



# Integrated Technologic<sup>®</sup> Controller with Parallel Pumping System (PPS)



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# 1. Introduction and Safety

## 1.1 Introduction

### 1.1.1 Purpose of the manual

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance



#### **CAUTION:**

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property and may void the warranty.

---

#### **NOTICE:**

Save this manual for future reference and keep it readily available at the location of the unit.

The information contained in this manual is intended to assist operating personnel by providing information on the characteristics of the purchased equipment.

It does not relieve the user of the responsibility to adhere to local codes and ordinances and the use of accepted practices in the installation, operation and maintenance of this equipment.

Further information pertaining to the installation, operation, and maintenance of your Technologic PPS pump controller can be found in the IOMs for the associated equipment provided Maintenance section for a list of relevant manuals.

Equipment cannot operate well without proper care. To keep this unit at top efficiency, follow the recommended installation and servicing procedures outlined in this manual.

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## 1.2 Safety

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#### **WARNING:**

The operator must be aware of safety precautions to prevent physical injury.

Any pressure-containing device can explode, rupture, or discharge its contents if it is over-pressurized. Take all necessary measures to avoid over-pressurization.

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact Xylem representative before proceeding.

This manual clearly identifies accepted methods of disassembling units. These methods must be adhered to. Trapped liquid can rapidly expand and result in a violent explosion and injury. Never apply heat to impellers, propellers, or their retaining devices to aid in their removal.

Do not change the service application without the approval of an authorized Xylem representative.

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### 1.3 Safety terminology and symbols

#### 1.3.1 About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards.

- Personal accidents and health problems
- Damage to the product
- Product malfunction

#### 1.3.2 Hazard levels

Hazard Level	Indication
 <b>DANGER:</b>	A hazardous situation which, if not avoided, will result in death or serious injury.
 <b>DANGER:</b>	A hazardous situation which, if not avoided, will result in minor or moderate injury.
<b>NOTICE:</b>	<ul style="list-style-type: none"> <li>• A potential situation which, if not avoided, could result in undesirable conditions.</li> <li>• A practice not related to personal injury.</li> </ul>

#### 1.3.3 Hazard categories

Hazard categories can either fall under hazard levels or let specific symbols replace the ordinary hazard level symbols.

Electrical hazards are indicated by the following specific symbol.



#### Electrical Hazards

These are examples of other categories that can occur. They fall under the ordinary hazard levels and may use complementing symbols:

- Crush hazard
- Cutting hazard
- Arc flash hazard

### 1.4 Environmental safety

#### 1.4.1 The work area

Always keep the station clean to avoid and/or discover emissions.

#### 1.4.2 Waste and emissions regulation

Observe these safety regulations regarding waste and emissions:

- Appropriately dispose of all waste.

- Handle and dispose of the processed liquid in compliance with applicable environmental regulations.
- Clean up all spills in accordance with safety and environmental procedures.
- Report all environmental emissions to the appropriate authorities.

### **1.4.3 Electrical installation**

For electrical installation recycling requirements, consult your local electric utility.

## **1.5 Recycling guidelines**

Always follow local laws and regulations regarding recycling.

## **1.6 User safety**

### **1.6.1 General safety rules**

These safety rules apply:

- Always keep the work area clean.
- Pay attention to the risks presented by gas and vapors in the work area.
- Avoid all electrical dangers. Pay attention to the risks of electric shock or arc flash hazards.
- Always bear in mind the risk of drowning, electrical accidents, and burn injuries.

### **1.6.2 Safety equipment**

Use safety equipment according to the company regulations. Use this safety equipment within the work area:

- Helmet
- Safety goggles
- Protective shoes
- Protective gloves
- Gas mask
- Hearing protection
- First-aid kit
- Safety devices

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#### **NOTICE:**

Never operate a unit unless safety devices are installed. Also see specific information about safety devices in other chapters of this manual.

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### **1.6.3 Electrical connections**

Electrical connections must be made by certified electricians in compliance with all international, national, state, and local regulations. For more information about requirements, see sections dealing specifically with electrical connections.

### **1.6.4 Precautions during work**

Observe these safety precautions when you work with the product or are in connection with the product:

- Never work alone.
- Always wear protective clothing and hand protection.

- Stay clear of suspended loads.
- Always lift the product by its lifting device.
- Beware of the risk of a sudden start if the product is used with an automatic level control.
- Beware of the starting jerk, which can be powerful.
- Rinse the components in water after you disassemble the pump.
- Do not exceed the maximum working pressure of the pump.
- Do not open any vent or drain valve or remove any plugs while the system is pressurized. Make sure that the pump is isolated from the system and that pressure is relieved before you disassemble the pump, remove plugs, or disconnect piping.
- Never operate a pump without a properly installed coupling guard.

**1.6.5 Wash the skin and eyes**

Do the following if chemicals or hazardous fluids have come into contact with your eyes or your skin:

If you need to wash your . . .

Eyes	<ul style="list-style-type: none"> <li>• Hold your eyelids apart forcibly with your fingers.</li> <li>• Rinse the eyes with eyewash or running water for at least 15 minutes.</li> <li>• Seek medical attention.</li> </ul>
Skin	<ul style="list-style-type: none"> <li>• Remove contaminated clothing.</li> <li>• Wash the skin with soap and water for at least one minute.</li> <li>• Seek medical attention, if required.</li> </ul>

**2. Transportation and Storage**

**2.1 Inspect the delivery**

**2.1.1 Inspect the package**

- Inspect the package for damaged or missing items upon delivery.
- Note any damaged or missing items on the receipt and freight bill.
- File a claim with the shipping company if anything is out of order.
- If the product has been picked up at a distributor, make a claim directly to the distributor.

**2.1.2 Inspect the unit**

- Remove packing materials from the product.
- Dispose of all packing materials in accordance with local regulations.
- Inspect the product to determine if any parts have been damaged or are missing.
- If applicable, unfasten the product by removing any screws, bolts, or straps.
- For your personal safety, be careful when you handle nails and straps.
- Contact your sales representative if anything is out of order.

## 2.2 Transportation guidelines

### 2.2.1 Lifting methods

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**WARNING:**

- Assembled units and their components are heavy. Failure to properly lift and support this equipment can result in serious physical injury and/or equipment damage. Lift equipment only at the specifically identified lifting points. Lifting devices such as eyebolts, slings, and spreaders must be rated, selected, and used for the entire load being lifted.
  - Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.
  - Care should be taken to prevent damage due to dropping or jolting when moving the controller. Transportation damage should be brought to the carrier's attention immediately upon receipt.
- 

## 2.3 Storage guidelines

### 2.3.1 Storage location

The product must be stored in a covered and dry location protected from extreme cold, heat, dirt, and vibrations.

---

**NOTICE:**

- Protect the product against humidity, heat sources, and mechanical damage.
  - Do not place heavy weights on the packed products.
- 

### 2.3.2 Long Term Storage

If the controller is stored for more than 6 months, these requirements apply:

- Store in a covered and dry location.
- Store the unit free from heat, dirt, and vibrations.
- Recommended storage includes but not limited to a tarp over the unit.

Extended storage of VFDs may require special attention prior to start-up. See manufacturer's IOM for details.

## 3. Product Description

### 3.1 General description

#### 3.1.1 Description

The controller is a specific purpose programmable pump controller. This provides:

- Optimum pump control without the cost of general purpose control hardware.
- Software dedicated and established for the unit.

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**NOTICE:**

Your controller should have a safety instruction decal. If the decal is missing or illegible, contact your representative for a replacement.

---



**WARNING:**

This product can expose you to chemical including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: [www.P65warnings.ca.gov](http://www.P65warnings.ca.gov).

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### 3.2 Operational limits

#### 3.2.1 Temperature and ventilation

All electrical equipment is susceptible to failure if operated in ambient temperatures outside of its rating. The OPERATING temperature range for this unit is 0 to 45°C. The relative humidity should not exceed 90% non-condensing. The unit should not be operated outside these extremes.


### 3.3 Nameplate information


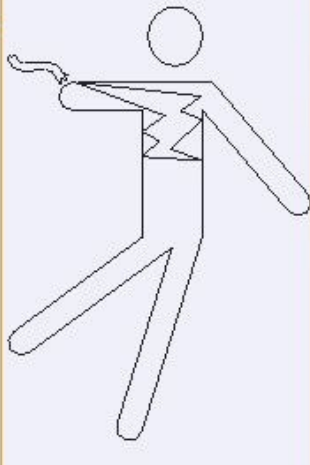

#### 3.3.1 Important information for ordering

Every pump station has a nameplate that provides information about the pump station. The pump station nameplate is located on the inside of the control enclosure door.

When ordering spare parts, be prepared to identify the nameplate information when contacting the factory.

- Model
- Size
- Serial number
- Item numbers of the required parts

Technologic PPS Controller	
Control Panel P/N:	
Factory No.	
Wired for _____ Volts _____ Hz _____ Ph	
Panel F. L. Amps	
Short Circuit Current: _____ kA rms Symmetrical	
Rep Name	
Rep Phone	
Date Code	
<hr/>	
<b>Xylem</b> Morton Grove, IL U.S.A	

 <b>AVERTISSEMENT</b>		 <b>WARNING</b>
<p><b>RISQUE D'ELECTROCUTION ETEINDRE ET VERROUILLER TOUTES LES SOURCES D'ALIMENTATION AVANT TOUT TRAVAIL SUR LE PANNEAU. LE DEFAUT DE SUIVRE CES INSTRUCTIONS POURRAIT ENTRAINER DE GRAVES BLESSURES PERSONNELLES. LA MORT OU DES DEGATS MATERIELS.</b></p>		<p><b>ELECTRICAL SHOCK HAZZARD. TURN OFF AND LOCKOUT ALL POWER SOURCES PRIOR TO SERVICE PANEL. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY DEATH, AND/OR PROPERTY DAMAGE.</b></p>

### 3.4 Main parts and functions

#### 3.4.1 Input voltage

The VFD and Parallel Pumping Controller can be set up to operate across a broad range of voltages. It was factory set to operate on the voltage shown on the nameplate. Check the VFD nameplate for the proper input and output voltages before wiring the VFD.

The voltage tolerance is +10/-5% and phase to phase voltage must not have an imbalance greater than 5 VAC.

#### 3.4.2 Ground connections

A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

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**WARNING:**

Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards.

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#### 3.4.3 Power wiring

Power wire types and sizes must be selected based upon conformance with the National Electrical Code and all local codes and restrictions. In addition, only copper (Cu) wire rated for 75°C (minimum) may be used for the power connections. Refer to the input current as listed on the nameplate affixed to the enclosure door when sizing wire.

#### 3.4.4 Output/motor disconnect

It is necessary that any device which can disconnect the motor from the output of the VFD be interlocked to the emergency shutdown circuits of the VFD. This will provide an orderly shutdown if the disconnecting device is open circuited while the VFD is in operation. Failure to provide this interlock may result in damaged components due to improper installation.

---



**CAUTION:**

Metal filings can create electrical short circuits. Do not drill, saw, file or perform any operation on the VFD conduit entry plate while attached to the VFD.

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#### 3.4.5 Analog signals

Shielded cable (#22 AWG, Belden type 8762, Alpha #2411, or equal) should be installed for all D.C. control wiring. The shield must be terminated in the Controller panel. Do not connect the shield at the other end of the cable! Insulate the shield so that no electrical connection is made at the other end of the cable. A twisted pair of #22 AWG conductors (Belden 8442, or equal) can be used in place of shielded cable. The cable length must be limited to 5,000 feet for #22 AWG wire.

#### 3.4.6 Field connection diagrams

Refer to the pump Installation, Operation, and Maintenance Manual for specific details unique to the pump.

Refer to the flow sensor/transmitter Installation, Operation, and Maintenance manual for specific details unique to the flow sensor/transmitter.

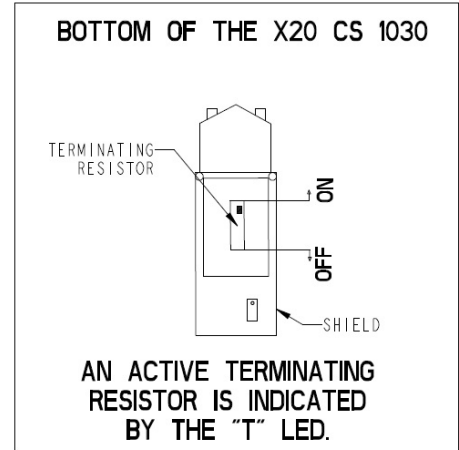
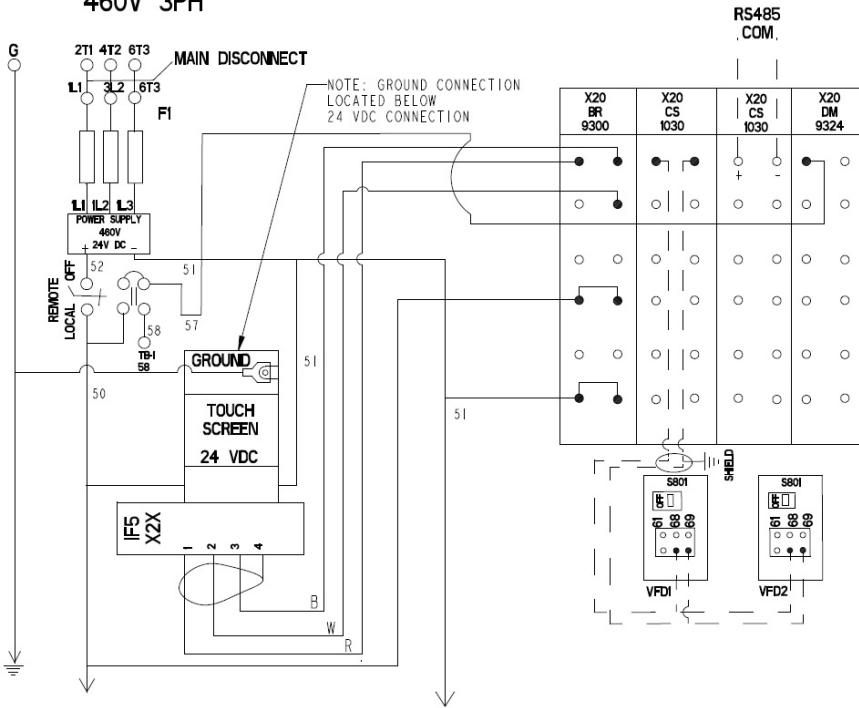
Job specific wiring and dimensional drawings and typical field connection diagram should be reviewed prior to unit installation and operation.

### 3.5 Glossary of Terms

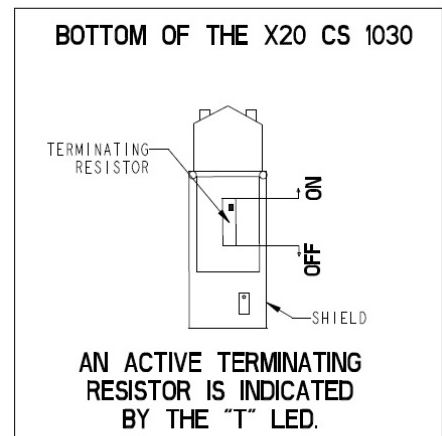
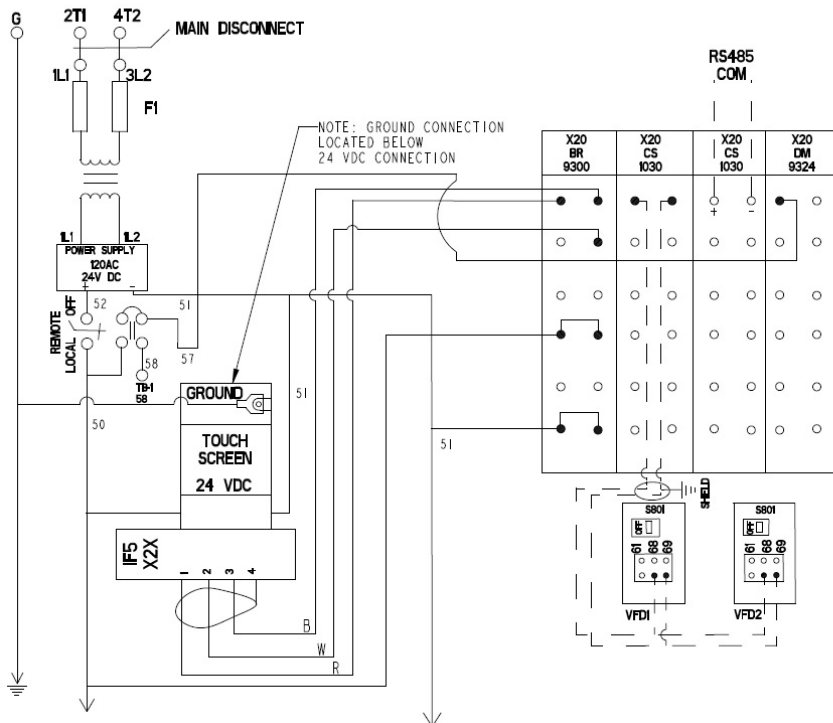
- **VFD** Variable Frequency drive; converts a constant power input into a variable power output for the motor; a device for controlling motor speed.
- **Alternation** Process of determining which pump will serve as lead pump and which pump will serve as lag pump.
- **Destage** To turn off a lag pump.
- **EOC** End of curve; point at which a pump is staged or destaged.
- **Lag pump** Standby pump which activates only when lead pump alone cannot efficiently provide sufficient pressure or flow rate.
- **Lead pump** Duty pump which runs continuously until a standby pump is required.
- **OIP** Operator Interface Panel.
- **PID** Proportional Integral Derivative; 3 variables required for error control.
- **PV (ProcessVariable)** Signal generated by a sensor which is set up to control the system.
- **Proof timer** Minimum time period before controller acknowledges an input; time period for which a signal must be stable before it is accepted by the controller as a sustained and valid signal.
  
- **RTC** Real time clock.
- **Stage** To start a lag pump.
- **SP** Set point.
- **UV** Undervoltage
- **OV** Overvoltage
- **OC** Overcurrent



460V 3PH



575V 1PH



## 4.2 Electrical precautions

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**WARNING:**

- Prevent electrical shocks. Disconnect the power supply before beginning installation. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE.
- Each motor must have a properly sized drive. Ground fault protection should be sized properly. Refer to local electrical codes for sizing and selection.
- Refer to the motor manufacturer's IOM for specific installation information.
- Motor can start automatically. Keep hands away from output shaft until motor is completely stopped and input power is removed from the motor control panel. Lockout main power switch while working near motor shaft.
- The use of motor disconnect switches is acceptable. Consult the factory for proper interlocking with variable frequency drives.
- Motor control equipment and electronic controls are connected to hazardous line voltages. When servicing electronic controls, there will be exposed components at or above line potential. Extreme care should be taken to protect against shock. Stand on an insulating pad and make it a habit to use only one hand when checking components. Always use accurate test meters when checking electrical components. Always work with another person in case of an emergency. Disconnect power when performing maintenance. Be sure equipment is properly grounded. Wear safety glasses whenever working on electronic control or rotating equipment.



**DANGER:**

Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

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## 4.3 Earth (Ground Connections)

A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

---



**WARNING:**

Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards.

---

#### 4.4 Sensor and Control Wiring – Diagrams

The following sections are based on the installation of standard Parallel Pumping System product. Because of customized software and hardware, the installing contractor should base all wiring connections on the wiring diagrams that accompany each controller. These sections are meant to complement, not replace, those wiring diagrams.

Differential pressure switches are installed to sense the increase in pressure between the pump suction and discharge gauge taps and are used to determine whether a pump is running. Each switch should be wired from the normally closed contact.

To control variable frequency drives it is necessary to wire RS485 with each VFD.

With certain bypass and control methods it is necessary to disable the adjustable frequency drive from running. This is accomplished by wiring from the terminals to each VFD's interlock terminals. Should this wiring be required, any jumpers which may be found on the VFD's interlock terminals should be removed.

The control family may be provided with the capability to accept many analog inputs. Typically, all analog inputs must be 4-20mA or with 0-10V and powered by the 24VDC power supply from the VFD. All shields must be grounded in the controller only to prevent ground loops and improper signals.

Hardwire communications refers to the capability of the Controller to communicate with an energy management system. Standard communication features are listed below:

**Remote Start/Stop** – Remove the jumper from Terminal 58 and install a switch as indicated on the wiring diagram. CLOSED CONTACT of this switch will provide the start signal.

Please note: The Remote Start/ Stop function is independent of the Remote and Local Sensor configuration.

**Remote Alarm Indication** – A digital output-1 is configured for remote alarm indication by default as an Alarm Out.

**User Configurable I/O** – The Controller comes equipped with the capability to define the operation of any unused input or output signal. Refer to **Section 5.4.6>Service>Optional IO**.

#### 4.5 System piping and unit installation – final checklist

- Check that the unit base is properly leveled, grouted and secured.
- Check that all lubrication points are properly lubricated per motor manufacturer's instructions.
- Check that the shut-off valves to the transmitters open.
- Check that the shut-off valves to the pump suction open.
- Check that the shut-off valves to the discharge line open.
- Check that the piping is properly supported to prevent strains on the unit.
- Check that the system, including pumps and valving, are purged of debris and air.



**CAUTION:**

Seal damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.

---

#### 4.6 Electrical wiring and control settings – final checklist

- Check the unit nameplate or motor terminal connection to ensure the feeder line voltage corresponds to the unit voltage



**WARNING:**

- Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices.
  - FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.
- 

- Check that feeder wires are correctly sized for the load.
  - Check that the fuses are correctly sized. They must not exceed 1.75 times the full load current of the motor. Usual sizing is 1.15 to 1.5 times the full load current.
- 



**DANGER:**

High voltage 3 phase power can kill. Disconnect and lockout power prior to servicing. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

---



**WARNING:**

Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

---

- Check that the unit is properly grounded.
- Make sure all the power terminals in the control panel have been tightened.

## 4.7 IO

### 4.7.1 Digital Inputs

The Technologic PPS Pump Controller is equipped with (8) 24VDC digital input channels. This signal voltage must be obtained from the 24VDC power supply mounted to the subpanel. It is not recommended that other power sources be used without factory approval. All digital inputs are automatically assigned based on Table 1. See the typical wiring diagrams in **Section 4.1>Installation>Power and Control Wiring**.

Table 1: Digital Inputs Functionalities

Functionality	DI #	Description
Start/Stop Sw	1*	Remote contact can be used to start/stop the system.
Optional DI	2-8	User can select the function of optional input in IO setup:

### 4.7.2 Digital Output Module

The Technologic PPS Pump Controller is equipped with (4) 24V DC digital output and 0.5 A Nominal Output Current. Customer connections are made directly to the terminals mounted on the digital output module. Refer to **Section 5.4.6.2 Digital Output** for optional digital output setup.

### 4.7.3 Analog Input (VFD)



Use VFD's inbuilt analog input that supports up to 16 sensors, two 4-20 mA sensors from Terminals AI53 and AI54 of each drive. Also 0-10V sensor can be configured using Terminal AI54 DIP Switch on VFD. See section 5.4.2.2 Sensor control for DIP switch location


## 5. Operation and Configuration

### 5.1 Access Tools

Access for all setup parameters and menus requires a Technician user type from service Log On/Off Tab. Supervisor and Guest user (Default user) will have limited access. Supervisor Default Password = 1. See **Section 5.3>User Types and Login** for more details.

1. To set the require parameters and configuration, user required to click on service tab and from dropdown menu user can go to the setup screens.
2. System considers the page change as a confirmation for saving the parameter change, except where it has been asked for confirmation.

3. User can use the (Previous  and Next ) Tabs to change the screens under the same menu.

4. Select required functions/type/value from the dropdown menu Controller does not allow any further HMI action  until dropdown menu is expanded. (i.e. If user has not selected any value after opening the dropdown menu, it will not allow to access other functions.)

5. Two types of keypad are available to enter data into any system parameter. They are as follows:

- **Numeric Keypad:** If only numeric data is to be entered into any parameter then Numeric Keypad will pop up upon tapping the required parameter. Numeric Keypad is shown in **Figure 5.1.1**.



To enter any Numeric Data, Tap on the numbers shown and then tap  to enter the data or tap  to cancel the entered data.



Figure 5.1.1 - Numeric Keypad

- **Alpha Numeric Keypad:** This keypad will display when alphanumeric input is accepted by parameter. Alpha Numeric Keypad is shown in **Figure 5.1.2**.



To enter any Alpha Numeric Data, Tap on the Alphabetic Characters and Numbers shown and then tap  to enter the data or tap  to cancel the entered data.



Figure 5.1.2 - Alpha Numeric Keypad

## 5.2 General Terms for Navigation of System

To operate and to navigate this system, user has to consider several points explained as follows:

Once powered up the system displays the **Home** screen. The default display in **Figure 5.2.1** is of the e-80/e80 SC pump series:

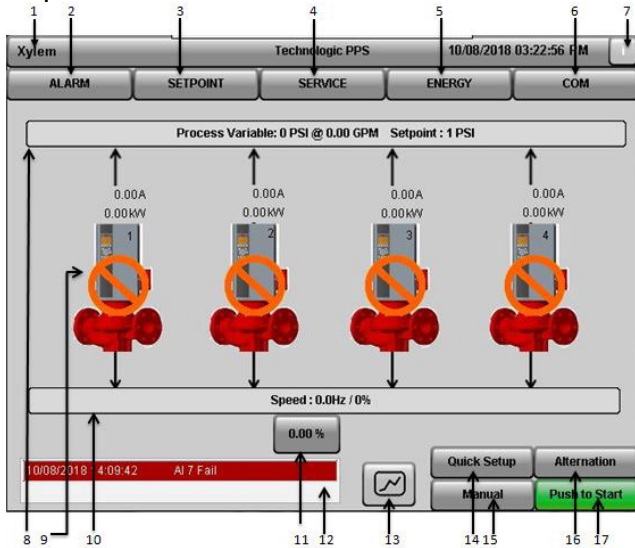


Figure 5.2.1 - Home Screen Default E80 Pumps

The Home screen has various buttons and information blocks as shown below.

1. Home Tab
2. Alarm Screen Navigation button
3. Setpoint Screen Navigation button
4. Service Screen Navigation button
5. Energy Screen Navigation button
6. [Com]Communication Screen Navigation button
7. Help File
8. Process Variable Bar
9. Pump Status
10. Speed Bar
11. Reset all Alarms
12. Alarm Status Screen
13. Trend Screen and Real Time Curve Navigation button
14. Quick Setup
15. Operation Mode
16. Alternation
17. Start/Stop

In the event the e-1510 pump series is selected **Figure 5.2.2** is displayed:

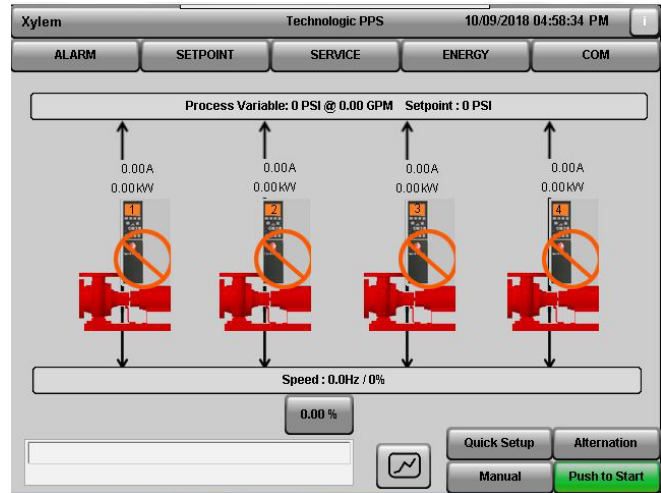


Figure 5.2.2 - Home Screen E1510 Pumps

In the event the e-1531 pump series are selected, **Figure 5.2.3** is displayed:

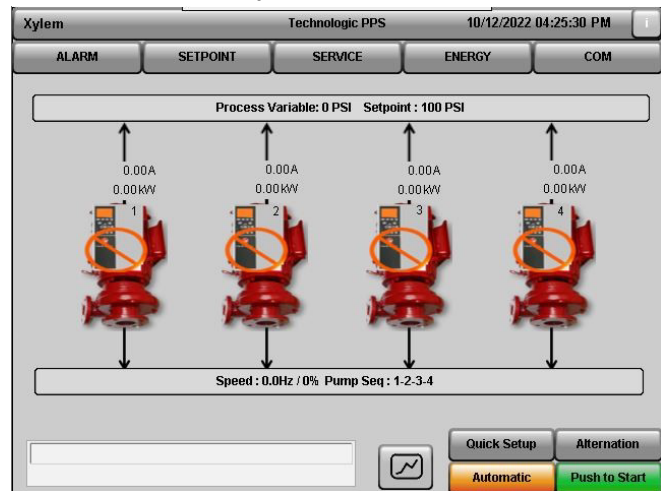


Figure 5.2.3 - Home Screen E1531 Pumps

### See **Section 5.4.3.4>Service>Pump Setup>Pump Selection**

for details on the selection of the appropriate pump series.

