



**MANUAL FOR MODEL MP800
VARIABLE SPEED PRESSURE LIMITING
ELECTRIC MOTOR DRIVEN
FIRE PUMP CONTROLLERS**

Starting Serial No. "NA"

This manual provides General Information, Installation, Operation, Maintenance and System Set-Up Information for METRON Model Model MP800 Variable Speed Pressure Limiting Electric Motor Driven Fire Pump Controllers.

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PART I: GENERAL INFORMATION

The basic function of the model MP800 Variable Speed Pressure Limiting Fire Pump Controller for electric motor driven fire pumps is to automatically start the fire pump electric motor upon a drop in pressure in the water main, or from a number of other demand signals and maintain a specific discharge pressure in the system by precisely controlling the speed of the motor. This controller provides alarm and/or alarm shutdown protection for various motor and power failures. Stopping of the motor after the demand period is over may be either manual or automatic. This controller also includes an automatic weekly test starting feature.

PART II: FUNCTIONS

Equipment is provided in the Controller to provide the following functions:

- A. Automatic Starting From:
 - a. Drop in water line pressure
 - b. Operation of optional remote start switches, such as remote start switch, deluge valve switch, fire alarm switch, etc.
 - c. Weekly test timer
- B. OID – Operator Interface Device - Provided for display of alarm functions, system pressure, 3 phase AC volts, 3 phase motor current and alarm conditions, etc. Also features a 4 line by 20 character LCD for display
- C. Alarms and Signal Lights - Fifteen (15) standard lights are provided to give visual signals for; **"Power On"**, **"System Fault"**, **"Phase Failure"**, **"Phase Reversal"**, **"Pump Running"**, **"Pump Failed to Start"**, **"Motor Overload"**, **"Low Pressure"**, **"Motor Lockout"**, **"Local Start"**, **"Remote Start"**, **"Deluge Start"**, **"VFD Drive Fault"**, **"Bypass Mode ON"**, **"High Discharge Pressure"** and **"Drive Failure"**. When a transfer switch is supplied, additional lights are provided for **"Transfer Switch in Normal"**, **"Transfer Switch in Emergency"** and **"Emergency Isolation Switch/Circuit Breaker Open"**. 7 additional lights (4 when a transfer switch is supplied), configurable by the factory, are provided for **"Pump Room Alarms"**. An audible alarm horn is mounted on the front of the cubicle for sounding in the event of failure. Terminals are provided for remote failure indication of the following:
 - "Power Available"**
 - "Phase Reversal"**
 - "Pump Running"**
 - "Controller Not in Auto"**
 - "VFD Drive Fault"**
 - "Bypass Mode On"**
 - "High Discharge Pressure"**
- D. A data logger is provided as standard to record system pressure along with numerous alarm conditions and system events. The data can be displayed on the OID or can be downloaded to a PC through the RS485 port provided on the main system board. Data is stored on an SD Memory card. This card contains individual pressure files with each file containing one days worth of pressure data. Each file is of the PressXXX.txt format. Each entry is stamped with the date and time and system pressure at that time. The Events.txt file contains all of the logged events with each event stamped with date and time. The SD memory card can be removed and files transferred directly to a PC using appropriate memory card reader. The controller will continue to operate normally with the SD card removed. **The SD card must be installed in the unit when it is powered on for the microprocessor to boot up normally.** There will, however, be a visual and audible alarm when the card is removed. Events and pressure data will continue to be logged while the card is missing. The memory cards should be replaced within 12 hours to ensure that no data is lost.
- E. A weekly test timer is supplied to automatically start the pump any set day of the week, at a set time of day, and a preset run time. See System Config Screen 106.
- F. **"Start"** Push button – A green push button is provided on the exterior of the cabinet to manually start the pump. When this button is pressed, the motor will continue to run until it is stopped using the Stop push button.
- G. **"Stop"** Push button - A red pushbutton is provided on the exterior of the cabinet to stop the pump in Automatic only after starting causes have returned to normal. This returns the controller to the automatic position. In the Manual mode this will also stop the pump after starting via the Start push button.
- H. Cabinet - A heavy gauge steel cubicle encloses the controller.

PART III: OPERATION OF THE CONTROLLER

- A. When the controller is powered up, the main circuit breaker and isolation switch are in the "On" position, the controller is in standby condition ready to start the pump automatically. The Power On light should be ON indicating that all power is available and the controller is ready to start the pump.

When the water pressure drops below a level, which is set in System Config Screen 101, the Controller will actuate the VFD module and run the motor at a speed that corresponds to the pressure limit set on the VFD unit. If the VFD is unable to keep the pressure above the Low Pressure alarm point, the **Bypass Mode** will be activated. If the pump fails to start after a set time delay (Screen #103), the "**Pump Failed to Start**" light will illuminate, and the alarm horn will sound. In addition, the "**System Fault**" light will illuminate.

If the VFD\Bypass Mode selector switch is in the "Bypass Mode", the motor will start according to the mode set in Screen #301 for the Bypass Mode, and run the motor at full speed.

The panel is wired so that optional remote start switches may be used, such as Deluge Valve, Remote Start pushbutton, Fire Alarm switches, etc. The Deluge Valve Switch Option (Screen #124), is a normally closed switch that when opened starts the pump similar to the pressure drop start. In addition, when "Supervisory Power Failure Startup" feature is enabled (System Config Screen 116), the Controller will automatically start the pump upon loss of a Separate 120VAC Supervisory Power, after an adjustable time delay (System Config Screen 117).

