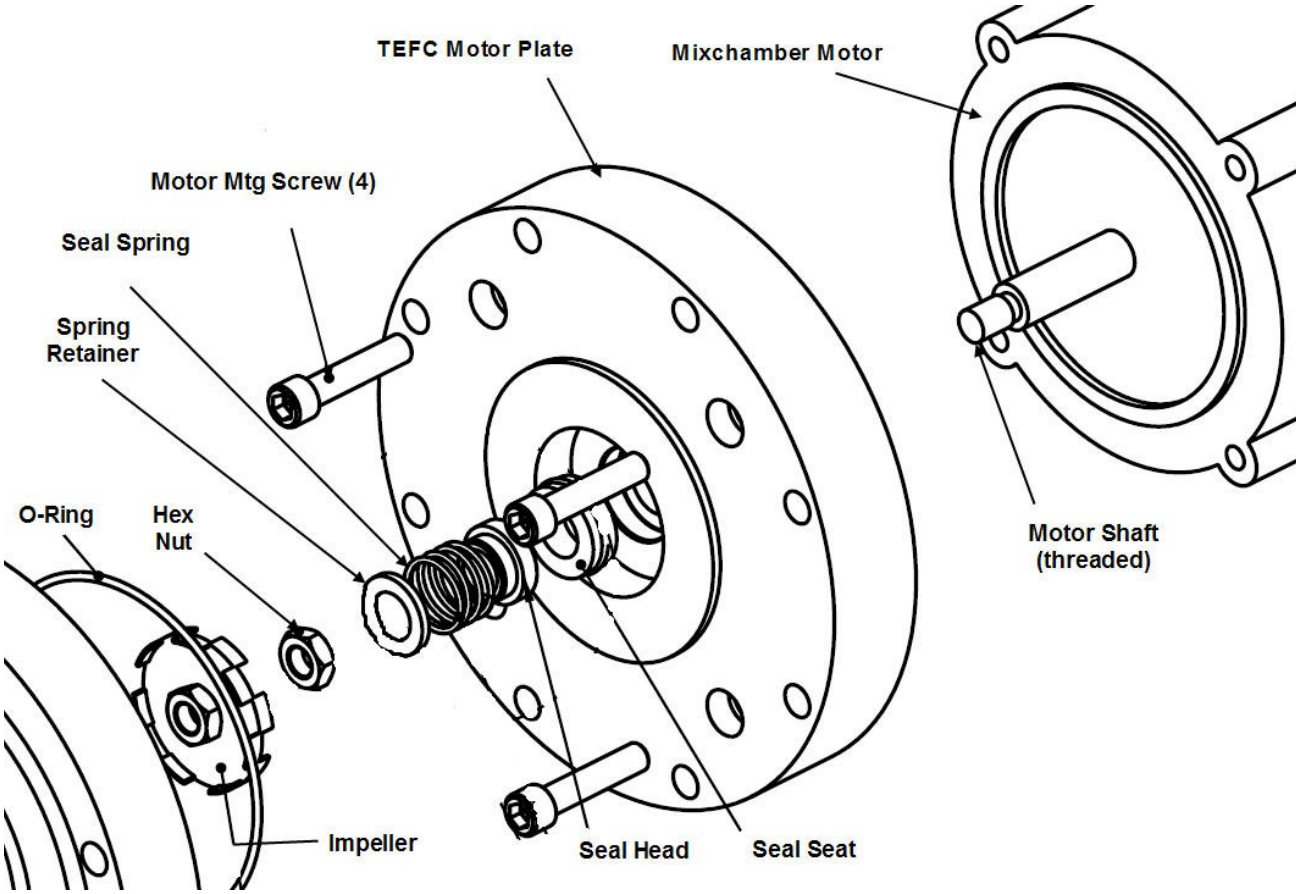


Figure 7-2, Mix chamber motor shaft seal replacement

7.3 Polymer Injector w/ Integrated Valve

The Pulsafeeder polymer activation system utilizes a special injector with integrated membrane valve (patent pending). This revolutionary, yet simplistic valve does not have springs or seats to foul. In fact there is only one elastomeric moving part that is easily replaceable and requires no tools. Simply slide the old sleeve off the end of the quill and slide on a new one (some lubricant will help with this). The quill has a recessed area for the sleeve with holes in it. Make sure the new sleeve is completely within the recessed area and that the sleeve completely covers the injection holes.