- 1) The common global Tab in **Figure 5.2.4** will appear on all screens.



Figure 5.2.4 - Global Header - Common for all Screens

At any point if user taps on the Home Tab in **Figure 5.2.4**, it will navigate to the home screen.



Figure 5.2.4 - Global Header - Home Tab


- 2) Alarm Screen Navigation button. When **[Alarm]** is tapped, Alarm Page appears. See **Section 5.4.7>Service>Alarm Setup** for details on Alarm setup.
- 3) Setpoint Screen Navigation button. When **[Setpoint]** is tapped, Setpoint Page appears. See **Section 5.6>Setpoint** for details on Setpoint setup.
- 4) Service Screen Navigation button - when **[Service]** is tapped, Service Page appears. See **Section 5.3>User Types and Login>Log In** for details on Service setup.
- 5) Energy Screen Navigation button - when **[Energy]** is tapped, Energy Page appears. See **Section 5.7>Energy** for details on Energy setup.
- 6) Com Screen Navigation button - when **[Com]** is tapped, the Communication Page appears. See **Section 5.8>Communication** for details on Communications features.
- 7) Help File - Tap the Help File button  to display information on the screen.
- 8) Process Variable Bar - The Station Process Variable bar is located above the Pump as shown in **Figure 5.2.5** for **sensorless system** shows differential pressure , Pressure Set point. It will also show Flow and Temperature if configured from sensor setting.



Figure 5.2.5 - Process Variable Bar

- 9) Pump Status - On the main screen, visualization of pumps will be animated as

per the current status. The visualization for Series e-80 pumps is shown in **Figure 5.2.6**.

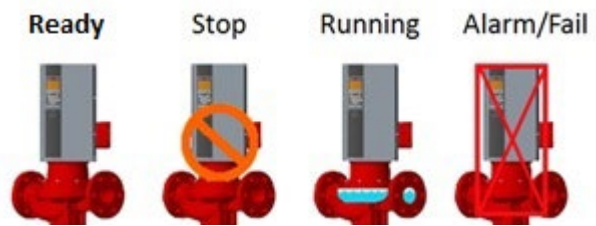


Figure 5.2.6 - Pump Status E80 Pumps

- **Ready:** Pump is in Standby mode and ready to run while in Auto mode.
- **Stop:** Pump is not running.
- **Running:** Pump is running either in Auto or Manual mode.
- **Alarm/Fail:** Pump and/or VFD have failed and are not running.

The visualization for Series e-1510 pumps is shown in **Figure 5.2.7**.

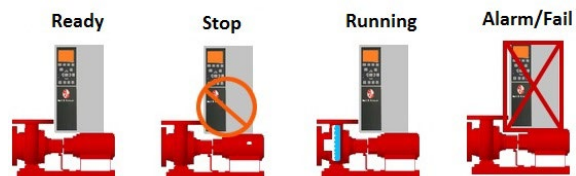


Figure 5.2.7 - Pump Status E1510 Pumps

The visualization for Series e-1531 pumps is shown in **Figure 5.2.8**.



Figure 5.2.8 - Pump Status E1531 Pumps

See **Section 5.4.3.4 Service>Pump Setup>Pump Selection** for details on the selection of the appropriate pump series.

Tap on each Pump will display its status as shown in **Figure 5.2.9**. Tap on **[Reset Pump Hour]** will reset the Run Time.



Figure 5.2.9- Pump Information

- Speed Bar - The Station Speed bar is located below the Pump as shown in **Figure 5.2.10**. This bar shows % Speed of System. It also shows Pump running sequence when the system is in Auto mode.



Figure 5.2.10- Speed Bar

- Reset all alarms – Tapping on Percent button will reset all alarms. See **Figure 5.2.11**.




Figure 5.2.11 - Reset Alarms

- Alarm Status Screen – will display the status of any alarms prior to being reset. See **Figure 5.2.12**.



Figure 5.2.12 - Alarm Status

- Trend Screen and Real Time Curve Navigation button – Tapping on the Trends button  will display the trend of parameters such as Pressure, Power, Setpoint, Speed and Flow Set Time Interval. Individual Parameters, Minimum and Maximum Boundaries can be set. See **Section 5.9>Trends Screen and Real Time Curve Navigation** for complete details. See **Figure 5.2.13**:

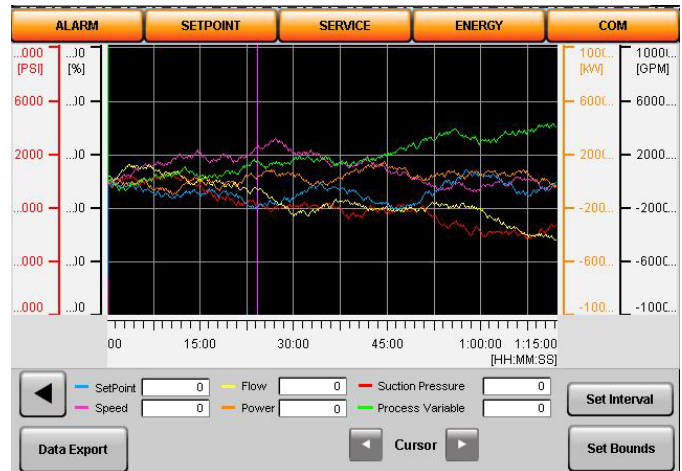


Fig 5.2.13-Trends Screen and Real Time Curve Navigation

On the main screen there are buttons for Quick Setup, Pump Sequence Alternation, Operation Mode change to automatic or manual and System Start/Stop. See **Figure 5.2.14**:



Figure 5.2.14-Quick Setup/Alternation/Auto\_Manual/Start\_Stop Alternation Buttons

- Quick Setup** will setup the system from a single window. Its smart setup process allows the setup of the main parameters required to start the system. Quick Setup may also be accessed via the Service Tab. See **Section 5.4.1.>Service>Quick Setup** for details.
- Operation Mode (Automatic/Manual)** displays the current state of operation mode (i.e., if showing Manual then at present system is in manual mode.) User can change the mode using this button. When system is running, operation mode cannot be changed. These modes of operation can be accessed through the interface button **[Auto/Manual]** on the home screen. The available two modes of operation are:
  - Automatic Mode:** Tap on **[Manual]** button shown in **Figure 5.2.14**. The system will enter into auto mode and the text on **[Manual]** Button will change to **[Automatic]** and it will be highlighted as shown in **Figure 5.2.15**.




Figure 5.2.15-System Mode Change Button in Auto Mode

- **Manual Mode:** Tap on [Automatic] button. The system will enter into manual mode and the text on [Automatic] Button will change to [Manual] as shown in Figure 5.2.16.



Figure 5.2.16-System Mode Change Button in Manual Mode

In manual mode the button for manual Speed control of pump gets visible on Home Screen. Text on this button displays the current set Speed of the system. On tapping  button, a Speed bar appears as shown in Figure 5.2.17. Speed can be control using speed bar in Manual mode.

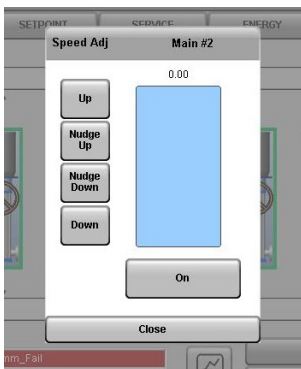


Figure 5.2.17-Pop up Screen for setting speed of system in manual mode

- 16) **Alternation** is used to alternate pump sequence in automatic operation mode. When alternation method is selected on pump run hour base, this button gets disabled. This button is shown in Figure 5.2.18.



Do you want to Alternate current sequence?

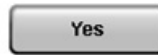


Figure 5.2.18-Alternate Sequence Selection

- 17) **Push to Start** - to start system at any point of time, tap [Push to Start] button. When the system is running, the text on [Push to Start] button will change to [Push to Stop] and Auto/Manual Button will be disabled.
  - **System Start/Stop:** It shows the command which can be performing by using this button (i.e. If it is showing "Push to Start" then user can use this button to start the system and if it shows "Push to Stop" then user can use this button to stop.). This button is shown in Figure 5.2.19.

Use pump bitmap to enhance as shown below for pump start/stop (enable/disable) page. At the event operation mode is changed to Auto, all pumps are forced to enabled and for manual mode, it is forced to disabled.

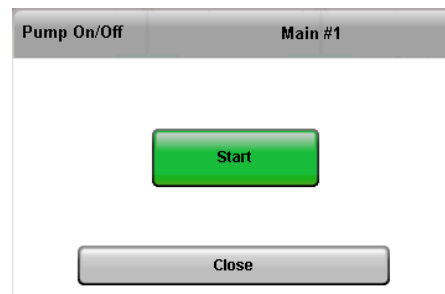


Figure 5.2.19-Pump On/Off control



Fig 5.2.20-Pump Information

### 5.3 User Types and Login

There are different types of users recognized by the system:

1. **Guest:** Only operation screens are accessible in view-only mode. **Users are logged in as a Guest by default.**
2. **Supervisor:** End-User configurable setup and operation screens are accessible. Supervisors must log-in using a password. The default Supervisor password is "1". This password should be changed upon the first log in. **Ensure you do not lose this password as there is no way to recover if lost.**
3. **Technician:** All setup and operation screens are accessible. Technicians must log-in using a password. The default technician master password will be provided to the certified installer at the time of installation.

### 5.3.1 Log In

Tap **[SERVICE]** from the Home Screen.

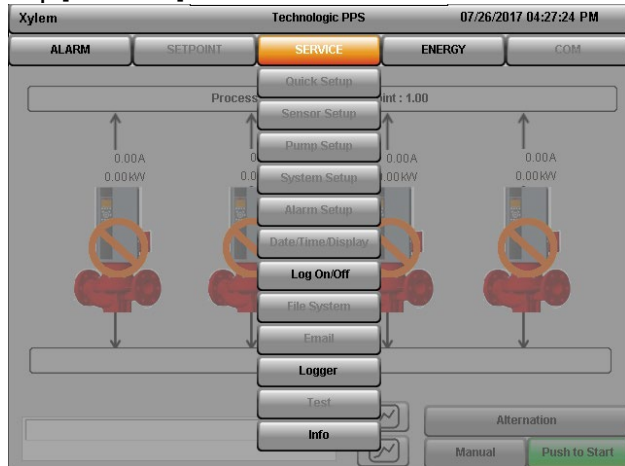


Figure 5.3.1 -Default Service Screen

Note that when logged in as a Guest certain boxes are disabled, as shown in **Figure 5.3.2**.

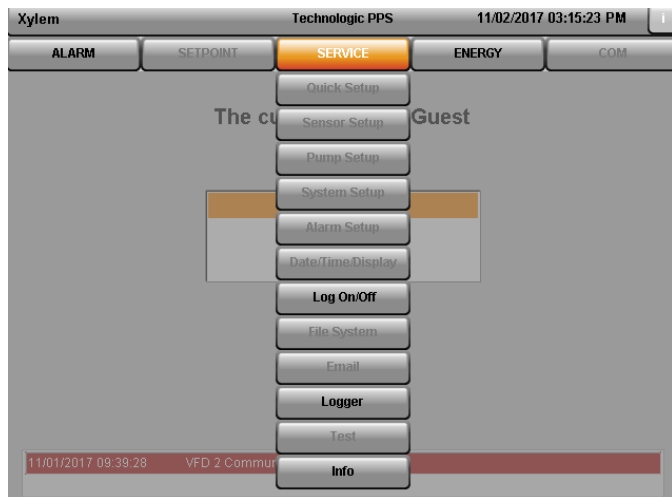


Figure 5.3.2 - Guest Service Screen

When logged in as a Supervisor more options will be made available, as shown in **Figure 5.3.3**. In order to enable all of these parameters user have to log in as Technician.

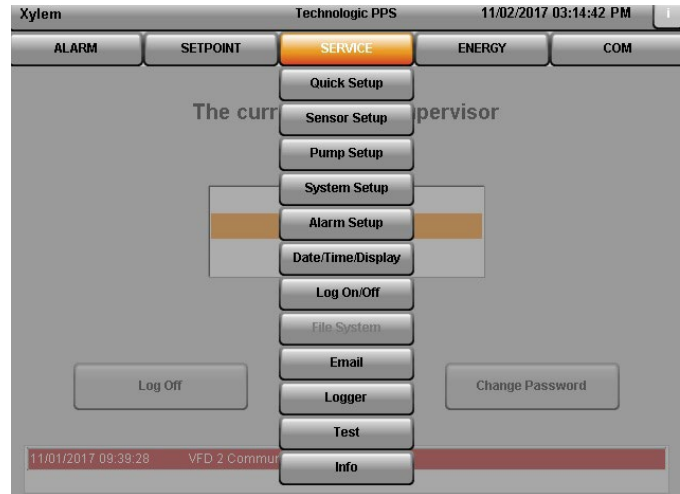


Figure 5.3.3 - Supervisor Service Screen

Tap **[Log on/off]** from the Service Screen to change User type. It will navigate to Login Screen, as shown in **Figure 5.3.4**.

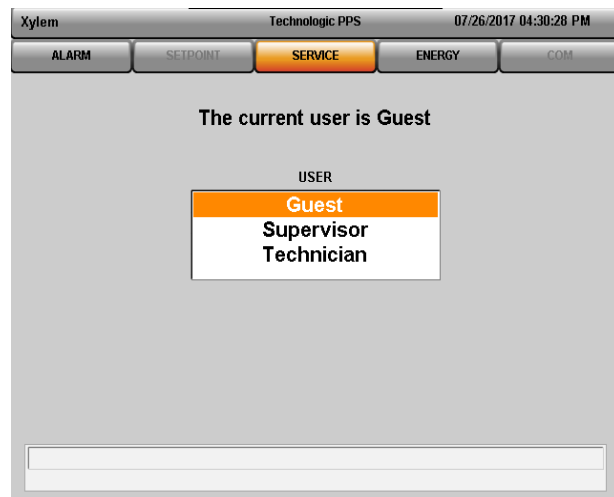


Figure 5.3.4 - Login Screen

To log in as a Technician, tap **[Technician]**, and then tap on the empty **[Password]** field to enter the Technician password. This will bring up an enhanced screen shown in **Figure 5.3.5**.

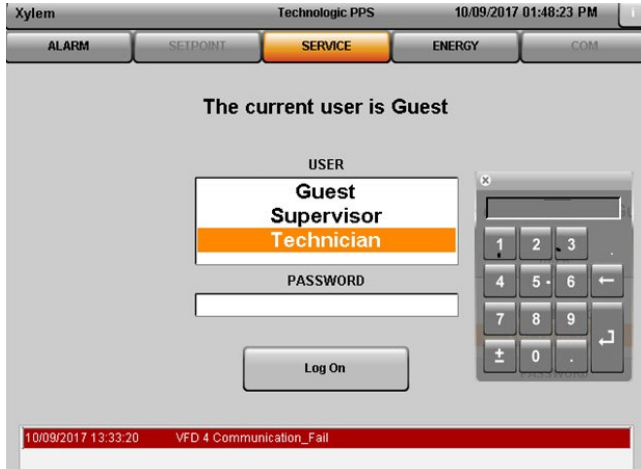




Figure 5.3.5-Login keypad

Enter your password and tap  enter button then tap Log On button to login. Tap cancel from top left of numeric pad to exit. 

If wrong password is entered, it will generate the message as shown in **Figure 5.3.6**.

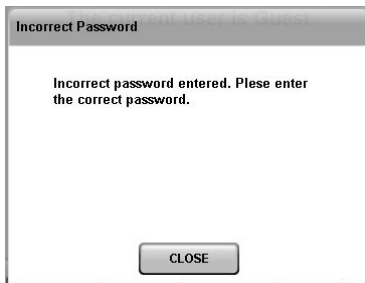


Figure 5.3.6-Incorrect Password

After entering the correct Password on Log On screen tap on **[Log ON]** or **[Cancel]** to abort. If Log in is successful the Service Screen should appear with all options enabled.

Tap on **[Log OFF]** to return to Guest or **[Change Password]** to bring up Password Change screen.

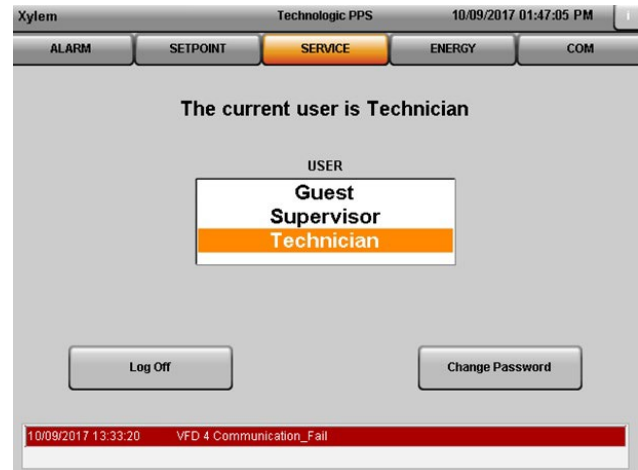


Figure 5.3.7-Technician Login

Enter Old Password, Enter New Password and Confirm New Password and tap on **[Change Password]** or **[Cancel]**. See **Figure 5.3.8**.

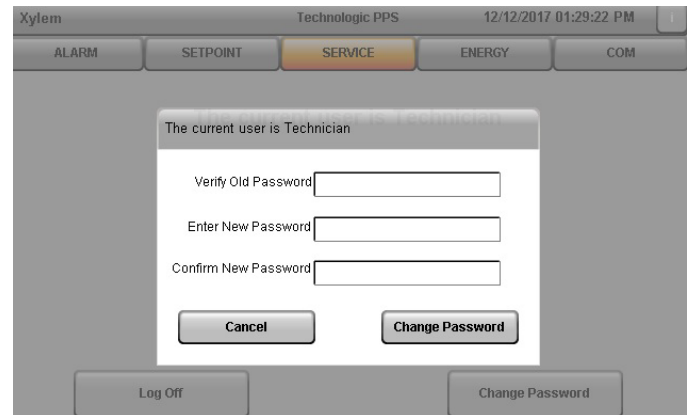
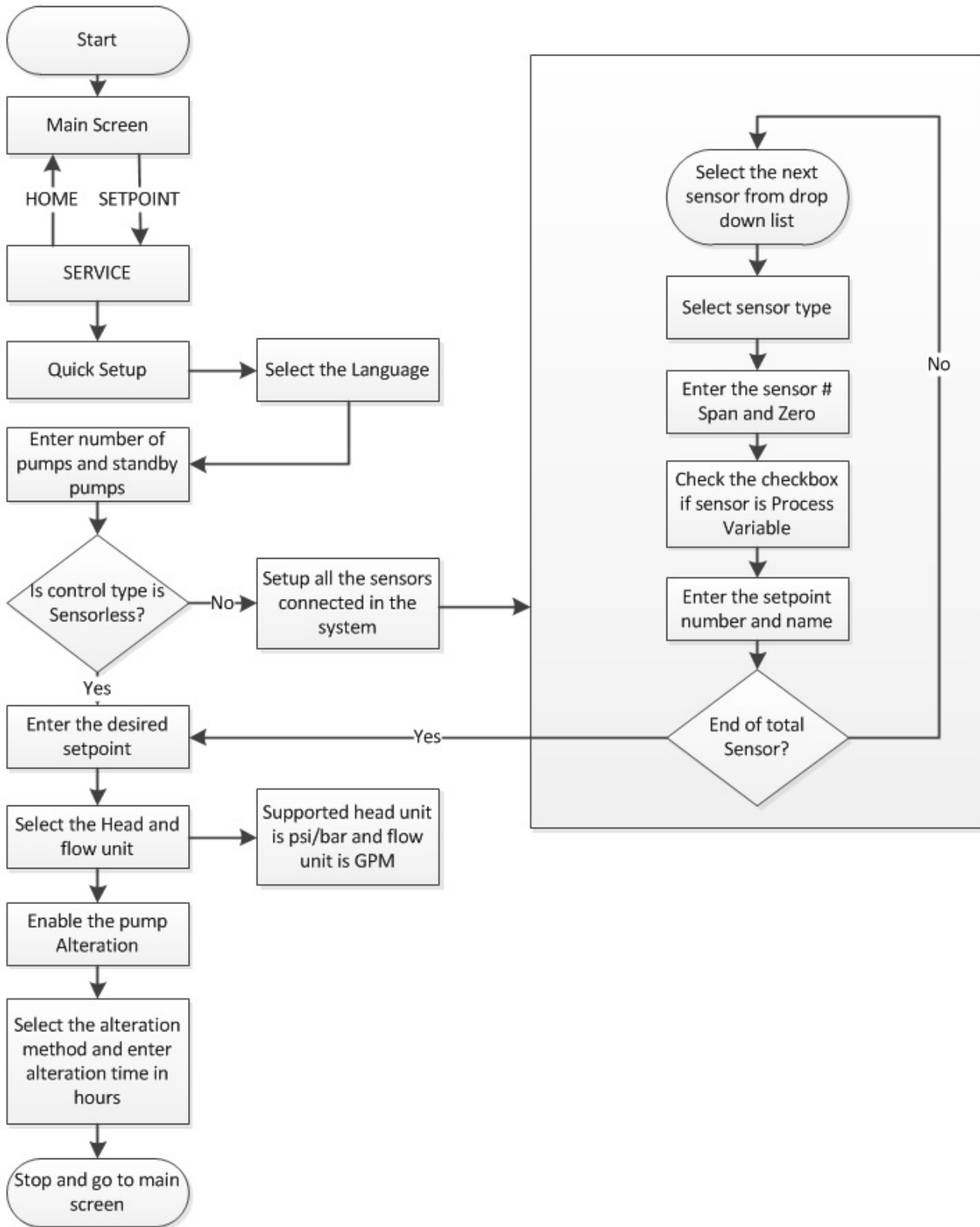


Figure 5.3.8-Technician Change Password

The same procedure can be followed to login as Supervisor. Make sure to log out before leaving system unattended. Tap **[Home Tab]** to return to the Home Screen.



Quick Setup Flow Chart

## 5.4 Service

### 5.4.1 Quick Setup

Use Quick Setup to setup the main parameters required to start the system from a single window.

To navigate to Quick Setup tap on **[SERVICE]** and on **[Quick Setup]**, the first option in drop down list. There is also a Quick Setup shortcut button on the Main Screen (see **Figure 5.2.1**).

#### 5.4.1.1 Pump Selection

Select the language and number of pump and standby pumps from Quick Setup (see **Figure 5.4.1**).

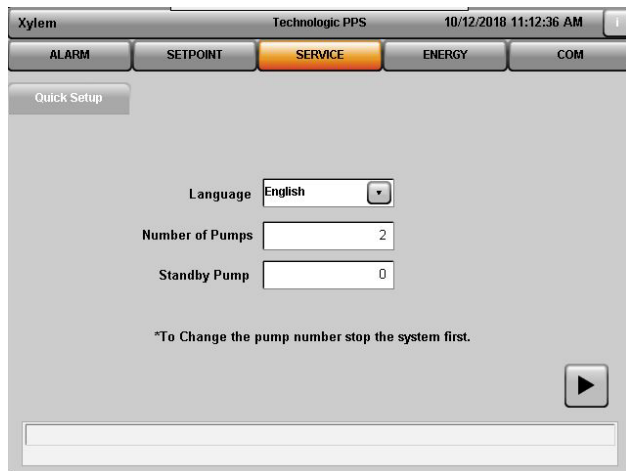


Figure 5.4.1 -Pump Selection

- **Language** – Dropdown box to select Language. Default is English.
- **Number of Pumps** – enter total number of pumps
- **Standby Pumps** – enter total number of standby pumps

#### 5.4.1.2 Control Type

Select *Control Type* Sensorless or Sensor Control from the dropdown menu. See **Figure 5.4.2**.

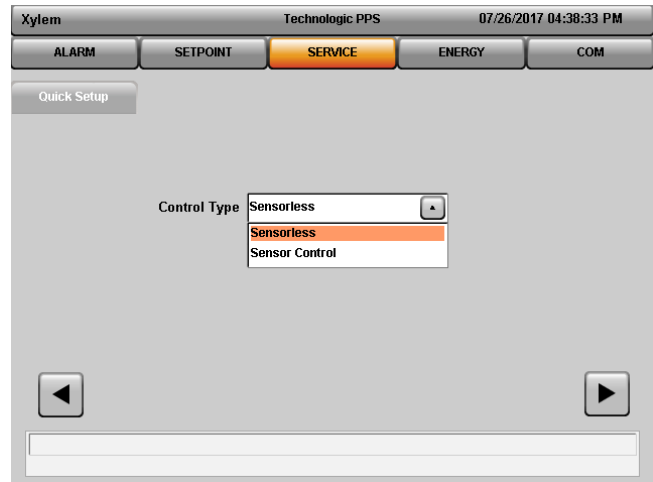


Figure 5.4.2 -Control Type

##### 5.4.1.2.1 Sensorless

Select *Sensorless* from the Control Type dropdown box. Parallel sensorless controls up to eight ITSC drives, or eight conventional Danfoss drives. ITSC Sensorless drives are with pre-loaded sensorless data. The conventional Danfoss drive are controlled by Xylem' sensorless control based upon the pump curve selected from pump curve data base. The PPS controller automatically detects the kinds of drives associated with and runs it accordingly. Select Setpoint as defined in **Section 5.4.1.3>Setpoint**.

##### 5.4.1.2.2 Sensor Control

Select *Sensor Control* from the Control Type dropdown box. Use VFD's inbuilt analog input that supports up to 16 sensors, two sensors from each drive. See **Figure 5.4.3**.

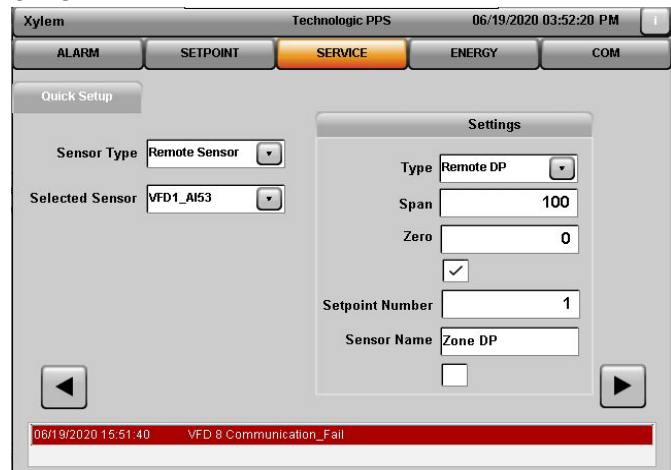


Figure 5.4.3 - Control Type\_Sensor Control

- **Selected Sensor**-dropdown box for each Sensor in each pump. Define the Sensor settings as in this example:  
Number of Pumps = 1 = VFD1  
Two sensors= VFD1\_AI53 and VFD1\_AI54
- **Type**-dropdown box for Sensor Type. Default is None.
- **Span** - enter the Span from the nameplate of the sensor
- **Zero** – prompt the user for Zero. Default is “0”
- **Process variable** – Tap Process Variable to engage signal generated by a sensor that is set up to control the system or zones.
- **Setpoint Number**– setpoint number is generated automatically with respect to process variables.
- **Sensor Name** – Enter sensor name
- **Override?**–Tap checkpoint to override local setpoint data

### 5.4.1.3 Setpoint

This page is displayed only when sensorless control type is selected. Enter the desired setpoint number. See **Figure 5.4.4**. Alternatively, the desired setpoint may be also entered in Figure 5.4.12 for Flow Based Control at Section of 5.4.3.3.2 Parameter Screen.

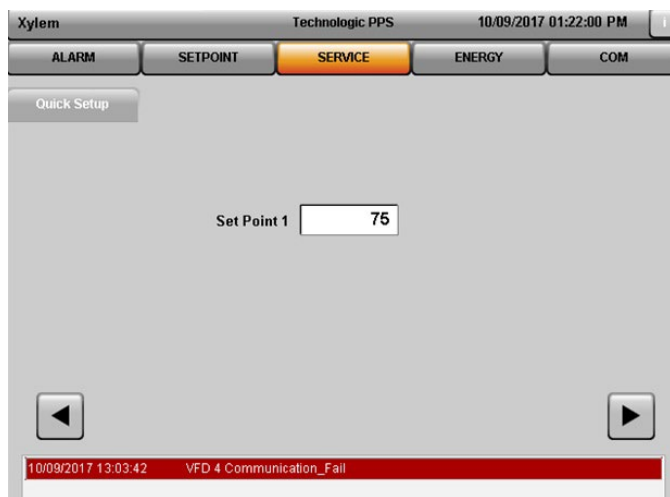


Figure 5.4.4 -Setpoint Selection

### 5.4.1.4 Flow and pressure unit

Select the flow and pressure unit. See **Figure 5.4.5**.

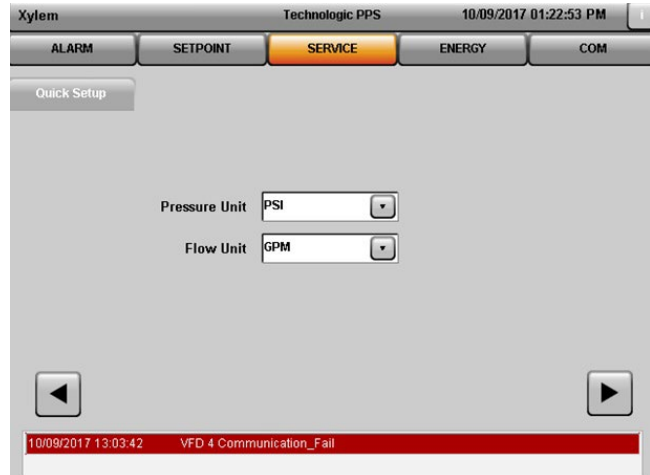


Figure 5.4.5- Pressure and Flow Unit

- **Pressure Unit** -dropdown box for Pressure Unit. Default is PSI
- **Flow Unit** – dropdown box for supported Flow Unit. Default is GPM

### 5.4.1.5 Alternation

If Alternation is enabled, tap on the checkbox and select and enter data. See **Figure 5.4.6**.

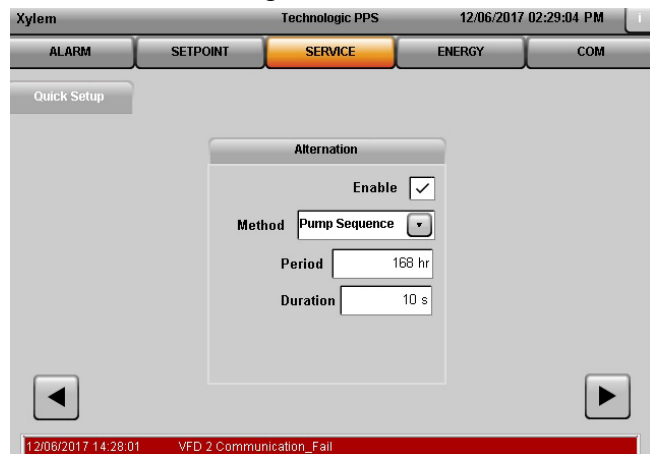


Figure 5.4.6-Alternation

- **Enable** - Tap the checkbox to *Enable*.
- **Method** – Drop down box to select alternation method. Alternation based on run hours and alternation based on sequence is supported.
- **Period** – Enter time period.
- **Duration**– Enter duration.

For other options see **Section 5.4.5>Alternation**.

Tap on the next button  will take the user back to the Main/Home Screen.

### 5.4.2 Sensor Setup

[Sensor Setup] Screen is as shown in **Figure 5.4.7**. This screen is used to setup the available sensors. Select the *Control Type* Sensorless or Sensor control from the dropdown menu.



Figure 5.4.7 - Sensor Setup\_Control Type

#### 5.4.2.1 Sensorless

Select Sensorless from the Control Type dropdown box. Parallel sensorless controls up to eight ITSC drives. Select Pump Setup as defined in **Section 5.4.3>Pump Setup**.

#### 5.4.2.2 Sensor Control

Select *Sensor Control* from the Control Type dropdown box. Use VFD’s inbuilt analog input that supports up to 16 sensors, two sensors from each pump. See **Figure 5.4.8**.

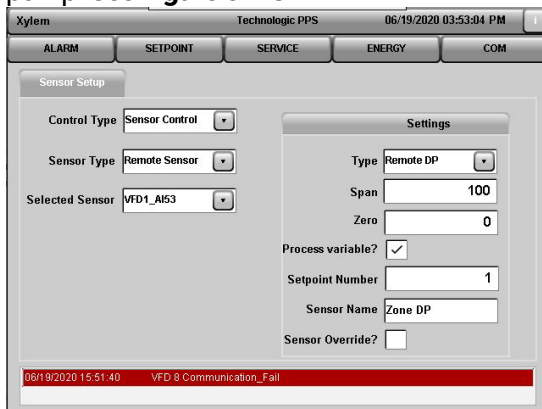


Figure 5.4.8 - Sensor Setup\_Control Type Sensor Control

- **Selected Sensor** - dropdown box for each Sensor in each pump. Define the Sensor settings as in this example:

Number of Pumps = 1 = VFD1

Two sensors = VFD1\_AI53 and VFD1\_AI54

- **Sensor Type :**
  - Remote Sensor
  - Local Sensor

Please note: The Remote Start/ Stop function is independent of the Remote and Local Sensor configuration.

- **Type** - dropdown box for Sensor Type. Default is None.
- **Span**- enter the Span from the nameplate of the sensor.
- **Zero** – prompt the user for Zero. Default is “0”.
- **Process variable** – Tap Process Variable to engage signal generated by a sensor that is set up to control the system or zones.
- **Setpoint Number** – setpoint number is generated automatically to process variable automatically.
- **Sensor Name** – Enter sensor name.
- **Override?** – Tap checkpoint to override local setpoint data.
- **Sensor Configuration in PPS:**
  - Go to Service > Sensor Setup > Control Type > Sensor Control.
  - Select VFD\_53 or VFD\_54 with which sensor is wired from the selected sensor.
  - AI\_53 can be used as only 4-20mA input while AI\_54 is user configurable from VFD control card Using DIP switch on VFD user can switch between 4-20mA or 0-10V as per requirement.

- **Sensor Wiring:**

- As shown in below picture (VFD 1), plug in input from your sensor to Analog 53 or Analog 54. See **Figure 5.4.9**.

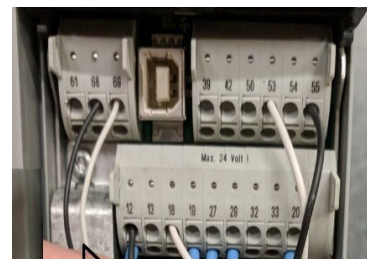


Fig 5.4.9- sensor wiring

**NOTE:** User have to make sure the AI configuration Terminal switch selection (Voltage or current) on VFD control card before connecting sensor.

- **Selecting Voltage/Current Input Signal** (DIP Switch Setting)
  - Refer below image for location of DIP switch.

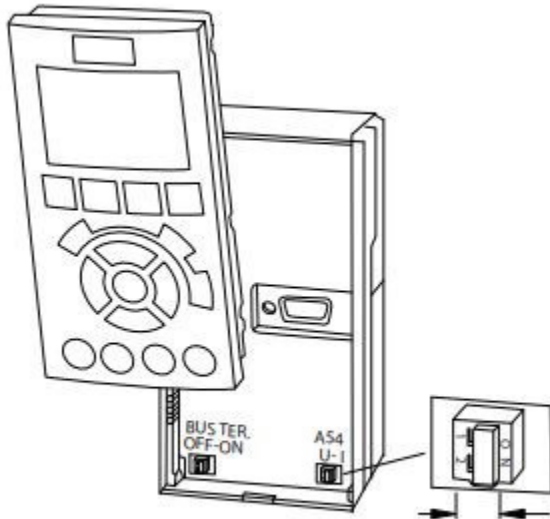


Illustration 5.23 Location of DIP switch A54

Fig 5.4.10- DIP switch A54 location

- For more details, refer to P2001487 Technologic Intelligent Pump Controller Manual (current version).

### 5.4.3 Pump Setup

Pump Setup contains four sections.

#### 5.4.3.1 Pump Setup

Define number of Pumps and Standby Pumps in this section.

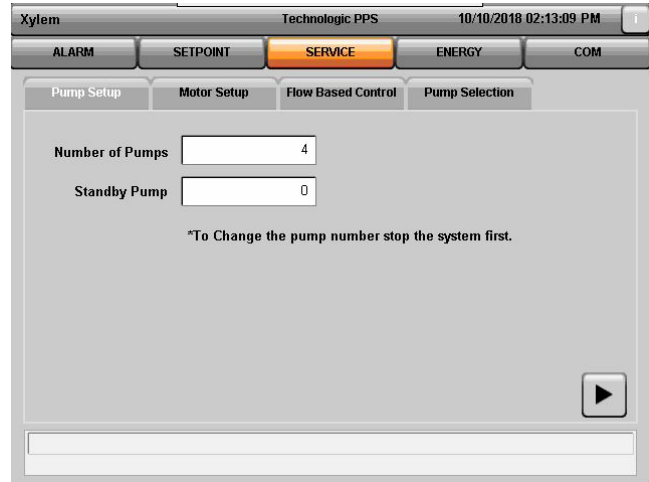


Figure 5.4.11 - Pump Setup

- **Number of Pumps** – enter total number of pumps.
- **Standby Pumps** – enter total number of standby pumps.

#### 5.4.3.2 Motor Setup

Configure Motor setup as per Ratings on Motor Name Plate. Check the check box of same pump/motor size if all motors are identical. See Figure 5.4.12.

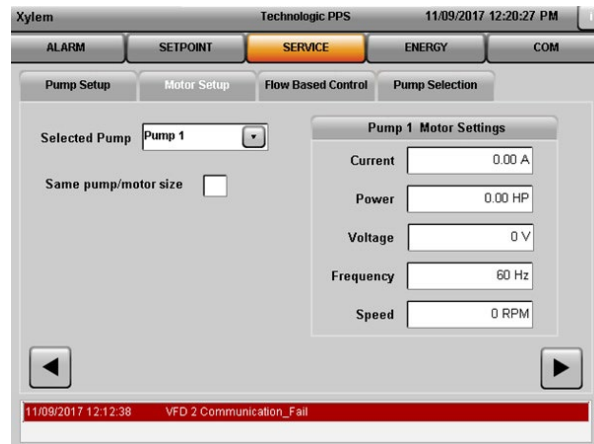


Figure 5.4.12- Motor Setup

- **Selected Pump** – Dropdown box for each Pump.
- **Same pump/motor size** – Tap checkbox if same pump and motor size. Settings will be same for all.

Motor Settings:

- **Current** – enter Current. Default is 0.00 A
- **Power** – enter Power. Default is 0.00 HP
- **Voltage** – enter Voltage. Default is 0 V
- **Frequency** – enter Frequency. Default is 60 Hz
- **Speed** – enter Speed. Default is 0 RPM

### 5.4.3.3 Flow Based Control

#### 5.4.3.3.1 Flow Based Control Setup

The flow adaptive control for a parallel multiple pump hydraulics system.

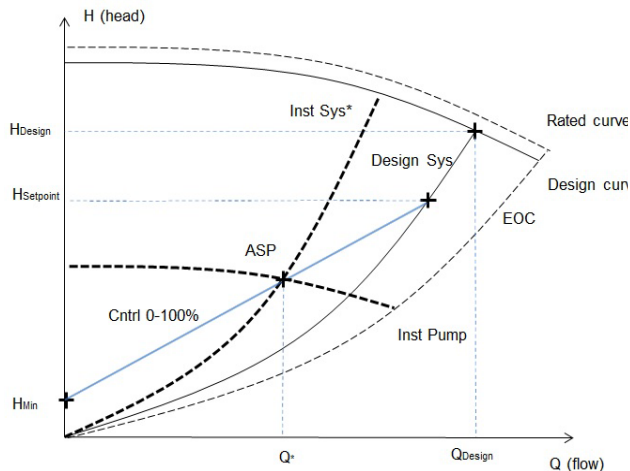


Figure 5.4.13-Flow Based Control Setup

As flow in a pumping system increases, system friction head loss also increases. Friction head loss is higher in systems with increased pipe lengths or decreased pipe size. The controller's internal Flow Adaptive function is used to correct the effect of friction head loss in the system for a parallel multiple pumps hydraulics system, which is schematically shown in **Figure 5.4.13**.

The flow adaptive pressure set point of ASP for pumping control may be derived by the Flow Adaptive equation, based upon the system flow rate per pump of  $Q$  which is the total system flow rate divided by the number of pumps running. The pumping control may be applied for the application where the instant system flow rate and pressure signals are available either from a sensorless converter or the combination of a flow meter and a differential pressure meter across the pumps. The controller actively adjusts the Setpoint along the control curve based on the system flow rate per pump.

The Flow Adaptive function requires some pump system control parameters to be set to accurately model the control curve. Parameters must be set based on the design of the system

in order to properly configure this function, including:

- **Rated curve** is the pump performance curve at full speed.
- **Design curve** is the pump curve defined by the flow rate and pressure at the design point of system pressure and system flow rate per pump. In this example the flow rate designed (or **QDesign**) is equal to the maximum flow rate with respect to the number of pumps running in parallel, while the pressure designed (or **HDesign**) is equal to the maximum system pressure for a parallel pumps hydraulic system.

Note that **HDesign** and **QDesign** will be calculated automatically based upon the pump maximum efficiency by default. The values of **HDesign** and **QDesign** can be entered manually as well, based upon the control requirement with respect to the system curve per pump.

- **Design system curve/Design sys** is defined once the pump design pressure and flow rate are determined, defined as the system load handled by individual pump in a parallel pumping system.
- **Control curve** is defined by setting pressure set point of **HSetpoint**, **Pressure at no-flow** of **HMin**, and Square-linear Curve Approximation Parameter of **Curve Shape**, after the design system curve is defined. The parameters are set up as:
  - **Pressure Set Point/HSetpoint** corresponds to **pPressure Set Point** along the **design system curve**, which is the upper point of the control curve. The introduction of **Pressure Set Point** is to make control curve stay closer to intended system operation parameters or **Design system curve**.
  - **Pressure at No-Flow Speed/HMin** is the minimum design head with its minimum pump speed calculated automatically by system.
  - **Curve Shape/Parameter Square-linear Curve Approximation** for the control curve can be modified to adjust the

control curve between a linear (0%) and quadratic (100%).

### 5.4.3.3.2 Parameter Screen

Tap on **[Flow Based Control]** provides a graphical representation of parameters to set up the control as seen in **Figure 5.4.14**. Configure Duty Pressure PSI, Pressure at No Flow PSI, Curve Shape %, Motor Efficiency %, Duty Flow GPM and Set Point 1 number.

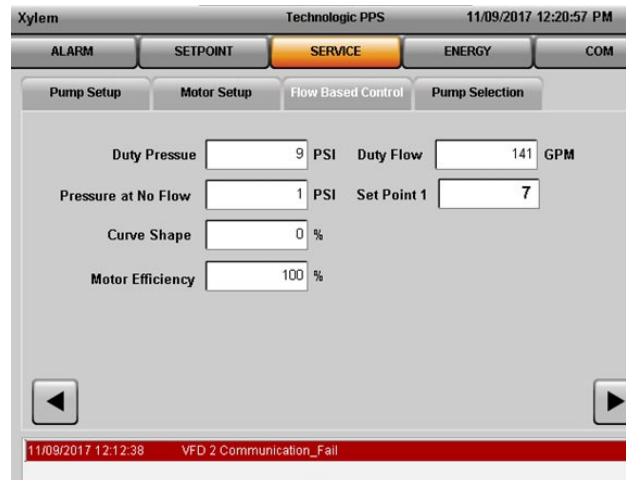


Figure 5.4.14 - Flow Based adaptive Control

- **Duty Pressure**—number of PSI corresponds to the system design pressure.
- **Pressure at No Flow**—number of PSI system pressure at no flow.
- **Curve Shape**—Square linear curve approximation between 0 (linear) and 100 (square) percent.
- **Motor Efficiency**—Value, default is 100%.for a ITSC sensorless drive. User can enter motor efficiency from the motor name plate..
- **Duty Flow**—Number of GPM setting that corresponds to the system design flow.
- **Set Point 1**—Number of PSI corresponds to pressure set point along the design system curve.

### 5.4.3.4 Pump Selection

Configure Pump Series, Model Name, Model Number, Speed and Impeller Size.

#### 5.4.3.4.1 Pump Series

Tapping on the **[Xylem Pump Data]** button will display a list of the available Pump Series. The e-1531 series are the default settings. This field lists the Xylem pump curve data available in File System under Xylem Folders (data is factory loaded).

**[Custom Pump Data]** button will display a list of the available Pump Series under custom folder in file system. Custom pump data is used when pump curve database is not available under **[Xylem Pump Data]**. Select the Pump Series from drop down list. (Pump Series detail is available on Pump Name Plate). **See Figure 5.4.15**.

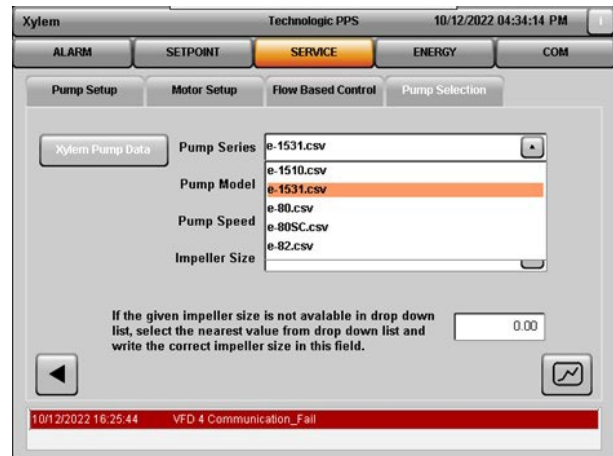


Figure 5.4.15-Pump Selection\_Pump Series

#### 5.4.3.4.2 Pump Model

This field lists the available models for the selected Pump Series. Select the Pump Model in use from drop down box. (Pump Model details are available on Pump Name Plate).In this example, the Pump Models under the e-80SC.csv Series are displayed in **Figure 5.4.16**.

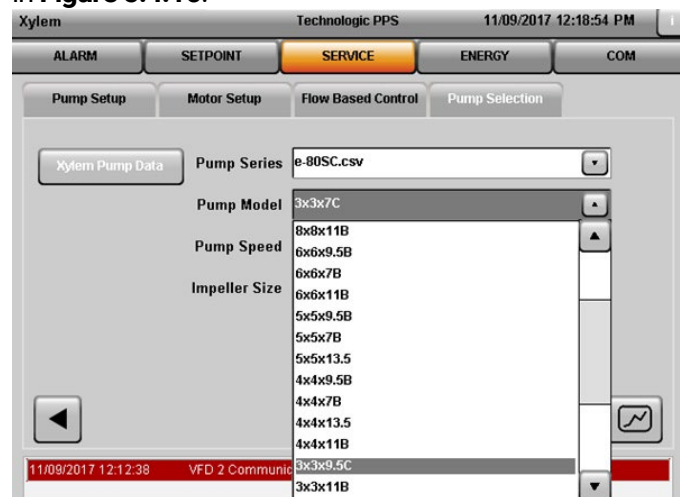


Figure 5.4.16-Pump Selection\_Pump Model

### 5.4.3.4.3 Pump Speed

This field lists the available speed for the selected Pump Model. Select the Pump Speed in use from the drop down box. (Pump Speed details are available on the Motor Name Plate). See Figure 5.4.17.

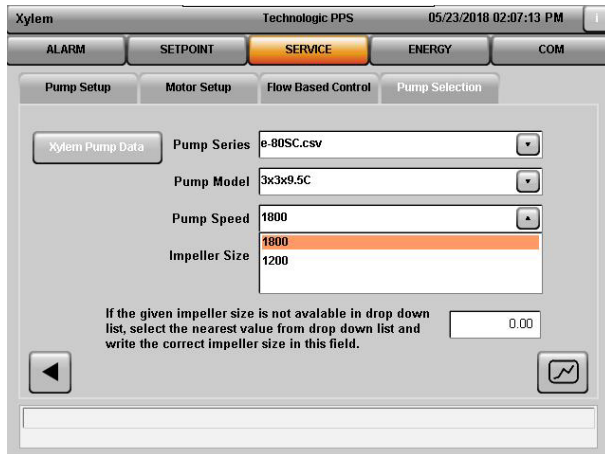


Figure 5.4.17-Pump Selection\_Pump Speed

### 5.4.3.4.4 Impeller Size

This field lists the available Impeller Size for the selected Pump Speed. (Pump Impeller Size details are available on the Motor Name Plate). See Figure 5.4.18.

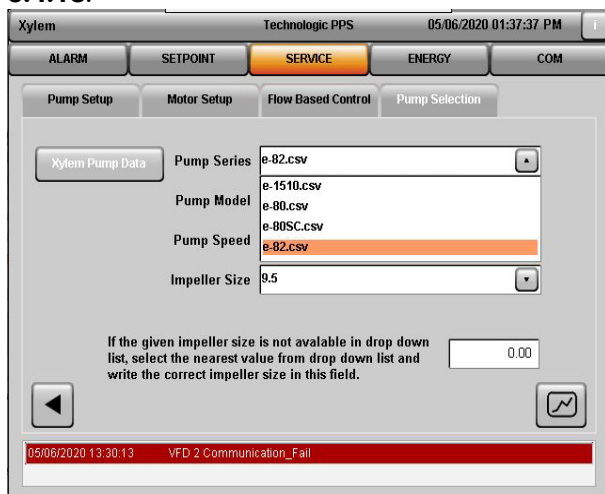



Figure 5.4.18-Pump Selection\_Impeller Size

The e-1531 series are the default settings and will display the Home Screen as defined in Figure 5.2.3 and the Pump Setup as defined in Figure 5.2.8. When the user selects the e-1510 series, the Home Screen will be displayed as in Figure 5.2.2, and the Pump Setup will be displayed as in Figure 5.2.7.

Tapping on the Trends button  will display the trend of parameters and curves such as Pressure, Power, Adaptive Setpoint, Speed and Flow, under the real time adaptive pump control in which the adaptive pump pressure set point varies with respect to flow rate adaptively along the pump control curve. See Section 5.9>Trends Screen and Real Time Curve Navigation for complete details.

### 5.4.4 System Setup

Sections under System setup are:

- Stage/Destage
- Speed Control
- Exercise/Alternation
- Optional IO

See Figure 5.4.19.

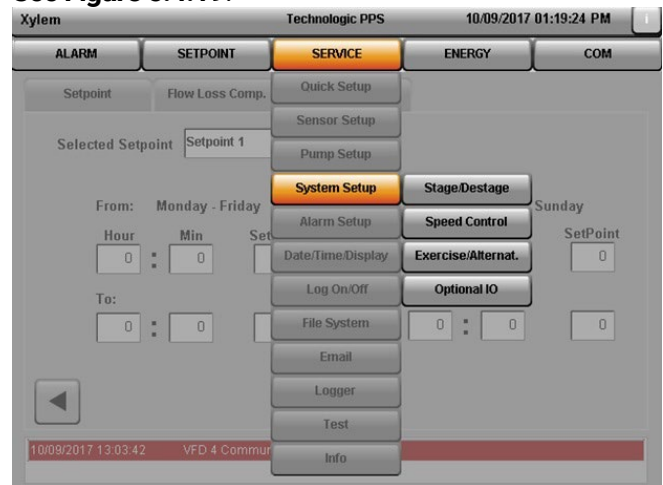


Figure 5.4.19-System Setup

#### 5.4.4.1 Stage/Destage

Sections under [Stage/Destage] are:

5.4.4.1.1 PV Stage/Destage controls staging and destaging of pumps based on Speed and Process Variable (Pressure). See Figure 5.4.20.

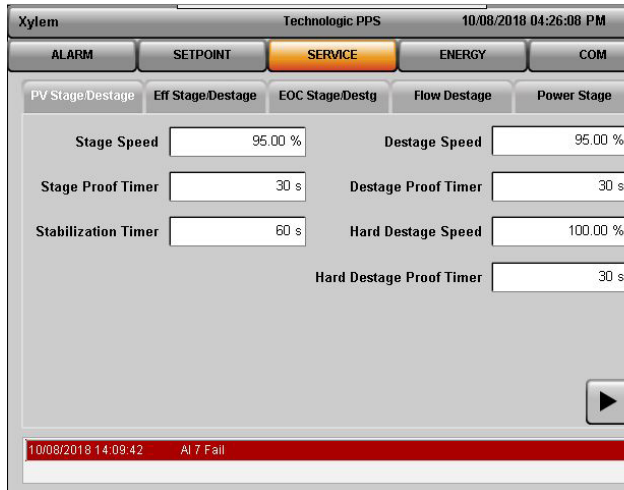


Figure 5.4.20-PV Stage/Destage

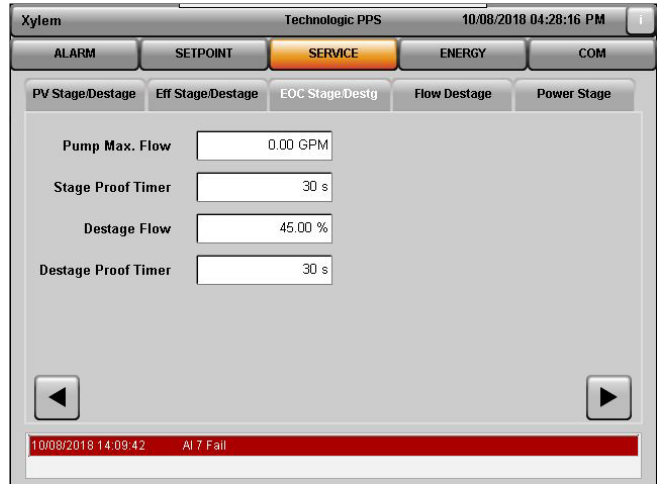


Figure 5.4.21-EOC Stage/Destage

Following parameter needs to be configured in [**PV Stage/Destage**] Section:

- **Stage Speed** - The maximum speed at which the lead pump will operate prior to starting a lag pump, %.
- **Stage Proof Timer** - Proof timer prior to starting lag pump, seconds.
- **Stabilization Timer** - Staging stabilization time, delay prior to calculating destage value, seconds.
- **Destage Speed** - Enter the percentage of the stabilized speed at which the lag pump will stop, %.
- **Destage Proof Timer** - Proof timer prior to stopping lag pump, seconds.
- **Hard Destage Speed** - The lowest speed at which parallel pumps will operate prior to destaging the lag pump, %. It must be greater or equal to minimum frequency.
- **Hard Destage Proof Timer** - The proof timer prior to destaging the lag pump when operating below the Hard destage speed, seconds.

#### 5.4.4.1.2 EOC Stage/Destage

[**EOC Stage/Destage**] controls staging and destaging of pumps based on Flow. Following parameter needs to be configured in [**EOC Stage/Destage**]. See **Figure 5.4.21**.

- **Pump Max Flow** - The maximum allowable flow in GPM prior to starting a lag pump. A value of 0 disables this function.
- **Stage Proof Timer** - Proof timer prior to end of curve staging, seconds.
- **Destage Flow** - Enter the percent of stabilized flow at which the lag pump is destaged, %.
- **Destage Proof Timer** - Proof timer prior to destaging lag pump, seconds

#### 5.4.4.1.3 Flow Destage

[**Flow Destage**] controls staging and destaging of pumps based on Flow. See **Figure 5.4.22**.

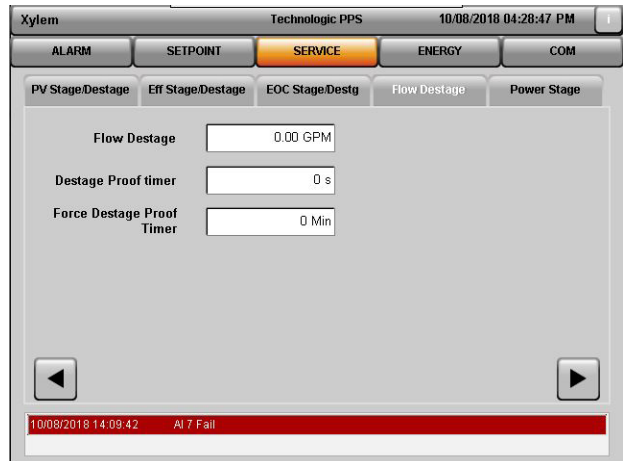


Figure 5.4.22 - Flow Destage

Following parameter needs to be configured in [**Flow Stage/Destage**] Section:

- **Flow Destage** - The total flow above which the lag pump will be forced to destage. A value of "0" disables this function.

- **Destage Proof Timer** - Proof timer prior to Flow destaging lag pump in seconds
- **Force Destage Proof Timer** - The time after which the lag pump will be forced to destage. A value of "0" disables this function.

#### 5.4.4.1.4 Power Stage

There is a checkbox to Enable/Disable Power Destage. If this check box is checked the Controller reads the Motor Current. If the Current is above the motor current rating, Staging begins. After a time delay, Controller again checks if the Motor current is in Limit. If not the next lag Pump will be staged. This process will be continued until Motor Current is in range. See **Figure 5.4.23**.

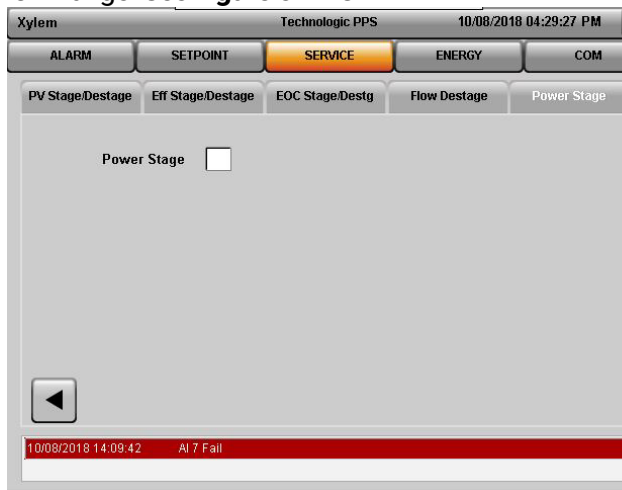


Figure 5.4.23-Power Stage

#### 5.4.4.1.5 Efficiency Stage/Destage

**[Efficiency Stage/Destage]** controls staging and destaging of pumps based on System Efficiency and Calculated Efficiency. See **Figure 5.4.24**.