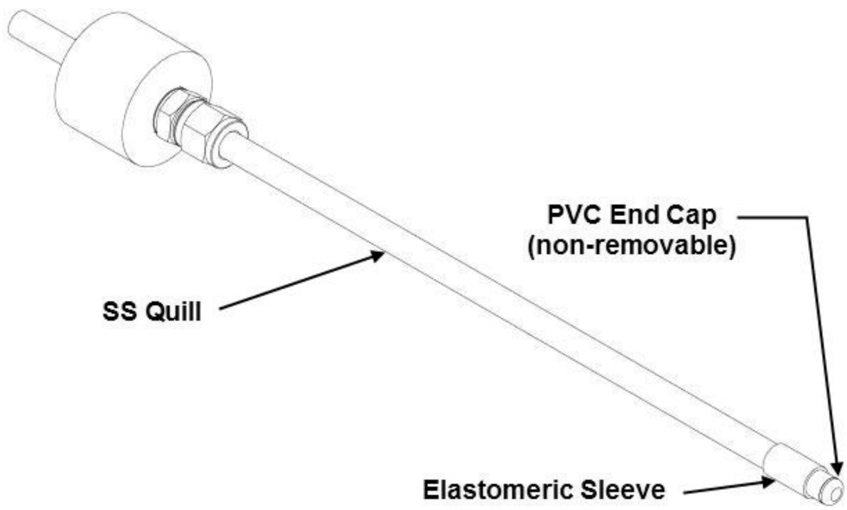


Figure 7-3, Injector w/ integrated valve

8. Replacement Parts

8.1 Ordering Parts

When ordering replacement parts always specify:

- System model number
- System serial number
- Part number if identified

9. Model Number Identification

Position	Sample	Specifies	Options
1 and 2	**P3**	Polyfeeder	
3 S		Type	**S** – standard
			C – custom
4 S		Pump Type	**S** – Solenoid
			P – Progressive Cavity
			G – Gear
			M - Magnetic
5,6 & 7	**100**	Max Neat Polymer	7th position is tenths of a gallon
		capacity (GPH)	(e.g. 10.0 GPH = 100, 0.5 GPH = 005)
8 R		Control	**M -** Manual
			R – Remote Control
			C – Auto Control (concentration**)**
9 P		Piping materials	**P** – PVC
			S – 300 series stainless steel
10 1		Input Voltage	**1** – 115VAC/60Hz/1ph
			2 – 230VAC/60Hz/1ph
			3 – 115VAC/50Hz/1ph
			4 – 230VAC/50Hz/1ph

10. Specifications

	Neat Polymer Feed: Solenoid	Neat Polymer Feed: Progressive Cavity	Neat Polymer Feed: Gear Pump
Maximum Neat Flow Rate	10 gph	56 gph	56 gph
Maximum Dilution Water Rate	30 GPM	120 GPM	120 GPM
Control Options (see below)	Manual/Remote/Auto Re	mote/Auto	Remote/Auto
Materials of Construction	PVC and 300 series stainless steel (all frames are stainless steel)		
Input Voltage	115 VAC standard, 230 VAC optional, 50 or 60 Hz		
Current Requirement	20 A @ 115 VAC, 10 A @ 230 VAC		
Basic Dimensions	Width 36 - 40"; Depth 24"; Height 60 - 68" (model dependent)		
Neat Polymer Inlet	0.5" MNPT		
Dilution Water Inlet	Neat polymer feed rates up to 3 gph, 1.0" FNPT		
	Neat polymer feed rates 3 gph to 21 gph, 1.5" FNPT		
	Neat polymer feed rates above 21 gph, 2.0" FNPT		
Solution Outlet	MNPT, follows same sizing as above inlet fittings		
Environment Rating	Controls: NEMA 4X, Motors: TEFC		

11. Materials Reference

All materials in contact with liquids in the system are as follows:

- 300 series stainless steel
- PVC
- Clear PVC
- Mix Chamber O-rings are BUNA -N
- Union elastomers are Viton
- Mix Chamber motor shaft seal is carbon vs. ceramic w/ Viton elastomers
- Refer to polymer feed pump manual for materials of construction
- Rotameters are clear acrylic, polypropylene, 316 stainless steel and Viton
- Ball cone checks are PVC/Viton

12. Troubleshooting

Difficulty	Probable Cause	Remedy
Mixing chamber motor does not run	Faulty power source	Check power source
	Blown fuse, circuit breaker	Replace - eliminate overload
	Broken wire	Locate and repair
	Wired improperly	Check diagram
No water flow	Lines clogged	Clean and flush
	Closed line valves	Open valves
	Strainer clogged	Remove and clean. Replace screen if necessary
No neat polymer flow	Check valve leakage	Clean, replace if damaged
	Leak in suction line	Locate and correct
	Strainer fouled	Clean or replace screen
	Product change	Check viscosity and other variables
	Supply tank vent plugged	Unplug vent
Finished polymer concentration incorrect	No neat polymer flow	See above
	Improper water flow	Check rotameters, see above
	Incorrect calculations	Review calculations
Abnormal noise	Hardware loose	Check and tighten
	Piping loose	Check and secure
	Air bubbles in water flow	Locate source and address

13. Drawings

System assembly and electrical drawings insert here.

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