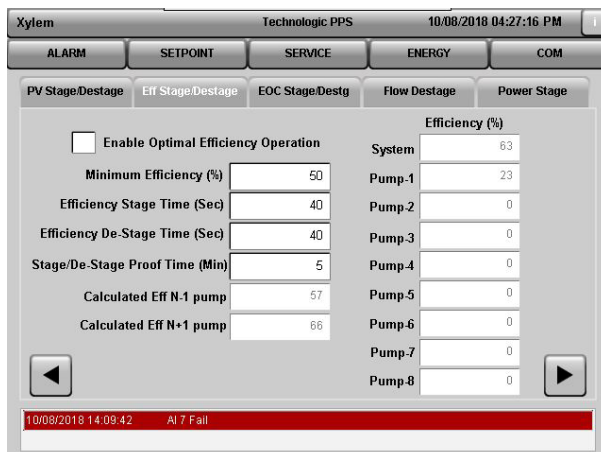


Figure 5.4.24–Efficiency Stage/Destage

Following parameter needs to be configured in **[Efficiency Stage/Destage]** Section:

- **Enable/Disable** - enable/disable the optimal efficiency operation.
- **Eff stage time** - stage time in seconds, timer starts when optimal eff stage condition occurs, next pump in sequence will start after timer expires, timer will reset if stage condition not satisfy.
- **Eff de-stage time** - destage time in seconds, timer starts when optimal eff destage condition occur, last pump in sequence will stop after timer expire, timer will reset if destage condition not satisfy.
- **Stage/De-stage Proof time** - proof timer in minutes between any eff stage/destage operation
- **Calculated eff N+1** - calculated efficiency if system run to achieve same head and flow by staging one pump, accuracy of calculated efficiency is effected by accurate pump data, system resistance change by staging or destaging pump in parallel.
- **Calculated eff N-1** - calculated efficiency if system run to achieve same head and flow by destaging one pump, accuracy of calculated efficiency is effected by accurate pump data, system resistance change by staging or destaging pump in parallel.
- **System/pump1-8 efficiency** - System/pump wires to water efficiency in percentage, displayed efficiency consider loss of drive and motor.

#### 5.4.4.2 Speed Control

Sections under **[Speed Control]** are:

### 5.4.4.2.1 VFD Setup

[VFD Setup] is used to configure VFD. See **Figure 5.4.25**.

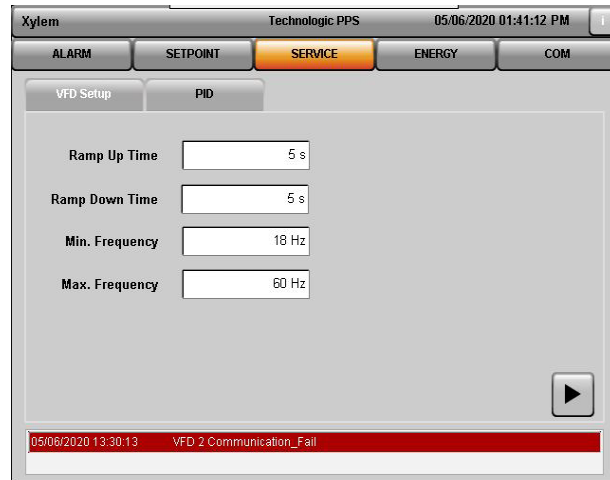


Figure 5.4.25-VFD Setup

Following parameter needs to be configured in [VFD Setup] Section:

- **Ramp Up Time** - Drive acceleration time in seconds from zero to maximum frequency ramp up.
- **Ramp Down Time** - Drive deceleration time in seconds from maximum to zero frequency ramp down.
- **Minimum Frequency** – Enter the minimum limit for the drive output frequency
- **Maximum Frequency** – Enter the maximum limit for the drive output frequency

### 5.4.4.2.2 PID Setup

Set up [PID] Parameters for automatic Controlling of Pump Speed through VFD Output. See **Figure 5.4.26**.

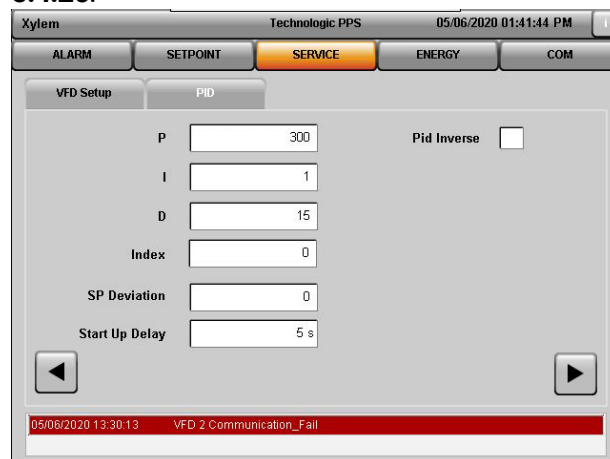


Figure 5.4.26-PID Setup

Following parameter needs to be configured in [PID] Section:

- **P** – Set the Proportional value for PID Control.
- **I** – Set the Integration value for PID Control.
- **D** – Set the Derivative value for PID Control.
- **Index** – Enter a value to buffer the response of the PID while operating in the dead band defined in [SP Deviation].  
Index = 1 (no impact)  
Index = 999 (maximum buffer.)
- **SP Deviation** – Enter the value for the number of PV units at which a dead band will be created around the set point. The PID will be modified within the dead band per the index setting below.
- **Startup Delay** – Enter the delay required to start the Pump.

Check the [Inverse PID] Checkbox to inverse the PID calculation.

### 5.4.5 Alternation

Four different options are available for Automatic Alternation of Pump Sequence. User can enable any one of the available four Alternation method to alter the pump sequence. The four methods for Automatic Alternation are shown in **Figure 5.4.27** and the methods are:

- **Timed**: In this method Alternation can be done time based. Check the Enable Checkbox in Timed Section on Alternation Screen. By doing so timed alternation method will be selected. Further Timed Alternation has two options.
- **Daily**: Check the Enable Checkbox in daily Section on Alternation Screen. By doing so daily alternation method will be selected. In this method user needs to enter [Hour] and [Minute] of the day when alternation needs to begin.
- **Weekly**: Check the Enable Checkbox in weekly Section on Alternation Screen. By doing so weekly alternation method will be selected. In this method user needs to enter [Hour], [Minute] and [Day] of the week when alternation needs to begin.
- **Monthly**: Check the Enable Checkbox in Monthly Section on Alternation Screen. By doing so Monthly alternation method will be selected. In this method user needs to enter [Hour], [Minute] and [Day] of the Month when alternation needs to begin.

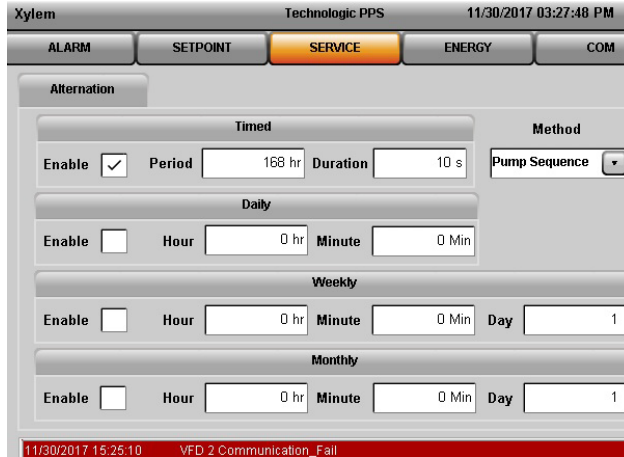


Figure 5.4.27-Alternation

There are two options to select the new Pump running sequence after alternation

- **[Pump Sequence]** – The Pump sequence will be based on pump number order. The next pump in sequence will become the lead pump after alternation. Alternation event will be based on time in hours, daily, weekly, monthly, manual or through communication.
- **[Pump Run hour]**- The pump sequence will be based on pump run hour, from lowest to highest run hour. The pump with the lowest run time will become the lead pump after alternation. This option does not depend on type of alternation method selected. Alternation event will occur only when system is restarting after all pumps are stopped.

**NOTE:** Enter the Alternation Day of Week (1= Monday to 7=Sunday) on which the pumps will be alternated.

Enter the Alternation Time in 24Hr format (range being 0:00-23:59).

### 5.4.6 Optional IO

The options available under I/O configuration depend on system setup. Complete all previous setup screens, specifically pumps and sensors prior to completing the following:

### 5.4.6.1 Digital Input

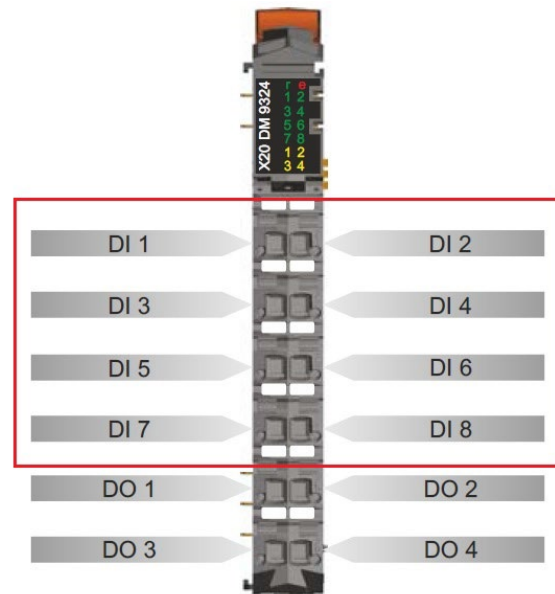
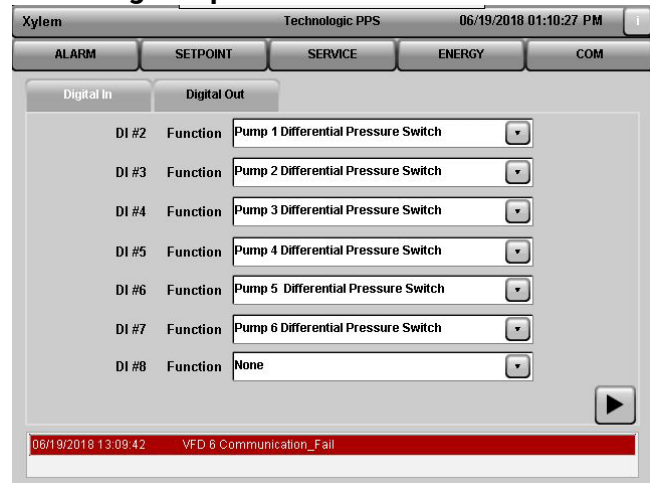


Figure 5.4.28-Digital Input

Screen for optional **[Digital In]** is shown in **Figure 5.4.28**. There are Up to 7 Digital Input and Each DI can be connected to respective Pump DP Switch. The desired functions are represented by the available Pumps for this setup, here DI #2 to DI #7 Specifically assigned to Pump-1 DP to Pump-7 DP Switch respectively.

### 5.4.6.2 Digital Output

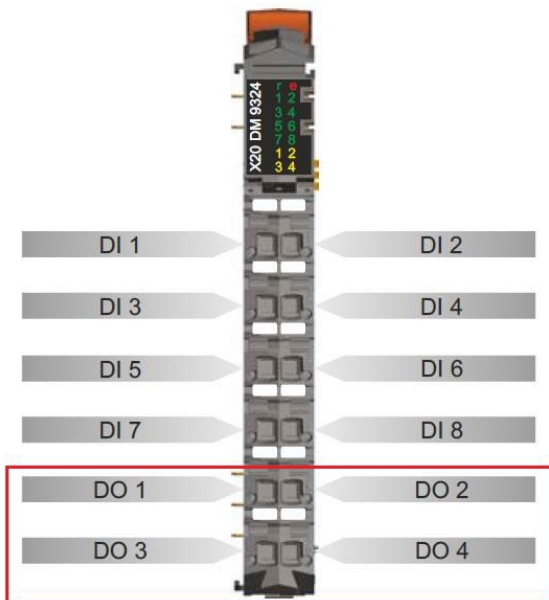
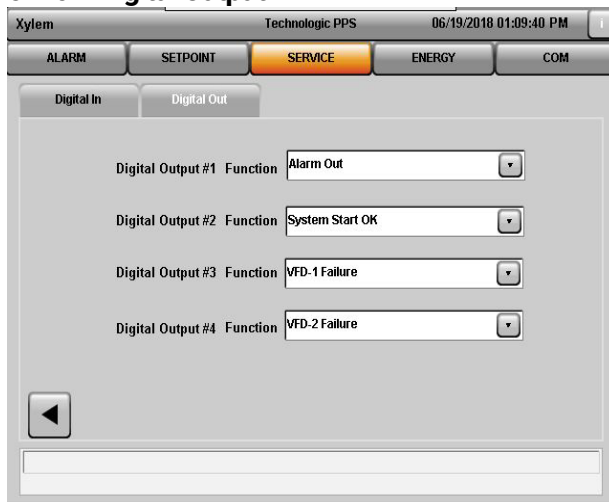


Figure 5.4.29-Digital Output

Screen for optional **[Digital Out]** is shown in **Figure 5.4.29**. There are four outputs. Out of four, First one is by default assigned to Alarm Out and rest of three can be select as a desired function against the terminal number wired in control panel from the drop down box. Refer to the control wiring diagram for wiring details.

In this example and setup Optional Digital Output can be configured for:

•**System Start OK** – Digital Output can be configured to know if the System Start is OK.

•**Pump 1-Status** – Digital Output can be configured to know Pump 1’s running status.

•**Pump 1-Failure** – Digital Output can be configured to know Pump1’s failure.

•**VFD-1 Failure** – Digital Output can be configured to know Pump 1’s VFD failure.

•**Alarm Out** –If there is no alarm in system it will give 1 as output or else 0.

### 5.4.7 Alarm Setup

Sections under **[Alarm Setup]** are:

#### 5.4.7.1 System Alarm

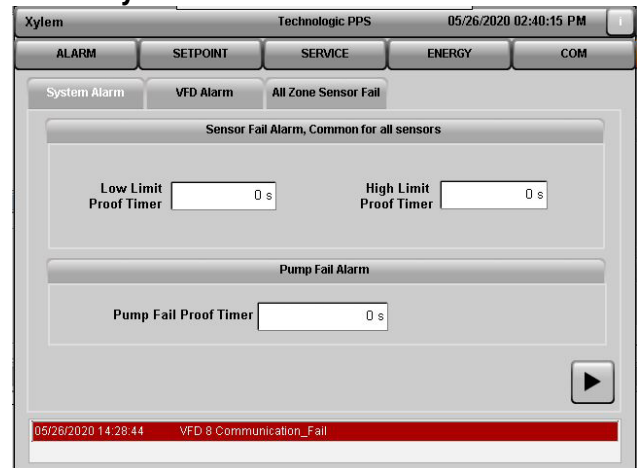


Figure 5.4.30-System Alarm

Set up **[System Alarm]** by configuring the following parameters. See **Figure 5.4.30**:

- **Sensor Fail Alarm, Common for All Sensors:**
  - **Low Limit Proof Timer** -The proof timer prior to setting low level alarm. A value of 0 will disable this alarm.
  - **High Limit Proof Timer** -The proof timer prior to setting high level alarm. A value of 0 will disable this alarm.
- **Pump Fail Proof Timer** – The proof timer prior to setting for a pump fail alarm. A value of 0 will disable this alarm.

### 5.4.7.2 VFD Alarm

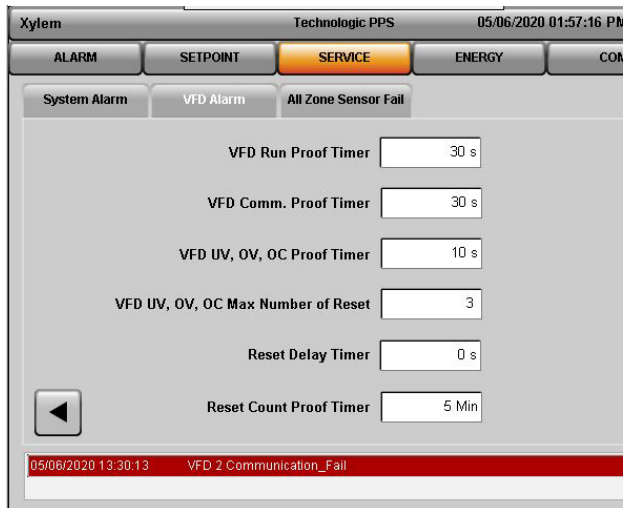


Figure 5.4.31-VFD Alarm

Set up [VFD Alarm] by configuring the following parameters. See **Figure 5.4.31**:

- **VFD Run Proof Timer** – The proof timer prior to setting the VFD run fail alarm. A value of 0 will disable this alarm.
- **VFD Comm. Proof Timer** - The proof timer prior to setting the VFD communication fail alarm, in seconds. A value of 0 will disable this alarm. VFD communication failure gets reset automatically as soon as it resumes.
- **VFD UV, OV, OC Proof Timer** – The proof timer prior to setting the VFD UV/OV/OC fail alarm.
- **VFD UV, OV, OC Max number of Reset** – Number of automatic resets attempt for VFD UV/OV/OC failure.
- **Reset Delay Timer** – The time delay between VFD UV/OV/OC failure and automatic reset attempt, in seconds.
- **Reset Count Proof Timer** – The proof timer prior to setting the reset count to zero, in minutes. Timer starts from the last reset attempt and run until controller detects UV/OV/OC fault or timer lapse.

### 5.4.7.3 All Zone Sensor Fail

Set up [All zone Sensor Fail] Parameters for running Pumps at definite Speed in case of all zone sensors are failed. See Figure 5.4.32.

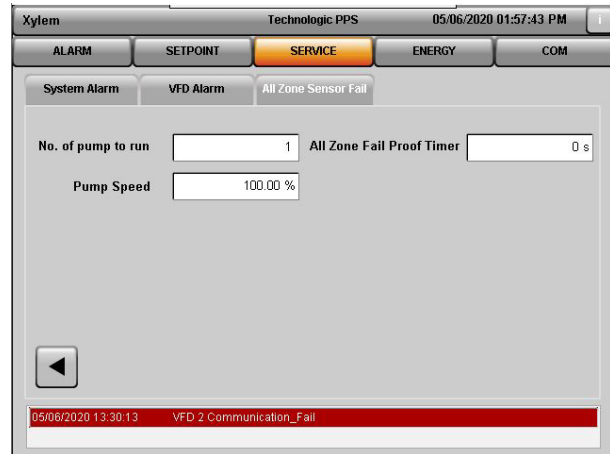


Fig 5.4.32 All Zone Failure Following parameter

Needs to be configured in [All zone Sensor Fail] Section:

- [No. of Pumps to run] – Enter the number of pumps that should operate at the defined [Pump Speed] speed in the event that all system sensors fail.
- [Pump Speed] – Enter the % speed for the drive(s) to operate at in the event that all system sensors fail.
- [All Zone failure Proof Timer] – Enter the time during which All Zone Failure condition is confirmed

### 5.4.8 Date/Time Display

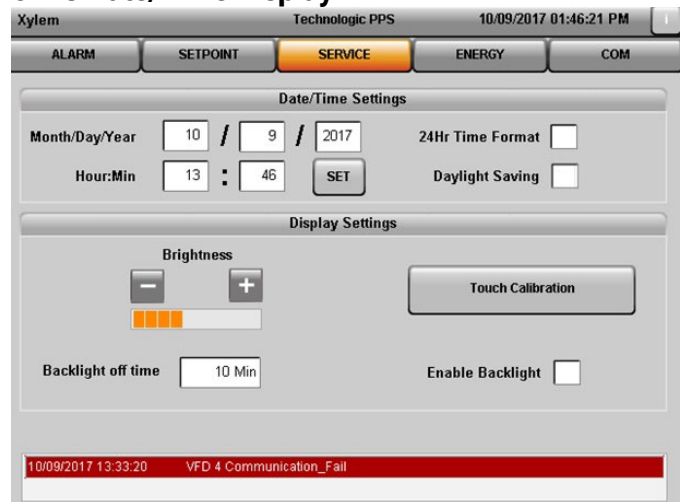


Figure 5.4.33-Date/Time Display

Date and Time can be set from [Date/Time] Page. Tap on [Service] button and then tap on [Date/Time] button to navigate to this page. See **Figure 5.4.33**.

**Date/Time Settings** can be made from this page:

- **Month/Day/Year** – Enter the current **month, Day and Year** in their respective input Space as shown in **Figure 5.4.33**. **For example:** 1<sup>st</sup> January 2017 should be entered as 01 in [Month], 01 in [Day] and 2017 in [Year]. Tap on **[Set]** button after entering Month, Day and Year to set the date.
- **Hour:Min**– Enter the hours using the 24 hour format and Minutes from 0 to 60 in their respective input Space as shown in **Figure 5.4.33**. **For example:** 9:30 p.m. should be entered as 21 Hours and 30 Minutes.
- **24 Hour Time Format** –Check this Checkbox if Date/Time needs to be displayed in 24 hours format.
- **Daylight Saving** - Check this Checkbox if Daylight saving needs to be enabled.

**Display Settings** are also available on the Date/Time Page. Options are:

- **Brightness** - Brightness of the Screen can be adjusted by tapping on [+] and [-] buttons.
- **Backlight off Time** - Enter the time in minutes for which if screen is ideal then Backlight will turn off. Touch the screen to turn Backlight on. If any alarm present in system, then Backlight will not turn off.
- **Enable Backlight** - Check this checkbox to enable Backlight on/off functionality.
- **Touch Calibration** – Tap this button to calibrate the Screen touch. On tapping it will navigate to Calibration Page. Touch the pointer as it appears on Calibration screen. Once all pointers are touched calibration will be automatically done and it will revert back to Date/Time screen.

### 5.4.9 File System



Figure 5.4.34-File System

File System can be used to load and save User defined Settings or Default Settings. File System page is shown in **Figure 5.4.34**.

In the example the settings for Xylem, a Custom Setting and the latest Recipe setting are displayed. All Parameters and Setpoint Settings can be stored on the Recipe setting and Loaded back when required.



Figure 5.4.35-User Buttons

Tap on **[Load User Setup]** button on **[File System]** Page as shown in **Figure 5.4.35**, to load the settings defined by user. This will overwrite default Setup. Default Setup will be saved for future use.

Tap on **[Save User Setup]** button on **[File System]** Page to save the settings defined by user. User can overwrite the default setpoints and parameters and this setup can be saved for Future use.

Tap on **[Load Default Setup]** button on **[File System]** Page to load the Default Settings. This will overwrite User Defined Setup. But User Defined Setup will be saved for future use.

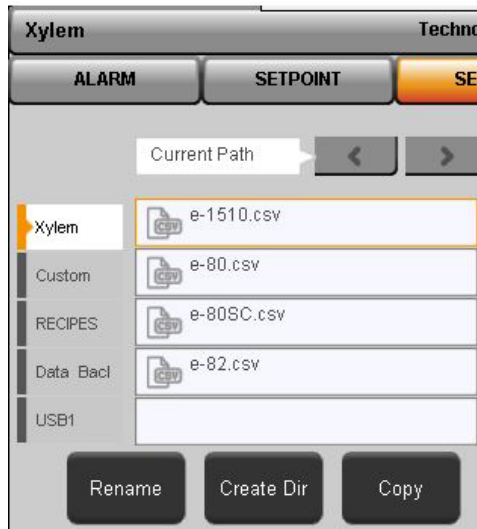


Figure 5.4.36-USB Directory

Insert USB in the USB slot available on Back panel of HMI. When USB is inserted in the slot, Directory for USB will appear as shown in **Figure 5.4.36**. User can Load the Recipe from the USB stick or can take Backup of the existing User/Default recipe into the USB stick.

There are some utility buttons on the File System Screen that facilitates user for certain operations:

- **Rename** – [Rename] button to Rename any Recipe file located in default Location or USB stick.
- **Create Dir** – [Create Dir] button to create a new directory to save the recipe file.
- **Copy** – [Copy] button to copy a recipe file from one location to another.
- **Cut** – [Cut] button to move Recipe file from one location to another.
- **Paste** – [Paste] button to Paste the copied Recipe file to the desired location.
- **Delete** – [Delete] button to delete the existing recipe file from Default location or USB stick.
- **Refresh** – [Refresh] button to refresh the list of recipes available in the directory.
- **Multiselect**– [Multiselect] button to select multiple Recipe files for Cut/Copy/Delete operation.
- **Directional Arrows** – move list of saved settings up and down.

**Note:** Opening or Importing a Recipe is only permitted when the machine is stopped.

One more directory available is Data Backup [Data\_Back]. This directory Stores Logger Data from Event Log in XML format.

### 5.4.10 Logger

Sections under [Logger] are:

#### 5.4.10.1 Event Log



Figure 5.4.37-Event Log

[Event Log] Logs, the event of the system with Date and Time as shown in **Figure 5.4.37**.

Historical events can be checked for desired time frame. Tap on [Edit] button to enter the desired time frame in the Filter settings as shown in **Figure 5.4.38**.



Figure 5.4.38-Filter Settings

Event Log can be exported and saved as XML file. To export event log tap on [Export] button available on [Event Log] Page.

This stored XML file can be found in Data\_Backup Directory on [Recipe] Page as shown in **Figure 5.4.34**.

### 5.4.10.2 System Diagnostic

System Diagnostic displays are available as Read Only items for **Technician** users. Sections under **[System Diagnostic]** are:

#### 5.4.10.2.1 SDM

**[SDM]** System Diagnostic manager is used to diagnose system hardware and software data statistics as shown in **Figure 5.4.39**.

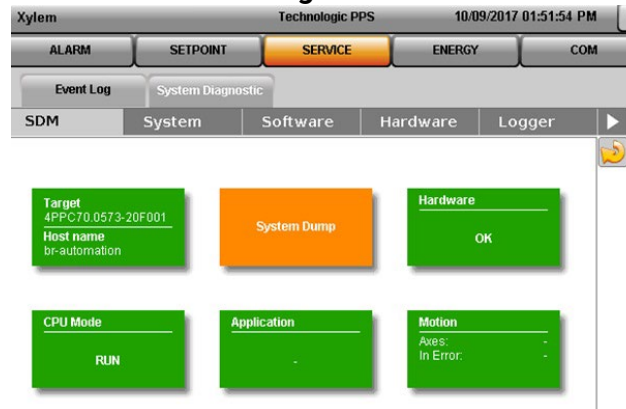


Figure 5.4.39-System Diagnostic

The SDM also provides the following diagnostics options:

- SDM support in diagnostics mode
- Load the System Dump for system analysis
- Motion axis information, trace data and operations, upload the network command trace
- I/O viewer in hardware tree for displaying I/O status
- Hardware analysis with additional display of model number/equipment ID.

#### 5.4.10.2.2 System

This tab displays the system settings and operating modes of the target system. See **Figure 5.4.40**.

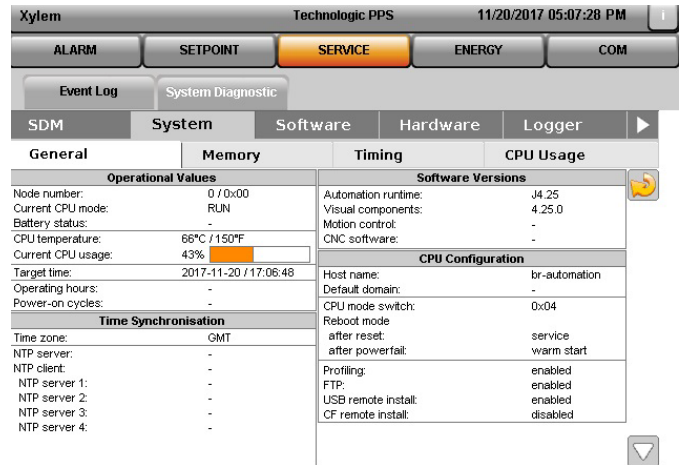


Figure 5.4.40-System Diagnostic\_System

- **[General]** displays Operational Values, Time Synchronization, Software Versions and CPU Configuration. Use Directional Arrow and to move list up or down and Refresh to update the listing.
- **[Memory]** displays the amount of configured and available memory on the target system.
- **[Timing]** displays the timer setting and the task class cycle time configured on the target system.
- **[CPU Usage]** displays a graph of the CPU load on the target system since the last power-on. The time range displayed can be set using the ComboBox under Time Interval.

#### 5.4.10.2.3 Software

**[Software]** displays the modules found on the target system. The module list can be saved on the PC in .txt or .csv format. See **Figure 5.4.41**.

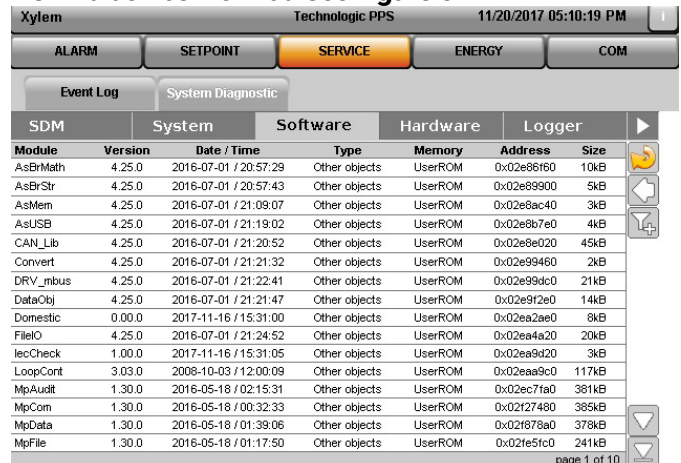


Figure 5.4.41-System Diagnostic\_Software

**[Software]** lists Software System Properties. Directional Arrow moves list up or down, Refresh to

update the listing. Left arrow returns user to previous Tab.

### 5.4.10.2.4 Hardware

[Hardware] displays the Hardware Tree of the target system. It contains information and status of configuring the various modules. See **Figure 5.4.42**.

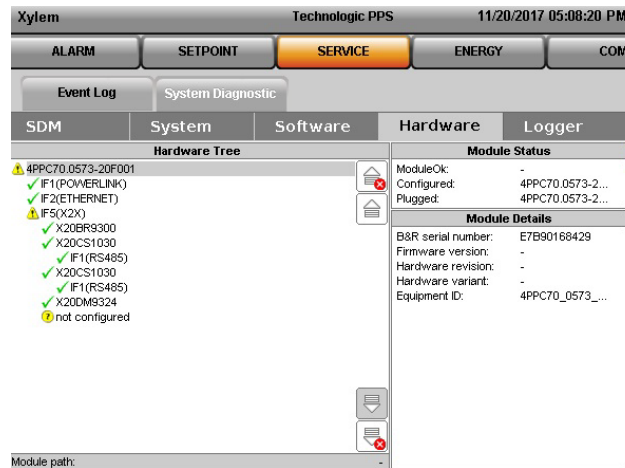


Figure 5.4.42-System Diagnostic\_Hardware

[Hardware] displays Hardware Tree, Module Status and Module Defaults.

### 5.4.10.2.5 Logger

[Logger] lists the current 100 log entries of the Logger modules (User Logbook/Error logbook) of the target system. Logger records can also be uploaded from the target system and evaluated in the Automation Studio Logger. See **Figure 5.4.43**.

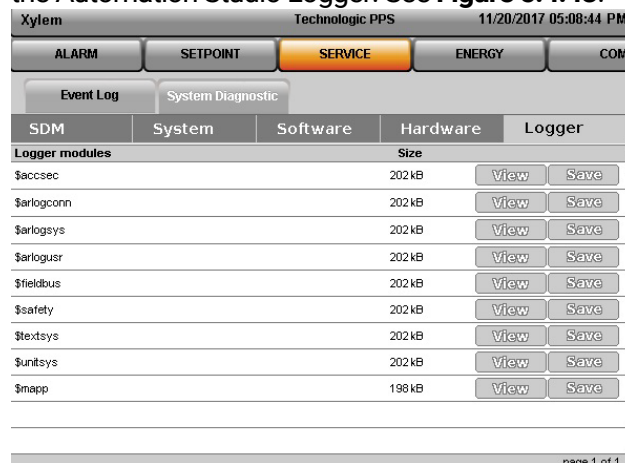


Figure 5.4.43-System Diagnostic\_Logger

[Logger] displays Logger modules and data size. Tap on [View] or [Save].

### 5.4.10.2.6 Profiler

[Profiler] configuration is created in Automation Studio and can be transferred to the target system, started and stopped on this page. Profiler records can also be uploaded from the target system and evaluated in the Automation Studio Profiler. See **Figure 5.4.42**.

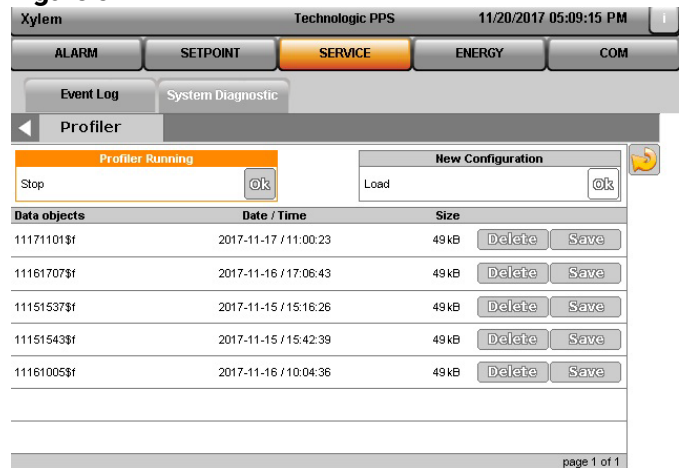


Figure 5.4.44-System Diagnostic-Profiler

[Profiler] displays

- Profile Running – Stop/Start/OK
- New Configuration – Load/OK
- Date objects/Date/Time/Size-Delete/Save

### 5.4.11 Test

Selections under [Test] are:

#### 5.4.11.1 Test IO

[Test IO] testing of Digital inputs and Digital Outputs. See **Figure 5.4.45**.

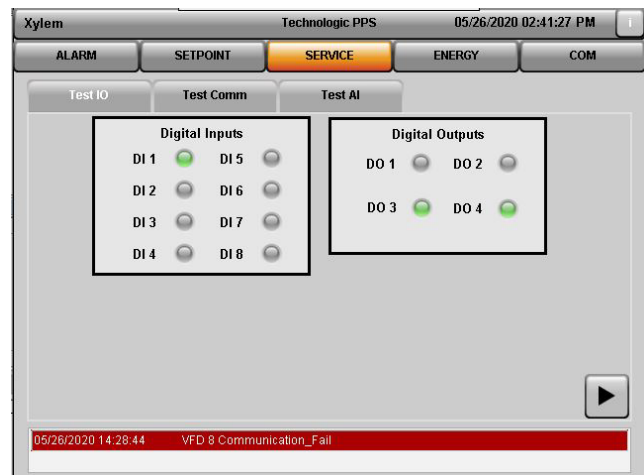






Figure 5.4.45-Test IO

- **Digital Input** - Status of Digital Inputs can be checked by indication bulb. If the input is 1 then indication is  and if the input is 0 then indication is . Digital inputs can only be read.
- **Digital Output** - Status of Digital Outputs can be changed by tapping on indication bulb. To make output TRUE when output is FALSE, Tap on indication bulb and the indication will be . To make output False when output is True, Tap on indication bulb and the indication will be .

### 5.4.11.2 Test Comm

VFD (Variable Frequency Drive) and BMS (Building Management System) Communication can be checked on [Test Comm] Page. See **Figure 5.4.46**.

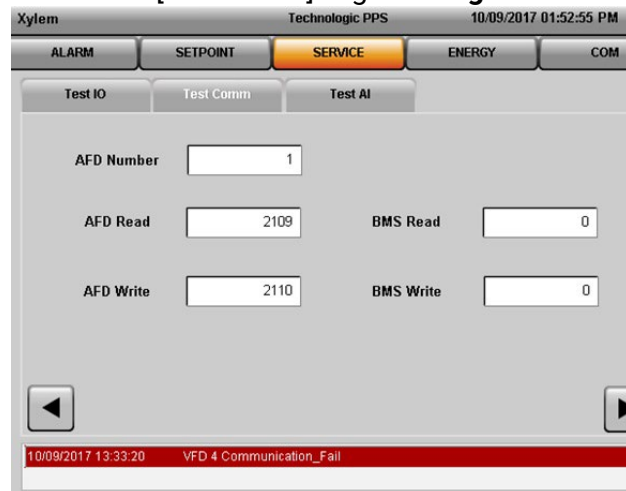


Figure 5.4.46-Test Comm

- **Test VFD Communication**—At a time only one VFD communication can be checked. Enter the VFD Number in the Numeric Input box. If the Communication is healthy, AFD Read and AFD Write counter will start counting.
- **BMS Communication**—As soon as the BMS communication is established, Counter for BMS Read and BMS Write will start Counting.

### 5.4.11.3 Test AI

The Test AI screen will show the row value coming from the sensor without any scaling. See **Figure 5.4.47**.

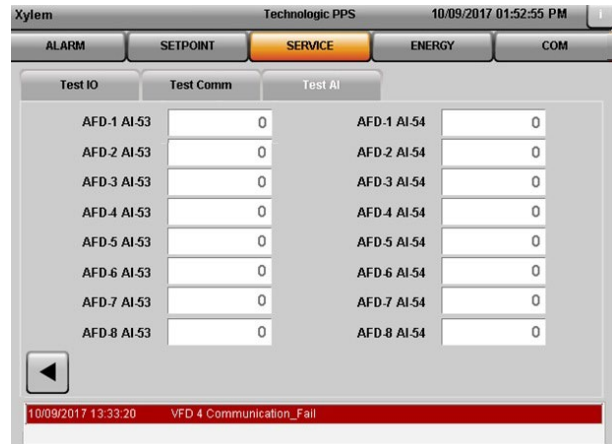


Figure 5.4.47-Test AI

Lists AFD-1 through 8 for AI-53  
Lists AFD-1 through 8 for AI-54

### 5.4.12 Info

System information can be checked on [Info] page. See **Figure 5.4.48**.

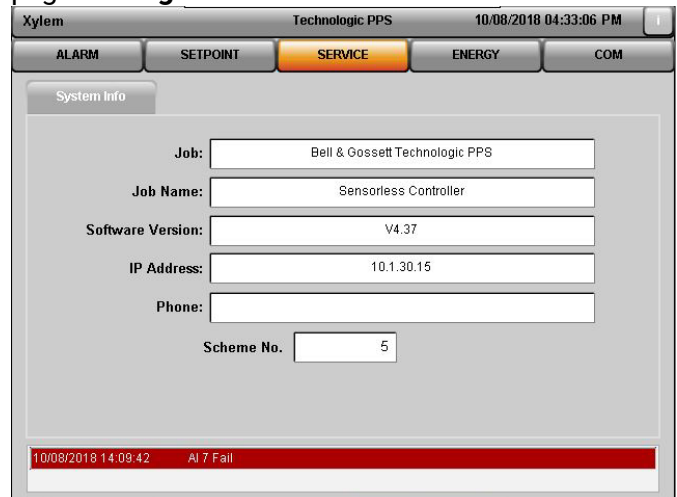


Figure 5.4.48-System Info

- Job
- Job Name
- Software version-the installed Application Software version
- IP Address-the IP Address of the System
- Phone-the contact number for registering a service request
- Scheme No-the current Scheme of the system.

### 5.5 Alarm

When [Alarm] button is tapped, Alarm Page appears as shown in **Figure 5.5.1**.




Figure 5.5.1-Alarm


On this page list of current alarm with date and time stamp is available. There is Color code to identify the Status of Alarm.

If the Alarm is highlighted in RED, then the alarm is Active and not acknowledged.

If the Alarm is highlighted in BLUE, then the Alarm is Active and acknowledged.

Alarms can be acknowledged by tapping  button on [Alarm] page.

The Alarms which are no more active will disappear automatically from [Alarm] page. Those alarms can be found in [Historical Alarm] page as shown in **Figure 5.4.2**. To open Historical alarm page, tap on **History** button available on [Alarm] page.

Tapping  on Alarm screen navigates to the Alarm Help page, a list of all Alarms with Help Text for each Alarm. The alarms which are active are shown in Red. See **Figure 5.5.3** for details.

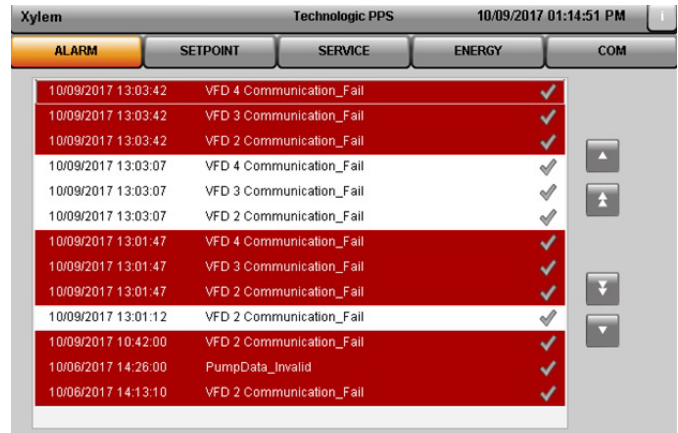


Figure 5.5.2-Alarm History

Alarm Name	Help Text	Alarm Name	Help Text
<b>Pump Fail</b> 1 2 3 4 5 6 7 8	Check DP switch, impeller, coupler, motor	<b>VFD Comm. Fail</b> 1 2 3 4 5 6 7 8	Check communication wiring, and VFD display
<b>All Zone Failure</b> True False	Check all vfd failure according to failure and make it correct	<b>VFD Over Current</b> 1 2 3 4 5 6 7 8	Remove Power & Check if motor shaft can be turned. Check that the motor data entered is correct. Check if motor size matches VFD.
		<b>VFD Over Volt.</b> 1 2 3 4 5 6 7 8	Connect a brake Resistor. Extend the Ramp time. Change Ramp Type in VFD.
		<b>VFD Run Fail</b> 1 2 3 4 5 6 7 8	Check if the motor is connected and the connection is not interrupted (by a service switch or other Device)
		<b>VFD Under Volt.</b> 1 2 3 4 5 6 7 8	The DC link voltage in VFD is lower than Low-Voltage warning limit. Check the DC Voltage link to VFD.

Figure 5.5.3-Alarm Help Page

Refer to **Section 6.14>Maintenance>Troubleshooting** for additional information on Troubleshooting.

Help Screen Alarm	Help/Help Screen Display	Detailed Description
AI Fail	Check Wiring, Piping, Polarity, Continuity. The Controller is not receiving the proper 4-20mA.	Check Wiring, Piping, Polarity, Continuity. The Controller is not receiving the proper 4-20mA or 0-10v
Pump Fail	Check DP switch, impeller, coupler, motor	The controller is receiving a closed signal from the differential pressure switch

		for pump number X after it has been given a start command
VFD Comm. Fail	Check communication wiring, and VFD display	The controller is not receiving a closed run signal from VFD number X after it has been given a start command or communication failure or VFD fault
VFD Over Current	Remove Power and Check if motor shaft can be turned. Check that the motor data entered is correct. Check if motor size matches VFD.	Remove Power and Check if motor shaft can be turned. Check that the motor data entered is correct. Check if motor size matches VFD.
VFD Over Volt.	Connect a brake Resistor. Extend the Ramp time. Change Ramp Type in VFD.	Connect a brake Resistor. Extend the Ramp time. Change Ramp Type in VFD.
VFD Run Fail	Check if the motor is connected and the connection is not interrupted (by a service switch or other Device)	Check if the motor is connected and the connection is not interrupted (by a service switch or other Device)
VFD Under Volt	The DC link voltage in VFD is lower than Low-Voltage warning limit. Check the DC Voltage link to VFD.	The DC link voltage in VFD is lower than Low-Voltage warning limit. Check the DC Voltage link to VFD.
All zone Failure	If all VFD fails then AZF alarm triggers.	Check all other alarm which leads to failure of VFDs.

## 5.6 Setpoint

Sections under [Setpoint] tab are:

### 5.6.1 Setpoint

Three Control Setpoint options are available.

#### 5.6.1.1 Fixed Setpoint

When Fixed Setpoint is selected as Control Setpoint option, then Setpoint is considered from Setpoint screen.

- Fixed Setpoint Screen for Sensorless Configuration as shown in **Figure 5.6.1**.

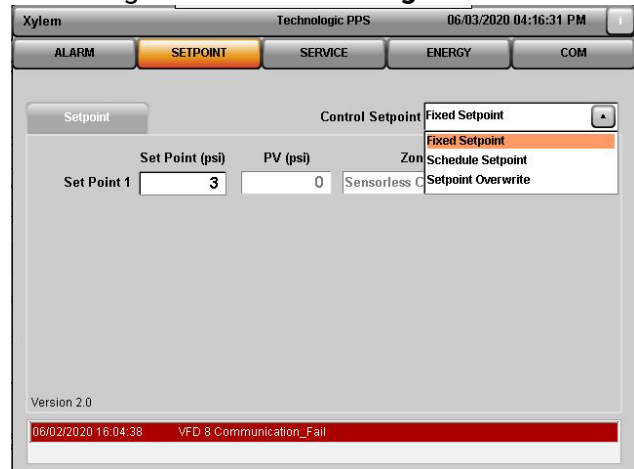


Figure 5.6.1-Fixed Setpoint-sensorless

- Fixed Setpoint Screen for Sensor Configuration as shown in **Figure 5.6.2**.

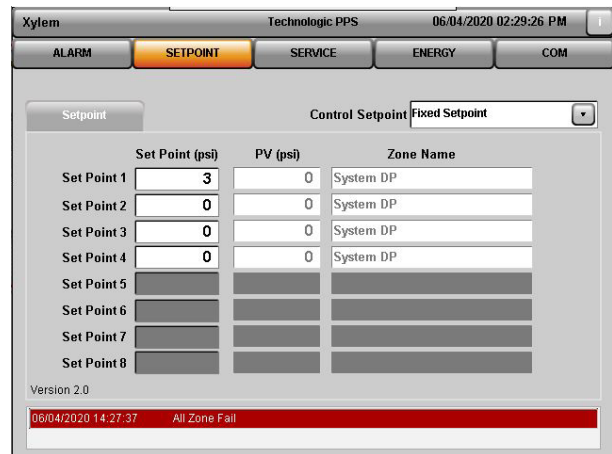


Fig 5.6.2 Fixed Setpoint-sensor control

#### 5.6.1.2 Schedule Setpoint

When Schedule Setpoint is selected as Control Setpoint option, then Setpoint is considered from Setpoint value entered on Scheduled Setpoint page as shown in **Section 5.6.3**. See **Figure 5.6.3**.

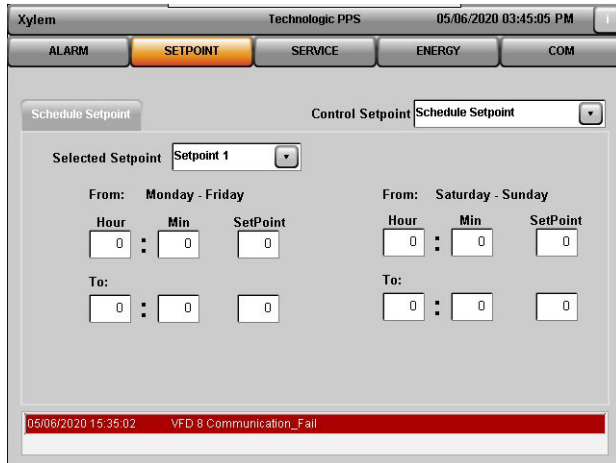


Figure 5.6.3-Setpoint\_ScheduleSetpoint

### 5.6.1.3 Setpoint Overwrite

When **Setpoint** Overwrite is the control setpoint option then the setpoint is overwritten by BMS communication.

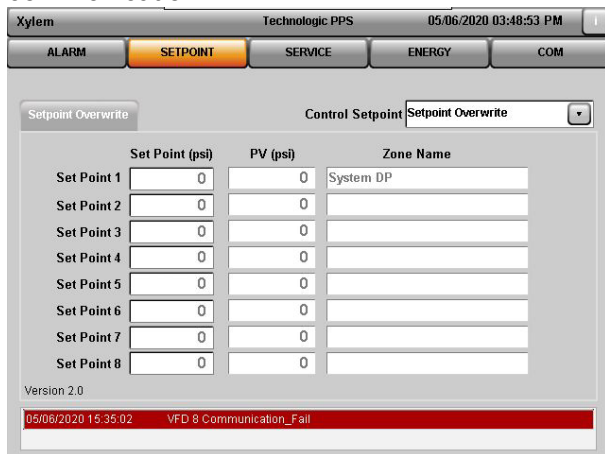


Figure 5.6.4-Setpoint\_Overwrite

## 5.6.2 Scheduled Setpoint

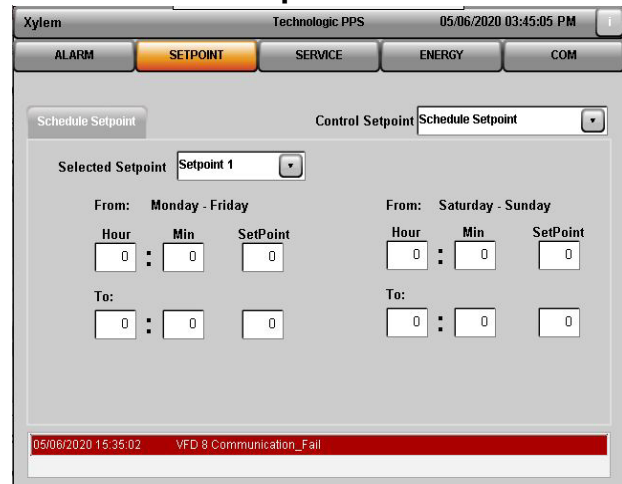


Figure 5.6.5-Scheduled Setpoint

When Scheduled Setpoint is selected as Control Setpoint option, then Setpoint is considered from Setpoint value entered on Scheduled Setpoint page as shown in **Figure 5.6.5**.

Two different set point values can be scheduled for Set Point 1, Set Point 2 and Set Point 3 from Monday to Friday and similarly for Saturday and Sunday.

Setpoints can be selected from dropdown list for Selected Setpoint.

## 5.7 Energy

Sections under **[Energy]** tab are as follows:

### 5.7.1 Data Table

Data Table Shows total KWh and Flow values for daily, weekly, monthly and yearly. Scrolling is possible using **[UP]** and **[DOWN]** arrow keys.

**5.7.1.1 Day** – Day wise sorting of KWh and Flow is available on this page. It is shown in **Figure 5.7.1**. Date is in MM/DD/YYYY Format. Maximum up to the last 180 days of data can be monitored.

DAY	WEEK	MONTH	YEAR
Date	kWh Variable speed	kWh Standard	Gallon
10/08/2018	4	6	50914
10/07/2018	3	4	0
10/06/2018	50	54	324636
10/05/2018	17	18	178681
10/04/2018	0	0	0
10/03/2018	36	63	479450
10/02/2018	37	53	458233
10/01/2018	38	54	479543
09/30/2018	38	53	471113
09/29/2018	21	33	260807

Figure 5.7.1-Data Table-Day

DAY	WEEK	MONTH	YEAR
Month	kWh Variable speed	kWh Standard	Gallon
10/2018	7	115	53755
09/2018	0	0	0
08/2018	98	140	1214336
07/2018	0	0	0
06/2018	13	15	136323
05/2018	0	0	0
04/2018	164	193	3782395629
03/2018	145	156	3782287387
02/2018	0	0	0
01/2018	1	0	1192115209

Figure 5.7.3-Data Table-Month

**5.7.1.2 Week** – Week wise sorting of KWh and Flow is available on this page. It is shown in **Figure 5.7.2**. Date is in MM/DD/YYYY Format. Maximum up to the last 60 weeks data can be monitored.

DAY	WEEK	MONTH	YEAR
Date	kWh Variable speed	kWh Standard	Gallon
10/07/2018	105	115	556648
09/30/2018	0	0	0
09/23/2018	0	0	0
09/16/2018	0	0	0
09/09/2018	0	0	0
09/02/2018	0	0	0
08/26/2018	0	0	0
08/19/2018	0	0	0
08/12/2018	0	0	0
08/05/2018	0	0	0

Figure 5.7.2-Data Table-Week

**5.7.1.4 Year** – Yearly sorting of KWh and Flow is available on this page. It is shown in **Figure 5.7.4**. Maximum of up to the last 20 years data can be monitored.

DAY	WEEK	MONTH	YEAR
Month	kWh Variable speed	kWh Standard	Gallon
2018	7	115	53755
2017	98	104	503317
2016	0	0	0
2015	0	0	0
2014	0	0	0
2013	0	0	0
2012	0	0	0
2011	0	0	0
2010	0	0	0
2009	0	0	0

Figure 5.7.4-Data Table-Year

**5.7.1.3 Month** – Monthly sorting of KWh and Flow is available on this page. It is shown in **Figure 5.7.3**. Date is in DD/YYYY Format. Maximum of up to the last 30 months of data can be monitored.

## 5.7.2 Operation

System Operation is logged on this page. This is shown in **Figure 5.7.5**.

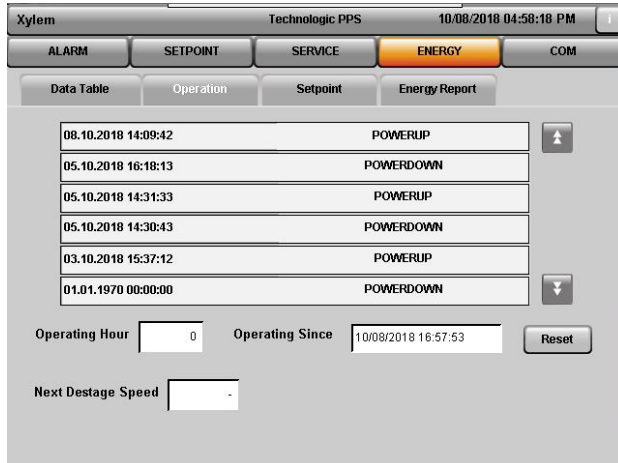


Figure 5.7.5-Operation

On this page System operations such as Power Up and Power Down are logged with a Time Stamp. Date Format is MM/DD/YYYY.

- **[Operating hour]** shows the time of System operation since last Power up.
- **[Operating Since]** shows time the time of last system Power up.
- **[Next DeStage Speed]** shows the speed of pump when next DeStage will occur.

### 5.7.3 Setpoint

#### 5.7.3.1 Auto Setpoint

Page for Auto Setpoint logging is shown in **Figure 5.7.6**. Setpoint changed through Flow compensation function will be logged on this page along with a Time Stamp, Number of Pump Running, Speed and Suction Pressure.

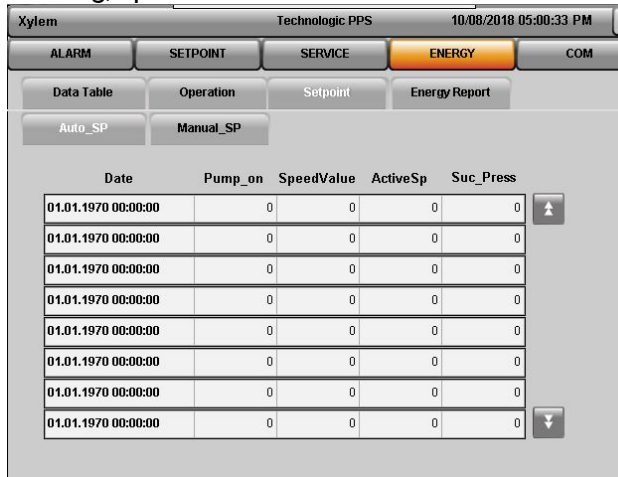


Figure 5.7.6-Auto Setpoint

#### 5.7.3.2 Manual Setpoint

Page for Manual Setpoint logging is shown in **Figure 5.7.7**. Setpoint changed through Fixed Setpoint and Schedule Setpoint will be logged along with a Time Stamp.

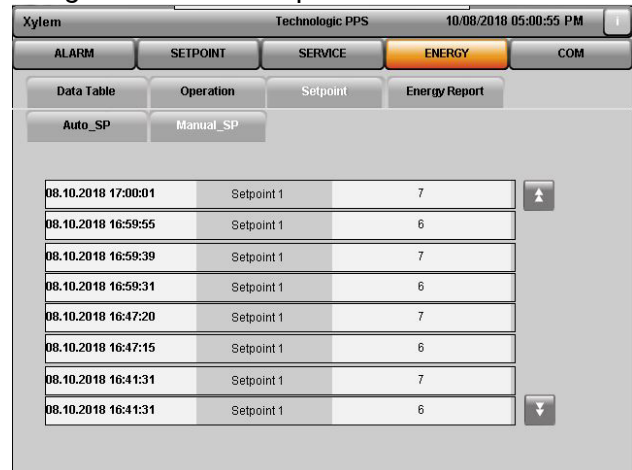


Figure 5.7.7-Manual Setpoint

### 5.7.4 Energy Report

#### 5.7.4.1 System Overview

System Overview Screen is shown in **Figure 5.7.8**. This is just an overview of the system configuration.



Figure 5.7.8-System Overview

#### 5.7.4.2 Energy Saving

[Energy Saving] Screen is shown in **Figure 5.7.9**. Energy saving tells the difference between standard kWh and variable speed kWh.

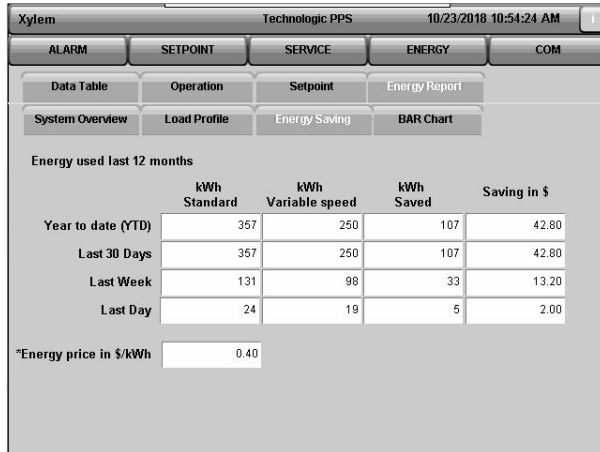


Figure 5.7.9–Energy Saving

### 5.7.4.3 Load Profile

[Load Profile] Screen is shown in **Figure 5.7.10**. Load profile is representation of system flow /loading over the system operating hours.

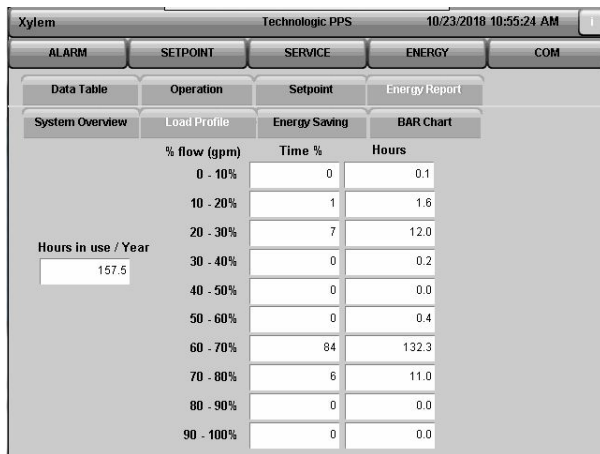


Figure 5.7.10–Load Profile

### 5.7.4.4 Bar Chart

[Bar Chart] Screen is shown in **Figure 5.7.11**. Bar Chart is a graphical representation of Load profile.

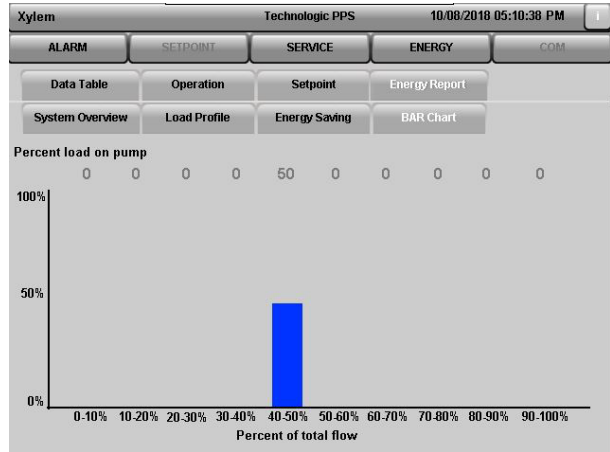


Figure 5.7.11–Bar Chart

## 5.8 Communication

Technologic PPS system supports five different communications Protocol. Those Communication protocols are explained in following sections.

Only one communication protocol will be active at a time. The rest of all communication protocols will be disabled.

### 5.8.1 Communication Selection

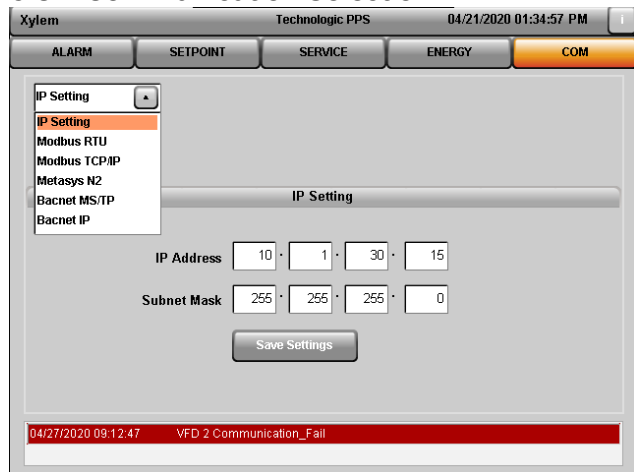


Figure 5.8.1–Communication selection

Click on drop down selection to browse through supported communication as shown in **Figure 5.8.1**. Select the required communication and corresponding window will open to configure the communication. The factory default selection is IP setting screen.

### 5.8.2 Modbus RTU

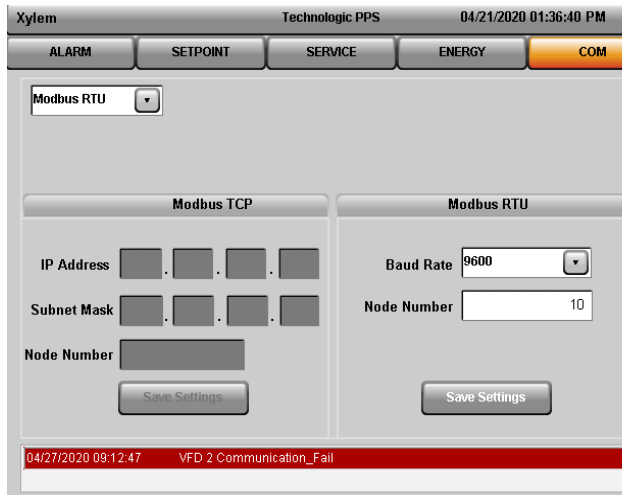


Figure 5.8.2-Modbus RTU

Enter the Node number and Baud rate on Modbus page as shown in **Figure 5.8.2**. Node number has to be unique for each device in the network. Baud rate has to be same for each device in the network. Supported baud rates are 9600, 19200, 38400, 57600, 76800 and 115200.

To make these changes active in controller, tap on [Save Settings] button available on [Modbus] Page. Once the [Save Settings] button is tapped, changes will be incorporated in the controller.

### 5.8.3 Modbus TCP/IP

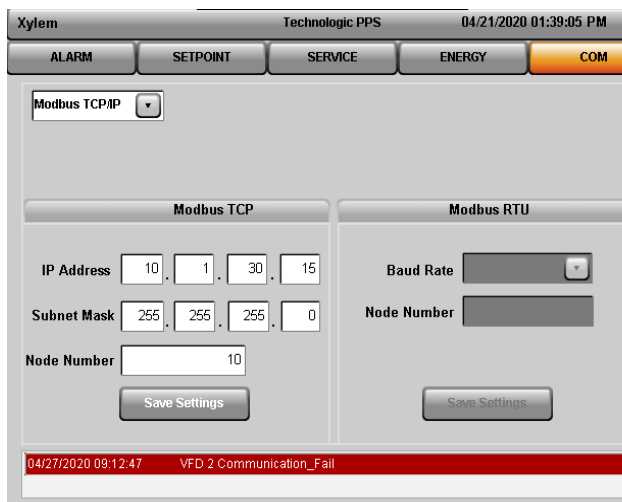


Figure 5.8.3-Modbus TCP/IP

Enter the Node number and IP address in the given range on Modbus page as shown in **Figure 5.8.3**.

To make these changes active in controller, tap on [Save Settings] button available on [Modbus] Page. Once the [Save Settings] button is tapped, changes will be incorporated in the controller.

### 5.8.4 Bacnet IP

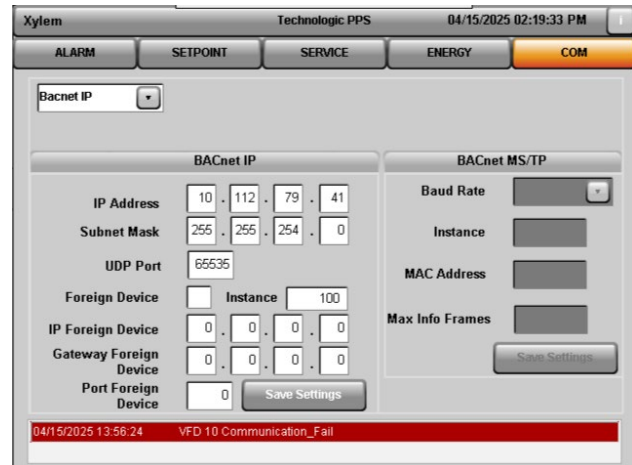


Figure 5.8.4-Bacnet IP

From the device manufacturer, obtain the node number, IP Address, Range and Subnet Mask Address Range of the device that will communicate with the Controller.

For Foreign Device to Communicate with Technologic PPS Controller, Check the Foreign Device Checkbox. From the Foreign device manufacturer, obtain the Port number, IP Address Range and Gateway Address Range of the foreign device that will communicate with the Controller.

Enter all the above gathered data from manufacturer on Bacnet IP Page as shown in **Figure 5.8.4**.

Note: Instance Number Max Value: 4194302  
UDP Port Value Range (Default - 47808):  
47808 - 47823 and 49512 - 65535.

To make these changes active in controller, tap on [Save Settings] button available on [Bacnet] Page. Once the [Save Settings] button is tapped, changes will be incorporated in the controller.

### 5.8.5 Bacnet MS/TP

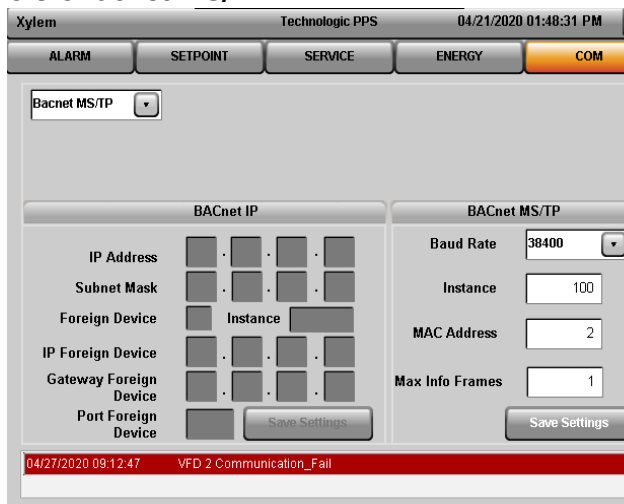


Figure 5.8.5-Bacnet MS/TP

Enter the MAC Address, Instance Number and Baud Rate on Bacnet page as shown in **Figure 5.8.5**. Supported baud rates are 9600, 19200, 38400, 57600 and 76800.

Note: Instance Number Max Value: 4194302

To make these changes active in controller, tap on [Save Settings] button available on [Bacnet] Page. Once the [Save Settings] button is tapped, changes will be incorporated in the controller.

### 5.8.6 Metasys N2

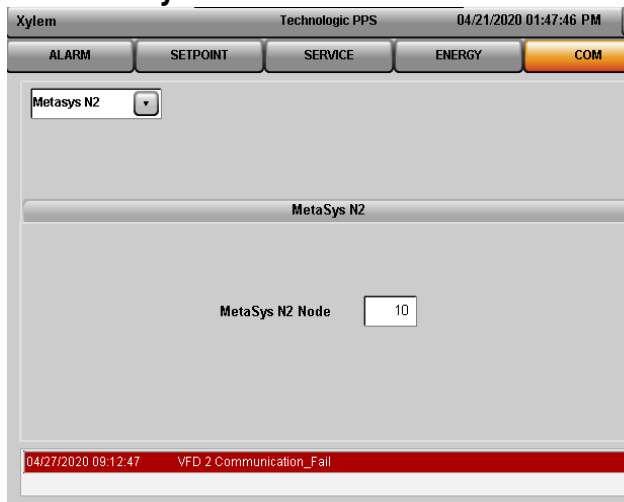


Figure 5.8.6-Metasys M2

Enter the Node number Metasys N2 page as shown in **Figure 5.8.6**. Node number has to be

unique for each device in the network. Obtain the node number that will communicate with the Technologic Controller. To make these changes active in controller, tap on [Save Settings]. Once the [Save Settings] button is tapped, changes will be incorporated in the controller.

### 5.8.7 IP Set

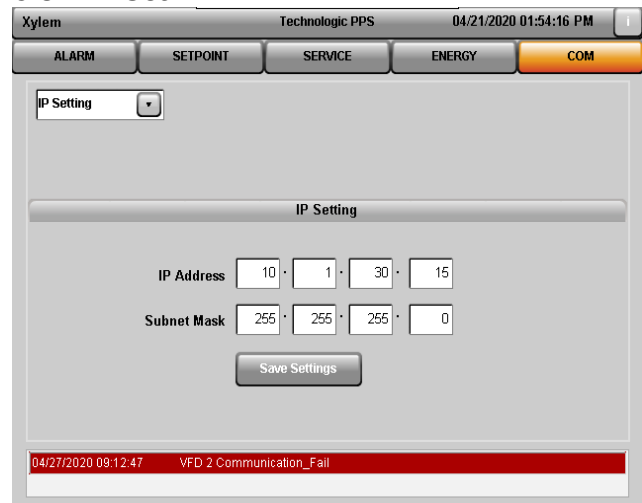



Figure 5.8.7-IP Set

There is an option to set the IP Address and Subnet Mask of the Technologic PPS controller.

On the IP Set page, as shown in **Figure 5.8.7**, enter the IP Address and Subnet Mask address of the controller.

To make these changes active in controller, tap on [Save Settings] button available on [IP Setting] Page. Once the [Save Settings] button is tapped, changes will be incorporated in the controller. IP change of controller will reflect to MODBUS IP and Bacnet IP communication as well.

## 5.9 Trends Screen and Real Time Curve Navigation

Tapping on the Trends button  will display the trend of Graphical representation parameters such as Pressure, Power, Setpoint, Speed and Flow Set Time Interval. Individual Parameters, Minimum and Maximum Boundaries can be set. Trend buttons are found on the Home Screen (**Section**

5.2>General Terms for Navigation of System) and in Pump Selection (Section 5.4.3.4>Service>Pump Selection). See Figure 5.9.1:



Figure 5.9.1-Trends Selection

Tap on [Show Trend] will open the Trends Screen as shown in Figure 5.9.2. This provides a graphical representation of parameters Set Point, Flow, Suction/Discharge Pressure, Pump Speed, Power etc. Historical graphs for these parameters can also be seen by tapping Left/Right cursor button located at bottom end of Trend screen.

Customized Bounds and Intervals can be set by tapping on [Set Interval] and [Set Bounds] button located at Bottom right part of the Trend Screen.

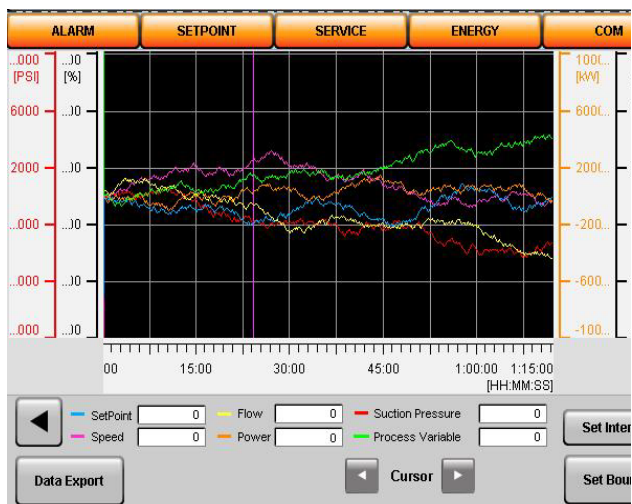


Figure 5.9.2-Trends Screen

On this trend screen, of parameters like Set point, Flow, Suction/Discharge Pressure, Pump Speed, Power etc. can be shown. Historical graphs for

these parameters can also be seen by tapping Left/Right cursor button located at bottom end of Trend screen.

[Data Export] button is located at bottom left part of trend screen. This button gives user option to back up the sensor's data by exporting it externally. On tapping this button, a pop up will appear which contains Checkbox in front of each sensor's name.

User can check/uncheck the checkboxes depending on which data needs to be exported.

Tap on [Show Real Time Graph] provides another graphical representation of parameters and curves as seen in Figure 5.9.3., which is the real time adaptive control associated with the pump control setup screen at Figure 5.4.12. In the real time adaptive pump control graphic display, the pump pressure set point varies adaptively with respect to pump flow rate along the pump control curve,






Figure 5.9.3-Real Time Graph

Key Parameters and Curves for Real Time Graph:

- **GPM** Gallons per minute standard measure for flow
- **Ft** Feet standard measure for pressure
- **%** Pump efficiency in percentage
- **kW** Pump power in kilowatt

- **MPC** Pump Curve or Maximum Pump Curve
- **EOC** Pump End of Curve defined with respect to Maximum Pump Curve for Sensorless conversion.
- **DPC** Designed Pump Curve, defined by the design pressure and flow rate of system per pump.
- **DSC** Designed System Curve, defined by the design pressure and flow rate of system per pump.
- **rtPC** Real Time Pump Curve at Pump Speed
- **rtSC** Real Time System Curve
- **CC** Control Curve, providing the Adaptive Set Point (**ASP**) for control
- **EC** Maximum Pump Efficiency Curve corresponding MPC
- **PC** Maximum Pump Power Curve.

Tap on up  or down  arrows will increase or decrease the GPM cursor reading value along flow axis displayed in Real Time Graph.

Tap on  will open the Filter Selection Screen as shown in **Figure 5.9.4**. This provides a Screen selection for the curves and axis to be displayed in Real Time Graph in **Figure 5.9.3**. The curves to be displayed may be selected by checking up the box on the corresponding curves and axis, etc.

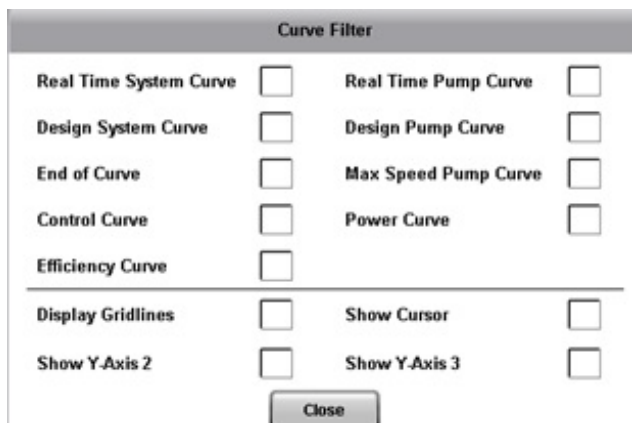


Figure 5.9.4-Filter Selection Screen

### 5.10 Parameter Range Table

REDUNDANT SENSOR MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
Redundant Sensor Type	Active Sensor	1	1-4	
	Drift Threshold	5	0-100	
	Drift Proof Timer	0	0-999	

STAGE/DESTAGE SETUP MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
PV Stage	Stage Speed	95	0-100	
	Stage Proof Timer	30	0-999	
	Stabilization Timer	60	0-999	
PV DeStage	DeStage Speed	85	0-100	
	DeStage Proof Timer	30	0-999	
	Hard DeStage Speed	50	0-100	
	Hard DeStage Proof Timer	30	0-999	
EOC stage (Flow Meter Required)	Pump Max Flow	0	0-65535	
	Stage Proof Timer	30	0-999	
EOC DeStage (Flow Meter Required)	DeStage Flow	0	0-100	
	DeStage Proof Timer	30	0-999	
Flow DeStage	Flow DeStage	0	0-65535	
	De-Stage Proof Timer	30	0-999	
	Force DeStage Timer	0	0-999	
Efficiency Stage/De-stage	Enable Optimal Efficiency operation	0	0-1	
	Minimum Efficiency (%)	50	0-100	
	Eff Stage Time	40	10-999	
	Eff De-stage time	40	10-999	
	Stage/De-stage Proof Time	5	5-999	

VFD MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
VFD Setup	Ramp up Time (s)	5	0-1800	
	Ramp down Time (s)	5	0-1800	
	Minimum Frequency (Hz)	30	0-60	
	Maximum Frequency (Hz)	60	0-60	

PID MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
PID	P	300	0-999	
	I	1	0-999	
	D	15	0-999	
	SP Deviation	0	0-999	
	Index	0	0-999	
	Startup Delay	5	0-999	

TIMED ALTERNATION MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
Timed Alternation	Period (Hrs)	168	0-999	
	Duration (s)	10	0-999	

DAILY ALTERNATION MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
Daily Alternation	Hours (Hrs)	0	0-24	
	Minute (min)	0	0-60	

WEEKLY ALTERNATION MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
Weekly Alternation	Hours (Hrs)	0	0-24	
	Minute (min)	0	0-60	
	Day (1= Mon and 7= Sun)	0	1-7	

MONTHLY ALTERNATION MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
Monthly Alternation	Hours (Hrs)	0	0-24	
	Minute (min)	0	0-60	
	Day (Day of the Month)	0	1-31	

ALARM SETUP - MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
VFD Comm. Failure	VFD Run Proof Timer (S)	30	30-999	
	VFD Comm. Proof Timer (S)	30	30-999	

ALARM SETUP - MENU ITEMS				
Menu Item	Variable	Default	Range	Field Value
VFD UV/OV/OC Failure	VFD UV,OV,OC Proof Timer (S)	10	0-999	
	VFD, UV, OC Max number of Reset	3	0-5	
	Reset Delay Timer (S)	0	0-99	
	Reset Count Proof Timer (Min)	5	0-99	
Pump Failure	Proof Timer (S)	10	0-999	

## 6 Maintenance

### 6.1 Preface

The following is a description of the hardware, diagnostics, and corrective action to maintain a process being controlled by the Pump Controller.

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**NOTE:** THE FOLLOWING SHOULD NOT BE INTERPRETED AS THE MAXIMUM CONFIGURATION OF THIS CONTROLLER, RATHER THIS DESCRIBES ITS APPLICATION AS A TECHNOLOGIC PPS PUMP CONTROLLER ONLY.

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### 6.2 Technical Overview

The Pump Controller is a microprocessor based dedicated pump controller unique to and exclusively manufactured by Xylem Bell & Gossett. All aspects of this unit are strictly proprietary to Xylem Bell & Gossett.

### 6.3 Digital Inputs

The controller has provision for digital inputs with an operating voltage of 24 VDC. This signal voltage must be obtained from the 24 VDC power supply mounted to the subpanel.

It is not recommended that other power sources be used without factory approval.

Customer connections are made directly to the terminal's blocks wired to the digital input module.

### 6.4 Digital Outputs

The controller has provision Only for Digital outputs with an 24 V DC and 0.5 A Current (source) to control External devices.

Customer connections are made directly to the terminal's blocks wired to the digital output module.

### 6.5 Analog Inputs

VFD Analog inputs are provided for process variables and optional transmitters. All analog inputs operate at 4-20mA or 0-10V. They must be powered from 24 VDC power supply.

### 6.6 Memory

The logic is stored in a non-removable flash PROM chip which can only be updated from the USB and Ethernet program port on the CPU. The user setup data is stored in xml file format. The logged data for pressure and flow is stored in csv file format.

### 6.7 CPU

The CPU does not require any maintenance and cannot be replaced as a field repair.

### 6.8 Power Supply

The power supply provides 24 VDC for all digital signals as well as the CPU. It is specifically rated only for the controller and other loads should not be applied without factory approval.

The power supply is protected with both primary and secondary fusing as indicated on the wiring diagram. The size of these fuses is indicated on a sticker inside each enclosure.

**DANGER:**

Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

## 6.9 Protection

**Analog inputs** – the analog inputs from the drive must be wired according to the wiring diagram that shipped with the unit.

**Protection** – all analog inputs are protected from high voltage, crossed wiring, etc. A sustained fault will be limited to 20mA or 10V by the current limiting circuit.

**Digital Inputs** – as long as input power is derived from the integral 24VDC power supply they are protected.

**Digital Outputs** – each output shall not exceed the ratings on the digital output module.

## 6.10 Instruments and Their Use

With the diagnostics described herein extensive instruments are not required. However, the instruments used should be quality units to meet the following at a minimum.

Under no circumstances shall any instrument be used to test any on board components. Especially risky is an ohmmeter with battery voltage higher than TTL logic or applied with incorrect polarity.

### 6.10.1 AC/DC voltmeter

- Input impedance shall not be less than 10 MEGOHM.
- Accuracy - AC  $\pm$  2% of Full Scale
- DC  $\pm$  3% of Full Scale
- Rated circuit to ground voltage = 1000V.

### 6.10.2 Ohmmeter

- Accuracy  $\pm$  2%
- Overload protection voltage = 1000V.

### 6.10.3 Millimeter

- Accuracy  $\pm$  2% of Full Scale

### 6.10.4 Signal generator (analyzer) – recommended

- Beta calibrator Model 434 20mA signal analyzer.
- Altek calibrator Model 334 4-20mA loop analyzer.

Either instrument may be purchased from a Local Process Control Distributor.

**NOTE:** If some other instrument is used it must float above ground, preferably battery powered.

## 6.11 Field Repair

### 6.11.1 General

Typical field repair should include: replacing fuses, replacing input/output modules and assuring connections are correct and secure.



**DANGER:**

Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.

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### 6.12 Program updating

To update to a new version of the program the program must be downloaded through the USB port on the controller. This can be accomplished by one of the following means:

- A factory authorized technician uploads on job site.
- Replace the controller with one that has been pre-programmed at the factory.

Contact your Xylem representative for the preferred method of upgrading your software.

### 6.13 Procedure to Switch Danfoss Drive in Hand Mode

**Case 1:** Lost the communication between Controller and Drive.

- Notice that Drive and/or Controller should be showing the communication Fault.
- Change parameter 8-04 to "OFF" in Drive and Go back to main page by pressing "STATUS" key
- Press "OFF" key, this step will make sure that Drive does not start up after pressing reset.
- Pressing "RESET" in Drive will reset the communication fault alarm from Drive.
- Press "HAND ON" key to start the Drive in manual mode and use UP, DOWN, LEFT and RIGHT arrow keys to change the speed.
- Press "AUTO ON" key in Drive to go back to auto mode after resolving the communication problem.

**Note:** For any reason if communication is unstable and so it is recovering and dropping at certain intervals then it will also require to disconnect the communication connector from the corresponding Drive or Controller itself if same problem with all Drive's communication.

**Case 2:** Communication between Controller and Drive is working.

- Notice that Drive and Controller both should be not showing the communication Fault.
- Disable the corresponding pump from the Controller using "PUMP ENABLE" key or stop the System using "START/STOP" key on Controller if all Drives are to be switch on Manual/Off mode.
- Press "HAND ON" key to start the Drive in manual mode and use UP, DOWN, LEFT and RIGHT arrow keys to change the speed.
- Use "OFF" key on drive to stop the Drive.
- Press "AUTO ON" key in Drive then enable pump from Controller and Start the system to go back to auto mode.

**Note:** In this case Drive stops, if communication loss occurs during the Drive running in Manual Mode. In that scenario follow the steps of case 1 to allow Drive to run again in Manual mode.

**Case 3:** Want to Replace the Controller

- Stop the System using "START/STOP" key on Controller.

- Disconnect the Drives communication cable from the controller.
- Drive and Controller both will notice the communication drop and raise the alarm.
- Follow five steps below for each drive require to be run in Manual Mode and switch back to Auto.
- Change parameter 8-04 to "OFF" in Drive and Go back to main page by pressing "STATUS" key
- Press "OFF" key, this step will make sure that Drive does not start up after pressing reset.
- Pressing "RESET" in Drive will reset the communication fault alarm from Drive.
- Press "HAND ON" key to start the Drive in manual mode and use UP, DOWN, LEFT and RIGHT arrow keys to change the speed.
- Press "AUTO ON" key in Drive to go back to auto mode when replaced Controller is ready to connect.
- Connect Drives communication cable to controller.

## 6.14 Troubleshooting

### VFD FAILURE

#### Remedy:

- Cycle Power to VFD and Station.
- Check power wiring and fuses for affected VFD.
- Check all wiring between VFD and PLC.
- Check to be sure VFD is not in LOC mode.

## 6.15 Maintenance (Physical)

### 6.15.1 Electrical

No maintenance is required for the electrical panel except to keep the modules free of dirt and dust that might hold moisture. Cabinet door should be kept closed, and the components kept dry.

### 6.15.2 Mechanical

- If a B&G pump was supplied, it was lubricated at the factory. Future lubrication should be according to the instructions that came with the pump.
- If there is a danger of freezing, drain the pump. Inspect pump and system piping regularly.
- For leaky seals or gaskets and loose or damaged components, replace or repair as required.

## 7. Appendix

### 7.1 TechnoLogic PPS Modbus RTU Points Table

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
02	1	Pump #1 Overload Failure	1 = Failure 0 = O.K.	10001	
02	2	Pump #1 Failure	1 = Failure 0 = O.K.	10002	
02	3	Pump #1 AFD Failure	1 = Failure 0 = O.K.	10003	
02	4	Pump #1 Off Alarm	1 = Alarm 0 = O.K.	10004	
02	5	Pump #2 Overload Failure	1 = Failure 0 = O.K.	10005	
02	6	Pump #2 Failure	1 = Failure 0 = O.K.	10006	
02	7	Pump #2 AFD Failure	1 = Failure 0 = O.K.	10007	
02	8	Pump #2 Off Alarm	1 = Alarm 0 = O.K.	10008	
02	9	Pump #3 Overload Failure	1 = Failure 0 = O.K.	10009	
02	10	Pump #3 Failure	1 = Failure 0 = O.K.	10010	
02	11	Pump #3 AFD Failure	1 = Failure 0 = O.K.	10011	
02	12	Pump #3 Off Alarm	1 = Alarm 0 = O.K.	10012	
02	13	Pump #4 Overload Failure	1 = Failure 0 = O.K.	10013	
02	14	Pump #4 Failure	1 = Failure 0 = O.K.	10014	
02	15	Pump #4 AFD Failure	1 = Failure 0 = O.K.	10015	
02	16	Pump #4 Off Alarm	1 = Alarm 0 = O.K.	10016	
02	17	Pump #5 Overload Failure	1 = Failure 0 = O.K.	10017	
02	18	Pump #5 Failure	1 = Failure 0 = O.K.	10018	
02	19	Pump #5 AFD Failure	1 = Failure 0 = O.K.	10019	
02	20	Pump #5 Off Alarm	1 = Alarm 0 = O.K.	10020	
s02	21	Pump #6 Overload Failure	1 = Failure 0 = O.K.	10021	
02	22	Pump #6 Failure	1 = Failure 0 = O.K.	10022	
02	23	Pump #6 AFD Failure	1 = Failure 0 = O.K.	10023	
02	24	Pump #6 Off Alarm	1 = Alarm 0 = O.K.	10024	
02	25	Pump #7 Overload Failure	1 = Failure 0 = O.K.	10025	
02	26	Pump #7 Failure	1 = Failure 0 = O.K.	10026	
02	27	Pump #7 AFD Failure	1 = Failure 0 = O.K.	10027	
02	28	Pump #7 Off Alarm	1 = Alarm 0 = O.K.	10028	
02	29	Pump #8 Overload Failure	1 = Failure 0 = O.K.	10029	
02	30	Pump #8 Failure	1 = Failure 0 = O.K.	10030	
02	31	Pump #8 AFD Failure	1 = Failure 0 = O.K.	10031	
02	32	Pump #8 Off Alarm	1 = Alarm 0 = O.K.	10032	
02	33	System Reset Required	1 = Yes 0 = No	10033	
02	34	Pump #1 Enabled	1 = Enabled 0 = Disabled	10034	
02	35	Pump #1 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10035	
02	36	Pump #1 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10036	
02	37	Pump #2 Enabled	1 = Enabled 0 = Disabled	10037	
02	38	Pump #2 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10038	
02	39	Pump #2 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10039	
02	40	Pump #3 Enabled	1 = Enabled 0 = Disabled	10040	
02	41	Pump #3 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10041	

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
02	42	Pump #3 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10042	
02	43	Pump #4 Enabled	1 = Enabled 0 = Disabled	10043	
02	44	Pump #4 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10044	
02	45	Pump #4 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10045	
02	46	Pump #5 Enabled	1 = Enabled 0 = Disabled	10046	
02	47	Pump #5 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10047	
02	48	Pump #5 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10048	
02	49	Pump #6 Enabled	1 = Enabled 0 = Disabled	10049	
02	50	Pump #6 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10050	
02	51	Pump #6 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10051	
02	52	Pump #7 Enabled	1 = Enabled 0 = Disabled	10052	
02	53	Pump #7 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10053	
02	54	Pump #7 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10054	
02	55	Pump #8 Enabled	1 = Enabled 0 = Disabled	10055	
02	56	Pump #8 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	10056	
02	57	Pump #8 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	10057	
02	58	Pump #1 On/Off	1 = On 0 = Off	10058	
02	59	Pump #2 On/Off	1 = On 0 = Off	10059	
02	60	Pump #3 On/Off	1 = On 0 = Off	10060	
02	61	Pump #4 On/Off	1 = On 0 = Off	10061	
02	62	Pump #5 On/Off	1 = On 0 = Off	10062	
02	63	Pump #6 On/Off	1 = On 0 = Off	10063	
02	64	Pump #7 On/Off	1 = On 0 = Off	10064	
02	65	Pump #8 On/Off	1 = On 0 = Off	10065	
02	66	System Start/Stop	1 = Start 0 = Stop	10066	
02	67	Analog Input #1 Failure	1 = Failure 0 = O.K.	10067	
02	68	Analog Input #2 Failure	1 = Failure 0 = O.K.	10068	
02	69	Analog Input #3 Failure	1 = Failure 0 = O.K.	10069	
02	70	Analog Input #4 Failure	1 = Failure 0 = O.K.	10070	
02	71	Analog Input #5 Failure	1 = Failure 0 = O.K.	10071	
02	72	Analog Input #6 Failure	1 = Failure 0 = O.K.	10072	
02	73	Analog Input #7 Failure	1 = Failure 0 = O.K.	10073	
02	74	Analog Input #8 Failure	1 = Failure 0 = O.K.	10074	
02	75	Analog Input #9 Failure	1 = Failure 0 = O.K.	10075	
02	76	Analog Input #10 Failure	1 = Failure 0 = O.K.	10076	
02	77	Analog Input #11 Failure	1 = Failure 0 = O.K.	10077	
02	78	Analog Input #12 Failure	1 = Failure 0 = O.K.	10078	
02	79	Analog Input #13 Failure	1 = Failure 0 = O.K.	10079	
02	80	Analog Input #14 Failure	1 = Failure 0 = O.K.	10080	

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
02	81	Analog Input #15 Failure	1 = Failure 0 = O.K.	10081	
02	82	Analog Input #16 Failure	1 = Failure 0 = O.K.	10082	
02	83	General Alarm	1 = Failure 0 = O.K.	10083	
05	1	Pump Sequence Alternation	1 = Yes 0 = No	00001	
05	2	System Reset Request	1 = Yes 0 = No	00002	
05	3	System Start / Stop	1 = Start 0 = Stop	00003	
04, 06	1	Process Variable #1 (Sensorless DP)	0 to Span (in Technologic User Setup Menu)	30001, 40001	
04, 06	2	Process Variable #2	0 to Span (in Technologic User Setup Menu)	30002, 40002	
04, 06	3	Process Variable #3	0 to Span (in Technologic User Setup Menu)	30003, 40003	
04, 06	4	Process Variable #4	0 to Span (in Technologic User Setup Menu)	30004, 40004	
04, 06	5	Process Variable #5	0 to Span (in Technologic User Setup Menu)	30005, 40005	
04, 06	6	Process Variable #6	0 to Span (in Technologic User Setup Menu)	30006, 40006	
04, 06	7	Process Variable #7	0 to Span (in Technologic User Setup Menu)	30007, 40007	
04, 06	8	Process Variable #8	0 to Span (in Technologic User Setup Menu)	30008, 40008	
04, 06	9	Process Variable #9	0 to Span (in Technologic User Setup Menu)	30009, 40009	
04, 06	10	Process Variable #10	0 to Span (in Technologic User Setup Menu)	30010, 40010	
04, 06	11	Process Variable #11	0 to Span (in Technologic User Setup Menu)	30011, 40011	
04, 06	12	Process Variable #12	0 to Span (in Technologic User Setup Menu)	30012, 40012	
04, 06	13	Process Variable #13	0 to Span (in Technologic User Setup Menu)	30013, 40013	
04, 06	14	Process Variable #14	0 to Span (in Technologic User Setup Menu)	30014, 40014	
04, 06	15	Process Variable #15	0 to Span (in Technologic User Setup Menu)	30015, 40015	
04, 06	16	Process Variable #16	0 to Span (in Technologic User Setup Menu)	30016, 40016	
04	17	Total Flow (Sensorless Flow)	0 to Span (in Technologic User Setup Menu)	30017	GPM
04	18	N/A	N/A	30018	N/A
04	19	System KW	0 to Span (in Technologic User Setup Menu)	30019	KW
04	20	KW #1	0 to Span (in Technologic User Setup Menu)	30020	KW
04	21	KW #2	0 to Span (in Technologic User Setup Menu)	30021	KW
04	22	KW #3	0 to Span (in Technologic User Setup Menu)	30022	KW
04	23	KW #4	0 to Span (in Technologic User Setup Menu)	30023	KW

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
04	24	KW #5	0 to Span (in Technologic User Setup Menu)	30024	KW
04	25	KW #6	0 to Span (in Technologic User Setup Menu)	30025	KW
04	26	KW #7	0 to Span (in Technologic User Setup Menu)	30026	
04	27	KW #8	0 to Span (in Technologic User Setup Menu)	30027	
04	28	AMP #1	0 to Span (in Technologic User Setup Menu)	30028	
04	29	AMP #2	0 to Span (in Technologic User Setup Menu)	30029	
04	30	AMP #3	0 to Span (in Technologic User Setup Menu)	30030	
04	31	AMP #4	0 to Span (in Technologic User Setup Menu)	30031	
04	32	AMP #5	0 to Span (in Technologic User Setup Menu)	30032	
04	33	AMP #6	0 to Span (in Technologic User Setup Menu)	30033	
04	34	AMP #7	0 to Span (in Technologic User Setup Menu)	30034	
04	35	AMP #8	0 to Span (in Technologic User Setup Menu)	30035	
04	36	System Differential Pressure	0 to Span (in Technologic User Setup Menu)	30036	PSI
04	37	Temperature Sensor #1	0 to Span (in Technologic User Setup Menu)	30037	F°
04	38	Temperature Sensor #2	0 to Span (in Technologic User Setup Menu)	30038	F°
04, 06	39	Setpoint #1	0 to Span (in Technologic User Setup Menu)	30039, 40039	
04, 06	40	Setpoint #2	0 to Span (in Technologic User Setup Menu)	30040, 40040	
04, 06	41	Setpoint #3	0 to Span (in Technologic User Setup Menu)	30041, 40041	
04, 06	42	Setpoint #4	0 to Span (in Technologic User Setup Menu)	30042, 40042	
04, 06	43	Setpoint #5	0 to Span (in Technologic User Setup Menu)	30043, 40043	
04, 06	44	Setpoint #6	0 to Span (in Technologic User Setup Menu)	30044, 40044	
04, 06	45	Setpoint #7	0 to Span (in Technologic User Setup Menu)	30045, 40045	
04, 06	46	Setpoint #8	0 to Span (in Technologic User Setup Menu)	30046, 40046	
04, 06	47	Setpoint #9	0 to Span (in Technologic User Setup Menu)	30047, 40047	
04, 06	48	Setpoint #10	0 to Span (in Technologic User Setup Menu)	30048, 40048	
04, 06	49	Setpoint #11	0 to Span (in Technologic User Setup Menu)	30049, 40049	

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
04,06	50	Setpoint #12	0 to Span (in Technologic User Setup Menu)	30050, 40050	
04,06	51	Setpoint #13	0 to Span (in Technologic User Setup Menu)	30051, 40051	
04,06	52	Setpoint #14	0 to Span (in Technologic User Setup Menu)	30052, 40052	
04,06	53	Setpoint #15	0 to Span (in Technologic User Setup Menu)	30053, 40053	
04,06	54	Setpoint #16	0 to Span (in Technologic User Setup Menu)	30054, 40054	
04	55	Speed %	0 to 100	30055	%
04	56	Speed Hz	0 to 60	30056	Hz
04	57	Lead Pump Number	1 to Pump # (in Technologic User Setup Menu)	30057	
04	58	Number of Pump Running	2 to Pump # (in Technologic User Setup Menu)	30058	
04	59	Active Zone Number	1 to Zone # (in Technologic User Setup Menu)	30059	
04	60	System Operation Mode	0=Manual, 1=Auto, 2=Auto Bypass, 3=Manual Bypass.	30060	
04	61	Wire to Water Efficiency %	0 to 100	30061	%
04	62	Pump 1 Run Hours	0 to 999	30062	Hours
04	63	Pump 1 Run KHours	0 to 32000	30063	Khours
04	64	Pump 2 Run Hours	0 to 999	30064	Hours
04	65	Pump 2 Run KHours	0 to 32000	30065	Khours
04	66	Pump 3 Run Hours	0 to 999	30066	Hours
04	67	Pump 3 Run KHours	0 to 32000	30067	Khours
04	68	Pump 4 Run Hours	0 to 999	30068	Hours
04	69	Pump 4 Run KHours	0 to 32000	30069	Khours
04	70	Pump 5 Run Hours	0 to 999	30070	Hours
04	71	Pump 5 Run KHours	0 to 32000	30071	Khours
04	72	Pump 6 Run Hours	0 to 999	30072	Hours
04	73	Pump 6 Run KHours	0 to 32000	30073	Khours
04	74	Pump 7 Run Hours	0 to 999	30074	Hours
04	75	Pump 7 Run KHours	0 to 32000	30075	Khours
04	76	Pump 8 Run Hours	0 to 999	30076	Hours
04	77	Pump 8 Run KHours	0 to 32000	30077	Khours
04	78	VFD 1 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30078	
04	79	VFD 2 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30079	
04	80	VFD 3 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30080	
04	81	VFD 4 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30081	
04	82	VFD 5 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30082	
04	83	VFD 6 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30083	

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNITS
04	84	VFD 7 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30084	
04	85	VFD 8 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	30085	

TechnoLogic PPS Modbus IP Points Table

Function Code	Points #	POINT DESCRIPTION	RANG/VALUE	Modbus Address	UNIT S
02	1	Pump #1 Overload Failure	1 = Failure 0 = O.K.	10001	
02	2	Pump #1 Failure	1 = Failure 0 = O.K.	10002	
02	3	Pump #1 AFD Failure	1 = Failure 0 = O.K.	10003	
02	4	Pump #1 Off Alarm	1 = Alarm 0 = O.K.	10004	
02	5	Pump #2 Overload Failure	1 = Failure 0 = O.K.	10005	
02	6	Pump #2 Failure	1 = Failure 0 = O.K.	10006	
02	7	Pump #2 AFD Failure	1 = Failure 0 = O.K.	10007	
02	8	Pump #2 Off Alarm	1 = Alarm 0 = O.K.	10008	
02	9	Pump #3 Overload Failure	1 = Failure 0 = O.K.	10009	
02	10	Pump #3 Failure	1 = Failure 0 = O.K.	10010	
02	11	Pump #3 AFD Failure	1 = Failure 0 = O.K.	10011	
02	12	Pump #3 Off Alarm	1 = Alarm 0 = O.K.	10012	
02	13	Pump #4 Overload Failure	1 = Failure 0 = O.K.	10013	
02	14	Pump #4 Failure	1 = Failure 0 = O.K.	10014	
02	15	Pump #4 AFD Failure	1 = Failure 0 = O.K.	10015	
02	16	Pump #4 Off Alarm	1 = Alarm 0 = O.K.	10016	
02	17	Pump #5 Overload Failure	1 = Failure 0 = O.K.	10017	
02	18	Pump #5 Failure	1 = Failure 0 = O.K.	10018	
02	19	Pump #5 AFD Failure	1 = Failure 0 = O.K.	10019	
02	20	Pump #5 Off Alarm	1 = Alarm 0 = O.K.	10020	
02	21	Pump #6 Overload Failure	1 = Failure 0 = O.K.	10021	
02	22	Pump #6 Failure	1 = Failure 0 = O.K.	10022	
02	23	Pump #6 AFD Failure	1 = Failure 0 = O.K.	10023	
02	24	Pump #6 Off Alarm	1 = Alarm 0 = O.K.	10024	
02	25	Pump #7 Overload Failure	1 = Failure 0 = O.K.	10025	
02	26	Pump #7 Failure	1 = Failure 0 = O.K.	10026	
02	27	Pump #7 AFD Failure	1 = Failure 0 = O.K.	10027	
02	28	Pump #7 Off Alarm	1 = Alarm 0 = O.K.	10028	
02	29	Pump #8 Overload Failure	1 = Failure 0 = O.K.	10029	
02	30	Pump #8 Failure	1 = Failure 0 = O.K.	10030	
02	31	Pump #8 AFD Failure	1 = Failure 0 = O.K.	10031	
02	32	Pump #8 Off Alarm	1 = Alarm 0 = O.K.	10032	
02	33	System Reset Required	1 = Yes 0 = No	10033	

02	34	Pump #1 Enabled	1 = Enabled	0 = Disabled	10034	
02	35	Pump #1 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10035	
02	36	Pump #1 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10036	
02	37	Pump #2 Enabled	1 = Enabled	0 = Disabled	10037	
02	38	Pump #2 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10038	
02	39	Pump #2 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10039	
02	40	Pump #3 Enabled	1 = Enabled	0 = Disabled	10040	
02	41	Pump #3 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10041	
02	42	Pump #3 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10042	
02	43	Pump #4 Enabled	1 = Enabled	0 = Disabled	10043	
02	44	Pump #4 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10044	
02	45	Pump #4 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10045	
02	46	Pump #5 Enabled	1 = Enabled	0 = Disabled	10046	
02	47	Pump #5 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10047	
02	48	Pump #5 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10048	
02	49	Pump #6 Enabled	1 = Enabled	0 = Disabled	10049	
02	50	Pump #6 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10050	
02	51	Pump #6 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10051	
02	52	Pump #7 Enabled	1 = Enabled	0 = Disabled	10052	
02	53	Pump #7 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10053	
02	54	Pump #7 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10054	
02	55	Pump #8 Enabled	1 = Enabled	0 = Disabled	10055	
02	56	Pump #8 Running In Variable Speed Mode	1 = In VSM	0 = Not In VSM	10056	
02	57	Pump #8 Running In Bypass Mode	1 = In Bypass	0 = Not In Bypass	10057	
02	58	Pump #1 On/Off	1 = On	0 = Off	10058	
02	59	Pump #2 On/Off	1 = On	0 = Off	10059	
02	60	Pump #3 On/Off	1 = On	0 = Off	10060	
02	61	Pump #4 On/Off	1 = On	0 = Off	10061	
02	62	Pump #5 On/Off	1 = On	0 = Off	10062	
02	63	Pump #6 On/Off	1 = On	0 = Off	10063	
02	64	Pump #7 On/Off	1 = On	0 = Off	10064	
02	65	Pump #8 On/Off	1 = On	0 = Off	10065	
02	66	System Start/Stop	1 = Start	0 = Stop	10066	

02	67	Analog Input #1 Failure	1 = Failure	0 = O.K.	10067	
02	68	Analog Input #2 Failure	1 = Failure	0 = O.K.	10068	
02	69	Analog Input #3 Failure	1 = Failure	0 = O.K.	10069	
02	70	Analog Input #4 Failure	1 = Failure	0 = O.K.	10070	
02	71	Analog Input #5 Failure	1 = Failure	0 = O.K.	10071	
02	72	Analog Input #6 Failure	1 = Failure	0 = O.K.	10072	
02	73	Analog Input #7 Failure	1 = Failure	0 = O.K.	10073	
02	74	Analog Input #8 Failure	1 = Failure	0 = O.K.	10074	
02	75	Analog Input #9 Failure	1 = Failure	0 = O.K.	10075	
02	76	Analog Input #10 Failure	1 = Failure	0 = O.K.	10076	
02	77	Analog Input #11 Failure	1 = Failure	0 = O.K.	10077	
02	78	Analog Input #12 Failure	1 = Failure	0 = O.K.	10078	
02	79	Analog Input #13 Failure	1 = Failure	0 = O.K.	10079	
02	80	Analog Input #14 Failure	1 = Failure	0 = O.K.	10080	
02	81	Analog Input #15 Failure	1 = Failure	0 = O.K.	10081	
02	82	Analog Input #16 Failure	1 = Failure	0 = O.K.	10082	
02	83	General Alarm	1 = Failure	0 = O.K.	10083	
05	16384	Pump Sequence Alternation	1 = Yes	0 = No	16384	
05	16385	System Reset Request	1 = Yes	0 = No	16385	
05	16386	System Start / Stop	1 = Start	0 = Stop	16386	
04, 06	8193	Process Variable #1 (Sensorless DP)	0 to Span (in Technologic User Setup Menu)		38193, 24577	
04, 06	8194	Process Variable #2	0 to Span (in Technologic User Setup Menu)		38194, 24578	
04, 06	8195	Process Variable #3	0 to Span (in Technologic User Setup Menu)		38195, 24579	
04, 06	8196	Process Variable #4	0 to Span (in Technologic User Setup Menu)		38196, 24580	
04, 06	8197	Process Variable #5	0 to Span (in Technologic User Setup Menu)		38197, 24581	
04, 06	8198	Process Variable #6	0 to Span (in Technologic User Setup Menu)		38198, 24582	
04, 06	8199	Process Variable #7	0 to Span (in Technologic User Setup Menu)		38199, 24583	
04, 06	8200	Process Variable #8	0 to Span (in Technologic User Setup Menu)		38200, 24584	
04, 06	8201	Process Variable #9	0 to Span (in Technologic User Setup Menu)		38201, 24585	
04, 06	8202	Process Variable #10	0 to Span (in Technologic User Setup Menu)		38202, 24586	
04, 06	8203	Process Variable #11	0 to Span (in Technologic User Setup Menu)		38203, 24587	
04, 06	8204	Process Variable #12	0 to Span (in Technologic User Setup Menu)		38204, 24588	

04, 06	8205	Process Variable #13	0 to Span (in Technologic User Setup Menu)	38205, 24589	
04, 06	8206	Process Variable #14	0 to Span (in Technologic User Setup Menu)	38206, 24590	
04, 06	8207	Process Variable #15	0 to Span (in Technologic User Setup Menu)	38207, 24591	
04, 06	8208	Process Variable #16	0 to Span (in Technologic User Setup Menu)	38208, 24592	
04	8209	Total Flow (Sensorless Flow)	0 to Span (in Technologic User Setup Menu)	38209	GPM
04	8210	N/A	N/A	38210	N/A
04	8211	System KW	0 to Span (in Technologic User Setup Menu)	38211	KW
04	8212	KW #1	0 to Span (in Technologic User Setup Menu)	38212	KW
04	8213	KW #2	0 to Span (in Technologic User Setup Menu)	38213	KW
04	8214	KW #3	0 to Span (in Technologic User Setup Menu)	38214	KW
04	8215	KW #4	0 to Span (in Technologic User Setup Menu)	38215	KW
04	8216	KW #5	0 to Span (in Technologic User Setup Menu)	38216	KW
04	8217	KW #6	0 to Span (in Technologic User Setup Menu)	38217	KW
04	8218	KW #7	0 to Span (in Technologic User Setup Menu)	38218	
04	8219	KW #8	0 to Span (in Technologic User Setup Menu)	38219	
04	8220	AMP #1	0 to Span (in Technologic User Setup Menu)	38220	
04	8221	AMP #2	0 to Span (in Technologic User Setup Menu)	38221	
04	8222	AMP #3	0 to Span (in Technologic User Setup Menu)	38222	
04	8223	AMP #4	0 to Span (in Technologic User Setup Menu)	38223	
04	8224	AMP #5	0 to Span (in Technologic User Setup Menu)	38224	
04	8225	AMP #6	0 to Span (in Technologic User Setup Menu)	38225	
04	8226	AMP #7	0 to Span (in Technologic User Setup Menu)	38226	
04	8227	AMP #8	0 to Span (in Technologic User Setup Menu)	38227	
04	8228	System Differential Pressure	0 to Span (in Technologic User Setup Menu)	38228	PSI
04	8229	Temperature Sensor #1	0 to Span (in Technologic User Setup Menu)	38229	F°

04	8230	Temperature Sensor #2	0 to Span (in Technologic User Setup Menu)	38230	F°
04, 06	8231	Setpoint #1	0 to Span (in Technologic User Setup Menu)	38231, 24615	
04, 06	8232	Setpoint #2	0 to Span (in Technologic User Setup Menu)	38232, 24616	
04, 06	8233	Setpoint #3	0 to Span (in Technologic User Setup Menu)	38233, 24617	
04, 06	8234	Setpoint #4	0 to Span (in Technologic User Setup Menu)	38234, 24618	
04, 06	8235	Setpoint #5	0 to Span (in Technologic User Setup Menu)	38235, 24619	
04, 06	8236	Setpoint #6	0 to Span (in Technologic User Setup Menu)	38236, 24620	
04, 06	8237	Setpoint #7	0 to Span (in Technologic User Setup Menu)	38237, 24621	
04, 06	8238	Setpoint #8	0 to Span (in Technologic User Setup Menu)	38238, 24622	
04, 06	8239	Setpoint #9	0 to Span (in Technologic User Setup Menu)	38239, 24623	
04, 06	8240	Setpoint #10	0 to Span (in Technologic User Setup Menu)	38240, 24624	
04, 06	8241	Setpoint #11	0 to Span (in Technologic User Setup Menu)	38241, 24625	
04, 06	8242	Setpoint #12	0 to Span (in Technologic User Setup Menu)	38242, 24626	
04, 06	8243	Setpoint #13	0 to Span (in Technologic User Setup Menu)	38243, 24627	
04, 06	8244	Setpoint #14	0 to Span (in Technologic User Setup Menu)	38244, 24628	
04, 06	8245	Setpoint #15	0 to Span (in Technologic User Setup Menu)	38245, 24629	
04, 06	8246	Setpoint #16	0 to Span (in Technologic User Setup Menu)	38246, 24630	
04	8247	Speed %	0 to 100	38247	%
04	8248	Speed Hz	0 to 60	38248	Hz
04	8249	Lead Pump Number	1 to Pump # (in Technologic User Setup Menu)	38249	
04	8250	Number of Pump Running	2 to Pump # (in Technologic User Setup Menu)	38250	
04	8251	Active Zone Number	1 to Zone # (in Technologic User Setup Menu)	38251	
04	8252	System Operation Mode	0=Manual, 1=Auto, 2=Auto Bypass, 3=Manual Bypass.	38252	
04	8253	Wire to Water Efficiency %	0 to 100	38253	%
04	8254	Pump 1 Run Hours	0 to 999	38254	Hours
04	8255	Pump 1 Run KHours	0 to 32000	38255	Hours

04	8256	Pump 2 Run Hours	0 to 999	38256	Hour s
04	8257	Pump 2 Run KHours	0 to 32000	38257	Khou rs
04	8258	Pump 3 Run Hours	0 to 999	38258	Hour s
04	8259	Pump 3 Run KHours	0 to 32000	38259	Khou rs
04	8260	Pump 4 Run Hours	0 to 999	38260	Hour s
04	8261	Pump 4 Run KHours	0 to 32000	38261	Khou rs
04	8262	Pump 5 Run Hours	0 to 999	38262	Hour s
04	8263	Pump 5 Run KHours	0 to 32000	38263	Khou rs
04	8264	Pump 6 Run Hours	0 to 999	38264	Hour s
04	8265	Pump 6 Run KHours	0 to 32000	38265	Khou rs
04	8266	Pump 7 Run Hours	0 to 999	38266	Hour s
04	8267	Pump 7 Run KHours	0 to 32000	38267	Khou rs
04	8268	Pump 8 Run Hours	0 to 999	38268	Hour s
04	8269	Pump 8 Run KHours	0 to 32000	38269	Khou rs
04	8270	VFD 1 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38270	
04	8271	VFD 2 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38271	
04	8272	VFD 3 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38272	
04	8273	VFD 4 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38273	
04	8274	VFD 5 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38274	
04	8275	VFD 6 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38275	
04	8276	VFD 7 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38276	
04	8277	VFD 8 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	38277	

## 7.2 Conformance Statement

### BACnet Protocol Implementation Conformance Statement

<b>Date:</b>	3/17/2017
<b>Vendor Name:</b>	Bell & Gossett
<b>Product Name:</b>	Technologic PPS Controller
<b>Product Model Number:</b>	N/A
<b>Applications Software Version:</b>	1.3 or above
<b>Firmware Revision:</b>	N/A
<b>BACnet Protocol Revision:</b>	12.0

### Product Description

The Technologic PPS Pump Controller is a variable speed pumping system for water booster systems. It operates either as a stand-alone controller or as part of a building-wide integrated system. The BACnet communication interface will provide communication between the TechnoForce pump controller and the BACnet system residing on EIA-485 media.

### BACnet Standardized Device Profile (Annex L)

- BACnet Operator Workstation (B-OWS)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

### List all BACnet Interoperability Building Blocks Supported (Annex K)

DS-RP-B	DM-TS-B	DM-DCC-B
DS-WP-B	DM-DDB-B	DM-DOB-B

### Segmentation Capability

<input type="checkbox"/> Able to transmit segmented messages	Window Size	N/A
<input type="checkbox"/> Able to receive segmented messages	Window Size	N/A

### Standard Object Types Supported

#### Analog input

Dynamically creatable:	No
Dynamically deletable:	No
Optional properties supported:	None
Writable properties:	Present Value    Conditionally writable
Out of Service	

Proprietary properties: None  
 Property range restrictions: None

**Analog output**

Dynamically creatable: No  
 Dynamically deletable: No  
 Optional properties supported: None  
 Writable properties: Present Value  
 Proprietary properties: None  
 Property range restrictions: None

**Binary input**

Dynamically creatable: No  
 Dynamically deletable: No  
 Optional properties supported: None  
 Writable properties: Present Value    Conditionally writable  
     Out of Service  
 Proprietary properties: None  
 Property range restrictions: None

**Binary output**

Dynamically creatable: No  
 Dynamically deletable: No  
 Optional properties supported: None  
 Writable properties: Present Value  
 Proprietary properties: None  
 Property range restrictions: None

**Device**

Dynamically creatable:	No
Dynamically deletable:	No
Optional properties supported:	Local_Date
Local_Time	
Max_Master	
Max_Info_Frames	
Writable properties:	Max_Master
Proprietary properties:	None
Property range restrictions:	None

**Data Link Layer Options**

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) \_\_\_\_\_
- MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400
- MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400
- Point-To-Point, EIA 232 (Clause 10), baud rate(s):
- Point-To-Point, modem, (Clause 10), baud rate(s):
- LonTalk, (Clause 11), medium: \_\_\_\_\_
- Other:

**Device Address Binding**

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)

Yes                       No

**Networking Options**

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices?                       Yes                       No

### Character Sets Supported

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- |   |   |                                     |
|---|---|-------------------------------------|
| <input type="checkbox"/> ANSI X3.4                    | <input type="checkbox"/> IBM'/Microsoft' DBCS | <input type="checkbox"/> ISO 8859-1 |
| <input type="checkbox"/> ISO 10646 (UCS-2)            | <input type="checkbox"/> ISO 10646 (UCS-4)    | <input type="checkbox"/> JIS C 6226 |
| <input checked="" type="checkbox"/> ISO 10646 (UTF-8) |   |                                     |

**If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:**            **N/A**

### 7.3 TechnoLogic PPS BACnet Points

Object Identifier	Object Name	Object Type	Present Value/Range	UNITS
Binary Input, 1	Pump1 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 2	Pump1 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 3	Pump1 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 4	Pump1 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 5	Pump2 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 6	Pump2 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 7	Pump2 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 8	Pump2 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 9	Pump3 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 10	Pump3 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 11	Pump3 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 12	Pump3 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 13	Pump4 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 14	Pump4 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 15	Pump4 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 16	Pump4 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 17	Pump5 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 18	Pump5 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 19	Pump5 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 20	Pump5 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 21	Pump6 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 22	Pump6 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 23	Pump6 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 24	Pump6 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 25	Pump7 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 26	Pump7 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 27	Pump7 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 28	Pump7 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 29	Pump8 Overload Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 30	Pump8 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 31	Pump8 AFD Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 32	Pump8 Off	BINARY_INPUT	1 = Alarm 0 = O.K.	
Binary Input, 33	System Reset Req	BINARY_INPUT	1 = Yes 0 = No	
Binary Input, 34	Pump1 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 35	Pump1 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 36	Pump1 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 37	Pump2 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 38	Pump2 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 39	Pump2 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 40	Pump3 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 41	Pump3 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 42	Pump3 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 43	Pump4 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 44	Pump4 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	

Binary Input, 45	Pump4 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 46	Pump5 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 47	Pump5 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 48	Pump5 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 49	Pump6 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 50	Pump6 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 51	Pump6 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 52	Pump7 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 53	Pump7 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 54	Pump7 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 55	Pump8 Enabled	BINARY_INPUT	1 = Enabled 0 = Disabled	
Binary Input, 56	Pump8 in Variable Speed	BINARY_INPUT	1 = In VSM 0 = Not In VSM	
Binary Input, 57	Pump8 In Bypass Mode	BINARY_INPUT	1 = In Bypass 0 = Not In Bypass	
Binary Input, 58	Pump #1 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 59	Pump #2 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 60	Pump #3 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 61	Pump #4 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 62	Pump #5 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 63	Pump #6 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 64	Pump #7 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 65	Pump #8 On/Off	BINARY_INPUT	1 = On 0 = Off	
Binary Input, 66	System Start/Stop	BINARY_INPUT	1 = Start 0 = Stop	
Binary Input, 67	AI #1 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 68	AI #2 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 69	AI #3 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 70	AI #4 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 71	AI #5 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 72	AI #6 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 73	AI #7 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 74	AI #8 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 75	AI #9 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 76	AI #10 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 77	AI #11 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 78	AI #12 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 79	AI #13 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 80	AI #14 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 81	AI #15 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 82	AI #16 Failure	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Input, 83	General Alarm	BINARY_INPUT	1 = Failure 0 = O.K.	
Binary Output, 1	Pump Sequence Alternation	BINARY_OUTPUT	1 = Yes 0 = No	
Binary Output, 2	System Reset Request	BINARY_OUTPUT	1 = Yes 0 = No	
Binary Output, 3	System Start / Stop	BINARY_OUTPUT	1 = Start 0 = Stop	
Analog Input, 1	Process Variable #1 (Sensorless DP)	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 2	Process Variable #2	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	

Analog Input, 3	Process Variable #3	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 4	Process Variable #4	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 5	Process Variable #5	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 6	Process Variable #6	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 7	Process Variable #7	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 8	Process Variable #8	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 9	Process Variable #9	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 10	Process Variable #10	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 11	Process Variable #11	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 12	Process Variable #12	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 13	Process Variable #13	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 14	Process Variable #14	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 15	Process Variable #15	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 16	Process Variable #16	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 17	Total Flow (Sensorless Flow)	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	GPM
Analog Input, 18	N/A	ANALOG_INPUT	N/A	N/A
Analog Input, 19	Total System Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 20	Pump #1 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 21	Pump #2 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 22	Pump #3 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 23	Pump #4 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 24	Pump #5 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 25	Pump #6 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 26	Pump #7 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 27	Pump #8 Power	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	KW
Analog Input, 28	Pump #1 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP

Analog Input, 29	Pump #2 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 30	Pump #3 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 31	Pump #4 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 32	Pump #5 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 33	Pump #6 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 34	Pump #7 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 35	Pump #8 Current	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	AMP
Analog Input, 36	System Differential Pressure	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	PSI
Analog Input, 37	Temperature Sensor #1	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	F°
Analog Input, 38	Temperature Sensor #2	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	F°
Analog Input, 39	Setpoint #1	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 40	Setpoint #2	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 41	Setpoint #3	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 42	Setpoint #4	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 43	Setpoint #5	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 44	Setpoint #6	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 45	Setpoint #7	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 46	Setpoint #8	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 47	Setpoint #9	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 48	Setpoint #10	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 49	Setpoint #11	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 50	Setpoint #12	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 51	Setpoint #13	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 52	Setpoint #14	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 53	Setpoint #15	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	
Analog Input, 54	Setpoint #16	ANALOG_INPUT	0 to Span (in Technologic User Setup Menu)	

Analog Input, 55	Speed %	ANALOG_INPUT	0 to 100	%
Analog Input, 56	Speed Hz	ANALOG_INPUT	0 to 60	Hz
Analog Input, 57	Lead Pump Number	ANALOG_INPUT	1 to Pump # (in Technologic User Setup Menu)	
Analog Input, 58	Number of Pump Running	ANALOG_INPUT	2 to Pump # (in Technologic User Setup Menu)	
Analog Input, 59	Active Zone Number	ANALOG_INPUT	1 to Zone # (in Technologic User Setup Menu)	
Analog Input, 60	System Operation Mode	ANALOG_INPUT	0=Manual, 1=Auto, 2=Auto Bypass, 3=Manual Bypass.	
Analog Input, 61	Wire to Water Efficiency %	ANALOG_INPUT	0 to 100	%
Analog Input, 62	Pump 1 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 63	Pump 1 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 64	Pump 2 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 65	Pump 2 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 66	Pump 3 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 67	Pump 3 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 68	Pump 4 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 69	Pump 4 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 70	Pump 5 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 71	Pump 5 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 72	Pump 6 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 73	Pump 6 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 74	Pump 7 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 75	Pump 7 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 76	Pump 8 Run Hours	ANALOG_INPUT	0 to 999	Hours
Analog Input, 77	Pump 8 Run KHours	ANALOG_INPUT	0 to 32000	Khours
Analog Input, 78	VFD 1 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 79	VFD 2 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 80	VFD 3 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 81	VFD 4 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 82	VFD 5 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 83	VFD 6 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 84	VFD 7 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Input, 85	VFD 8 Mode	ANALOG_INPUT	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
Analog Output, 1	PV1_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 2	PV2_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 3	PV3_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	

Analog Output, 4	PV4_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 5	PV5_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 6	PV6_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 7	PV7_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 8	PV8_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 9	PV9_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 10	PV10_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 11	PV11_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 12	PV12_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 13	PV13_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 14	PV14_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 15	PV15_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 16	PV16_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 17	SP1_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 18	SP2_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 19	SP3_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 20	SP4_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 21	SP5_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 22	SP6_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 23	SP7_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 24	SP8_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 25	SP9_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 26	SP10_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 27	SP11_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 28	SP12_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 29	SP13_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	

Analog Output, 30	SP14_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 31	SP15_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	
Analog Output, 32	SP16_Command	ANALOG_OUTPUT	0 to Span (in Technologic User Setup Menu)	

### 7.4 TechnoLogicPPS N2 Points

NPT	NPA	POINT DESCRIPTION	RANGE/VALUE	UNITS
BI	1	Pump #1 Overload Failure	1 = Failure 0 = O.K.	
BI	2	Pump #1 Failure	1 = Failure 0 = O.K.	
BI	3	Pump #1 AFD Failure	1 = Failure 0 = O.K.	
BI	4	Pump #1 Off Alarm	1 = Alarm 0 = O.K.	
BI	5	Pump #2 Overload Failure	1 = Failure 0 = O.K.	
BI	6	Pump #2 Failure	1 = Failure 0 = O.K.	
BI	7	Pump #2 AFD Failure	1 = Failure 0 = O.K.	
BI	8	Pump #2 Off Alarm	1 = Alarm 0 = O.K.	
BI	9	Pump #3 Overload Failure	1 = Failure 0 = O.K.	
BI	10	Pump #3 Failure	1 = Failure 0 = O.K.	
BI	11	Pump #3 AFD Failure	1 = Failure 0 = O.K.	
BI	12	Pump #3 Off Alarm	1 = Alarm 0 = O.K.	
BI	13	Pump #4 Overload Failure	1 = Failure 0 = O.K.	
BI	14	Pump #4 Failure	1 = Failure 0 = O.K.	
BI	15	Pump #4 AFD Failure	1 = Failure 0 = O.K.	
BI	16	Pump #4 Off Alarm	1 = Alarm 0 = O.K.	
BI	17	Pump #5 Overload Failure	1 = Failure 0 = O.K.	
BI	18	Pump #5 Failure	1 = Failure 0 = O.K.	
BI	19	Pump #5 AFD Failure	1 = Failure 0 = O.K.	
BI	20	Pump #5 Off Alarm	1 = Alarm 0 = O.K.	
BI	21	Pump #6 Overload Failure	1 = Failure 0 = O.K.	
BI	22	Pump #6 Failure	1 = Failure 0 = O.K.	
BI	23	Pump #6 AFD Failure	1 = Failure 0 = O.K.	
BI	24	Pump #6 Off Alarm	1 = Alarm 0 = O.K.	
BI	25	Pump #7 Overload Failure	1 = Failure 0 = O.K.	
BI	26	Pump #7 Failure	1 = Failure 0 = O.K.	
BI	27	Pump #7 AFD Failure	1 = Failure 0 = O.K.	
BI	28	Pump #7 Off Alarm	1 = Alarm 0 = O.K.	
BI	29	Pump #8 Overload Failure	1 = Failure 0 = O.K.	
BI	30	Pump #8 Failure	1 = Failure 0 = O.K.	
BI	31	Pump #8 AFD Failure	1 = Failure 0 = O.K.	
BI	32	Pump #8 Off Alarm	1 = Alarm 0 = O.K.	
BI	33	System Reset Required	1 = Yes 0 = No	
BI	34	Pump #1 Enabled	1 = Enabled 0 = Disabled	
BI	35	Pump #1 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	36	Pump #1 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	

<b>NPT</b>	<b>NPA</b>	<b>POINT DESCRIPTION</b>	<b>RANGE/VALUE</b>	<b>UNITS</b>
BI	37	Pump #2 Enabled	1 = Enabled 0 = Disabled	
BI	38	Pump #2 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	39	Pump #2 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	40	Pump #3 Enabled	1 = Enabled 0 = Disabled	
BI	41	Pump #3 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	42	Pump #3 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	43	Pump #4 Enabled	1 = Enabled 0 = Disabled	
BI	44	Pump #4 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	45	Pump #4 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	46	Pump #5 Enabled	1 = Enabled 0 = Disabled	
BI	47	Pump #5 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	48	Pump #5 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	49	Pump #6 Enabled	1 = Enabled 0 = Disabled	
BI	50	Pump #6 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	51	Pump #6 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	52	Pump #7 Enabled	1 = Enabled 0 = Disabled	
BI	53	Pump #7 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	54	Pump #7 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	55	Pump #8 Enabled	1 = Enabled 0 = Disabled	
BI	56	Pump #8 Running In Variable Speed Mode	1 = In VSM 0 = Not In VSM	
BI	57	Pump #8 Running In Bypass Mode	1 = In Bypass 0 = Not In Bypass	
BI	58	Pump #1 On/Off	1 = On 0 = Off	
BI	59	Pump #2 On/Off	1 = On 0 = Off	
BI	60	Pump #3 On/Off	1 = On 0 = Off	
BI	61	Pump #4 On/Off	1 = On 0 = Off	
BI	62	Pump #5 On/Off	1 = On 0 = Off	
BI	63	Pump #6 On/Off	1 = On 0 = Off	
BI	64	Pump #7 On/Off	1 = On 0 = Off	
BI	65	Pump #8 On/Off	1 = On 0 = Off	
BI	66	System Start/Stop	1 = Start 0 = Stop	
BI	67	Analog Input #1 Failure	1 = Failure 0 = O.K.	
BI	68	Analog Input #2 Failure	1 = Failure 0 = O.K.	
BI	69	Analog Input #3 Failure	1 = Failure 0 = O.K.	
BI	70	Analog Input #4 Failure	1 = Failure 0 = O.K.	
BI	71	Analog Input #5 Failure	1 = Failure 0 = O.K.	
BI	72	Analog Input #6 Failure	1 = Failure 0 = O.K.	
BI	73	Analog Input #7 Failure	1 = Failure 0 = O.K.	
BI	74	Analog Input #8 Failure	1 = Failure 0 = O.K.	
BI	75	Analog Input #9 Failure	1 = Failure 0 = O.K.	
BI	76	Analog Input #10 Failure	1 = Failure 0 = O.K.	

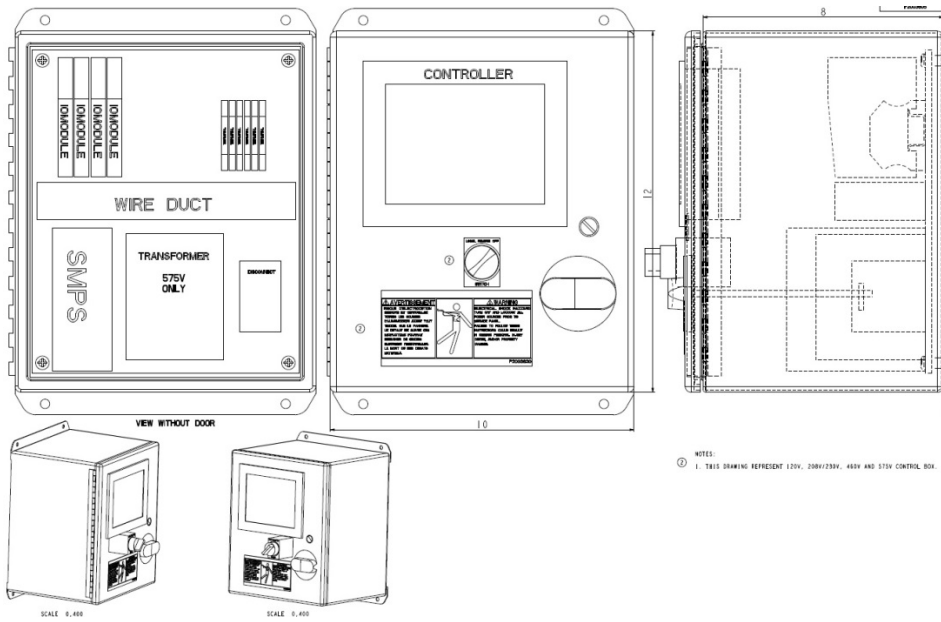
<b>NPT</b>	<b>NPA</b>	<b>POINT DESCRIPTION</b>	<b>RANGE/VALUE</b>	<b>UNITS</b>
BI	77	Analog Input #11 Failure	1 = Failure 0 = O.K.	
BI	78	Analog Input #12 Failure	1 = Failure 0 = O.K.	
BI	79	Analog Input #13 Failure	1 = Failure 0 = O.K.	
BI	80	Analog Input #14 Failure	1 = Failure 0 = O.K.	
BI	81	Analog Input #15 Failure	1 = Failure 0 = O.K.	
BI	82	Analog Input #16 Failure	1 = Failure 0 = O.K.	
BI	83	General Alarm	1 = Failure 0 = O.K.	
BO	1	Pump Sequence Alternation	1 = Yes 0 = No	
BO	2	System Reset Request	1 = Yes 0 = No	
BO	3	System Start / Stop	1 = Start 0 = Stop	
ADI	1	Process Variable #1 (Sensorless DP)	0 to Span (in Technologic User Setup Menu)	
ADI	2	Process Variable #2	0 to Span (in Technologic User Setup Menu)	
ADI	3	Process Variable #3	0 to Span (in Technologic User Setup Menu)	
ADI	4	Process Variable #4	0 to Span (in Technologic User Setup Menu)	
ADI	5	Process Variable #5	0 to Span (in Technologic User Setup Menu)	
ADI	6	Process Variable #6	0 to Span (in Technologic User Setup Menu)	
ADI	7	Process Variable #7	0 to Span (in Technologic User Setup Menu)	
ADI	8	Process Variable #8	0 to Span (in Technologic User Setup Menu)	
ADI	9	Process Variable #9	0 to Span (in Technologic User Setup Menu)	
ADI	10	Process Variable #10	0 to Span (in Technologic User Setup Menu)	
ADI	11	Process Variable #11	0 to Span (in Technologic User Setup Menu)	
ADI	12	Process Variable #12	0 to Span (in Technologic User Setup Menu)	
ADI	13	Process Variable #13	0 to Span (in Technologic User Setup Menu)	
ADI	14	Process Variable #14	0 to Span (in Technologic User Setup Menu)	
ADI	15	Process Variable #15	0 to Span (in Technologic User Setup Menu)	
ADI	16	Process Variable #16	0 to Span (in Technologic User Setup Menu)	
ADI	17	Total Flow (Sensorless Flow)	0 to Span (in Technologic User Setup Menu)	GPM
ADI	18	N/A	N/A	N/A
ADI	19	System KW	0 to Span (in Technologic User Setup Menu)	KW
ADI	20	KW #1	0 to Span (in Technologic User Setup Menu)	KW
ADI	21	KW #2	0 to Span (in Technologic User Setup Menu)	KW
ADI	22	KW #3	0 to Span (in Technologic User Setup Menu)	KW
ADI	23	KW #4	0 to Span (in Technologic User Setup Menu)	KW
ADI	24	KW #5	0 to Span (in Technologic User Setup Menu)	KW
ADI	25	KW #6	0 to Span (in Technologic User Setup Menu)	KW
ADI	26	KW #7	0 to Span (in Technologic User Setup Menu)	KW
ADI	27	KW #8	0 to Span (in Technologic User Setup Menu)	KW
ADI	28	AMP #1	0 to Span (in Technologic User Setup Menu)	
ADI	29	AMP #2	0 to Span (in Technologic User Setup Menu)	
ADI	30	AMP #3	0 to Span (in Technologic User Setup Menu)	
ADI	31	AMP #4	0 to Span (in Technologic User Setup Menu)	
ADI	32	AMP #5	0 to Span (in Technologic User Setup Menu)	
ADI	33	AMP #6	0 to Span (in Technologic User Setup Menu)	
ADI	34	AMP #7	0 to Span (in Technologic User Setup Menu)	
ADI	35	AMP #8	0 to Span (in Technologic User Setup Menu)	

<b>NPT</b>	<b>NPA</b>	<b>POINT DESCRIPTION</b>	<b>RANGE/VALUE</b>	<b>UNITS</b>
ADI	36	System Differential Pressure	0 to Span (in Technologic User Setup Menu)	PSI
ADI	37	Temperature Sensor #1	0 to Span (in Technologic User Setup Menu)	F°
ADI	38	Temperature Sensor #2	0 to Span (in Technologic User Setup Menu)	F°
ADI	39	Setpoint #1	0 to Span (in Technologic User Setup Menu)	
ADI	40	Setpoint #2	0 to Span (in Technologic User Setup Menu)	
ADI	41	Setpoint #3	0 to Span (in Technologic User Setup Menu)	
ADI	42	Setpoint #4	0 to Span (in Technologic User Setup Menu)	
ADI	43	Setpoint #5	0 to Span (in Technologic User Setup Menu)	
ADI	44	Setpoint #6	0 to Span (in Technologic User Setup Menu)	
ADI	45	Setpoint #7	0 to Span (in Technologic User Setup Menu)	
ADI	46	Setpoint #8	0 to Span (in Technologic User Setup Menu)	
ADI	47	Setpoint #9	0 to Span (in Technologic User Setup Menu)	
ADI	48	Setpoint #10	0 to Span (in Technologic User Setup Menu)	
ADI	49	Setpoint #11	0 to Span (in Technologic User Setup Menu)	
ADI	50	Setpoint #12	0 to Span (in Technologic User Setup Menu)	
ADI	51	Setpoint #13	0 to Span (in Technologic User Setup Menu)	
ADI	52	Setpoint #14	0 to Span (in Technologic User Setup Menu)	
ADI	53	Setpoint #15	0 to Span (in Technologic User Setup Menu)	
ADI	54	Setpoint #16	0 to Span (in Technologic User Setup Menu)	
ADI	55	Speed %	0 to 100	%
ADI	56	Speed Hz	0 to 60	Hz
ADI	57	Lead Pump Number	1 to Pump # (in Technologic User Setup Menu)	
ADI	58	Number of Pump Running	2 to Pump # (in Technologic User Setup Menu)	
ADI	59	Active Zone Number	1 to Zone # (in Technologic User Setup Menu)	
ADI	60	System Operation Mode	0=Manual, 1=Auto, 2=Auto Bypass, 3=Manual Bypass.	
ADI	61	Wire to Water Efficiency %	0 to 100	%
ADI	62	Pump 1 Run Hours	0 to 999	Hours
ADI	63	Pump 1 Run KHours	0 to 32000	Khours
ADI	64	Pump 2 Run Hours	0 to 999	Hours
ADI	65	Pump 2 Run KHours	0 to 32000	Khours
ADI	66	Pump 3 Run Hours	0 to 999	Hours
ADI	67	Pump 3 Run KHours	0 to 32000	Khours
ADI	68	Pump 4 Run Hours	0 to 999	Hours
ADI	69	Pump 4 Run KHours	0 to 32000	Khours
ADI	70	Pump 5 Run Hours	0 to 999	Hours
ADI	71	Pump 5 Run KHours	0 to 32000	Khours
ADI	72	Pump 6 Run Hours	0 to 999	Hours
ADI	73	Pump 6 Run KHours	0 to 32000	Khours
ADI	74	Pump 7 Run Hours	0 to 999	Hours
ADI	75	Pump 7 Run KHours	0 to 32000	Khours
ADI	76	Pump 8 Run Hours	0 to 999	Hours
ADI	77	Pump 8 Run KHours	0 to 32000	Khours
ADI	78	VFD 1 Mode	0 = In Off Mode, 1 = In Hand Mode, 2 = In Auto Mode	

<b>NPT</b>	<b>NPA</b>	<b>POINT DESCRIPTION</b>	<b>RANGE/VALUE</b>	<b>UNITS</b>
ADI	79	VFD 2 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	80	VFD 3 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	81	VFD 4 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	82	VFD 5 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	83	VFD 6 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	84	VFD 7 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	
ADI	85	VFD 8 Mode	0 = In Off Mode, 1= In Hand Mode, 2 = In Auto Mode	

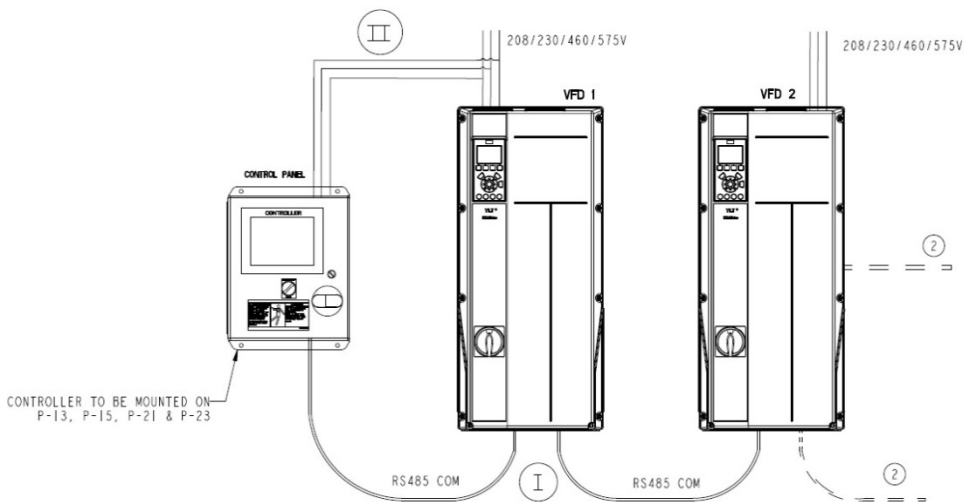
## 7.5 Panel Drawing

### 7.5.1 Panel Component Layout



### 7.5.2 Wiring Block Diagram

POWER WIRING BETWEEN CONTROL PANEL AND VARIABLE FREQUENCY DRIVE DONE BY XYLEM





## **Notice – Inclusion of third-party PLCs and associated software**

This product includes Programmable Logic Controllers (PLCs) manufactured by B&R Automation to enable feedback control of the system. B&R uses certain software versions in its PLC that B&R knows to be potentially vulnerable. Xylem strongly advises that you, as the system operator, engage with B&R to understand any support and security requirements of the PLC, including reviewing the support site located at <https://www.br-automation.com/en/service/support-portal/>. Any updates to this PLC require coordination between B&R and Xylem. Please contact your Xylem sales representative with any such questions.

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Xylem values your system security and the availability of your critical services. For more information on Xylem cybersecurity practices or to contact the cybersecurity team please visit [xylem.com/security](https://xylem.com/security).

## Product warranty

### Commercial warranty

**Warranty.** For goods sold to commercial buyers, Seller warrants the goods sold to Buyer hereunder (with the exception of membranes, seals, gaskets, elastomer materials, coatings and other “wear parts” or consumables all of which are not warranted except as otherwise provided in the quotation or sales form) will be (i) be built in accordance with the specifications referred to in the quotation or sales form, if such specifications are expressly made a part of this Agreement, and (ii) free from defects in material and workmanship for a period of thirty-six (36) months from the date of installation or forty-two (42) months from the date of shipment (which date of shipment shall not be greater than thirty (30) days after receipt of notice that the goods are ready to ship), whichever shall occur first, unless a longer period is specified in the product documentation (the “Warranty”).

Except as otherwise required by law, Seller shall, at its option and at no cost to Buyer, either repair or replace any product which fails to conform with the Warranty provided Buyer gives written notice to Seller of any defects in material or workmanship within ten (10) days of the date when any defects or non-conformance are first manifest. Under either repair or replacement option, Seller shall not be obligated to remove or pay for the removal of the defective product or install or pay for the installation of the replaced or repaired product and Buyer shall be responsible for all other costs, including, but not limited to, service costs, shipping fees and expenses. Seller shall have sole discretion as to the method or means of repair or replacement. Buyer’s failure to comply with Seller’s repair or replacement directions shall terminate Seller’s obligations under this Warranty and render the Warranty void. Any parts repaired or replaced under the Warranty are warranted only for the balance of the warranty period on the parts that were repaired or replaced. Seller shall have no warranty obligations to Buyer with respect to any product or parts of a product that have been: (a) repaired by third parties other than Seller or without Seller’s written approval; (b) subject to misuse, misapplication, neglect, alteration, accident, or physical damage; (c) used in a manner contrary to Seller’s instructions for installation, operation and maintenance; (d) damaged from ordinary wear and tear, corrosion, or chemical attack; (e) damaged due to abnormal conditions, vibration, failure to properly prime, or operation without flow; (f) damaged due to a defective power supply or improper electrical protection; or (g) damaged resulting from the use of accessory equipment not sold or approved by Seller. In any case of products not manufactured by Seller, there is no warranty from Seller; however, Seller will extend to Buyer any warranty received from Seller’s supplier of such products.

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# Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

**For more information on how Xylem can help you, go to [www.xylem.com](http://www.xylem.com)**

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