If the pump stops while running, and there is still an auto start demand, the control will attempt to restart the pump. If the pump fails to start the "**Pump Failed to Start**" light will illuminate and the alarm will sound. If the motor current exceeds a set overload value (Screen #319) while the motor is running, the "**Motor Overload**" light will illuminate and the alarm will sound indicating motor overload.

The Controller may be configured as either "**Manual**" or "**Automatic**" stop as required (System Config Screen 104).

"**Manual**" stop is set as standard. When Automatic stop is enabled the stop timer is preset at the factory to 10 minutes. Longer time settings can be set in System Config screen 105. The current status of this setting is visible on the Main System Status Screen where the letter "A" will appear in the upper right hand corner of the screen when set to Automatic Stop and an "M" will appear when set for Manual stop. When "Automatic Stop" is disabled, the pump will continue to run even though the pressure switch or other remote starting switch returns to its normal position. The pump can be stopped immediately only by pressing the "**Stop**" button. If set up for "**Automatic**" stop, the pump will be stopped automatically upon restoration to normal of whatever demand switch started the pump providing it has run at least 10 minutes or longer as set in System Config screen 105. If the demand period was less than the time set on the auto stop timer, the pump will continue to run until the timer times out and then will stop.

- B. When the "**Test**" mode button is pressed for two or more seconds, the pump will be started by causing a drop in water pressure if the Solenoid Drain Valve Option (Screen #108) is selected. If the Solenoid Drain Valve Option is set to NO, the unit will start automatically similar to the Deluge Valve switch start feature. Failure alarm circuits will be operative in the "**Test**" mode. This method of starting provides a test of the Controller, thereby assuring proper operation when required. The pump will run continuously in this position until the "**Stop**" push button is pressed.
- C. Periodic Self Testing - The Weekly Test Start Timer can be set to give test runs on any day of the week and time of day desired. A timing element is incorporated in the controls so that when the pump starts in this manner, it will run for a definite time before it shuts down. See System Config Screens 109 through 112 to set the starting time and length of pump running. See item B. above. The Weekly test feature will also use the Solenoid Drain Valve option to start the pump if it is enabled as described in B. above. If Screen #113 (Stop Motor During Test on Alarm) is set to Yes, the motor will be stopped should any alarm condition occur during the weekly test operation.
- D. Provision for sequential starting is accomplished by the use of adjustable time delay on pressure drop starting or "Deluge Valve" starting. On Multiple Pump installations these timers are set sequentially and progressively longer in time to prevent more than one (1) pump from starting simultaneously with another pump. Failure of the lead pump to start will not prevent subsequent pumps from starting. The time delay on starting is set in System Config Screen 103.
- E. **Emergency Manual Operation:** Emergency manual operation is provided in case of failure of control circuitry. This lever is manually moved to the "On" position and must be manually latched in the "ON" position or it will return to "Off" when released. The lever should be moved from the "Off" position to the "On" position in as quickly a motion as possible to prevent burning the contacts. The circuit breaker should be turned off to disconnect the circuit before releasing emergency lever. This lever is for emergency use only. A mechanical interlock switch is connected to the emergency lever to operate the contactor electrically when all circuitry is functioning properly. This is provided to prevent inadvertent slow closing of contactor and burning of contacts.

- F. **Drive Fault –Drive Failure lights** – Two lights are provided to indicate problems or failure of the VFD unit. When the controller receives a command to start, the VFD line isolation contactor will close and power up the VFD. If the VFD does not power up and clear the fault contactor within the specified time delay set in screen 334, the **Drive Failure** light will illuminate and the controller will go to Bypass mode and start the motor according to the method as described below. If after the VFD has powered up and starts the motor and a fault should occur during motor operation, the **Drive Fault** light will illuminate, the controller will stop the motor and restart it in Bypass mode according to the method as described below.
- G. **MP300 Across-the-Line Bypass:** When the controller switches to the bypass mode due to VFD failure or other factors as listed elsewhere in this manual, the controller will start the motor across the line.
- H. **MP450 Autotransformer Bypass:** When the controller switches to the bypass mode due to VFD failure or other factors as listed elsewhere in this manual, the controller will start the motor using an autotransformer reduced voltage start sequence. The autotransformer main contactor and the autotransformer neutral contactor will close immediately on bypass mode initiation. This connects the motor leads through the autotransformer to reduce the voltage to the motor. After the transition time delay the run contactor closes and then the start contactor and autotransformer neutral contactor open, thus connecting the motor to full voltage. The motor will now run at full speed and deliver rated horsepower to the load.
- I. **Series MP700 Solid State Soft Start Bypass:** When the controller switches to the bypass mode due to VFD failure or other factors as listed elsewhere in this manual, the controller will start the motor using a solid state soft start module. There are two contactors for solid state soft starting. The solid state starter line contactor will close immediately on initiation of bypass mode and ramp the motor up to speed depending on the solid state starter configuration parameters. After the transition time delay the run contactor closes and bypasses the solid state starter, thus connecting the motor to full voltage. The motor will now run at full speed and deliver rated horsepower to the load. When the stop command is received and the controller is set up for the ramp stop option (Screen #106) the motor will ramp down in speed over a fixed time delay (Screen #107) until it stops.

Note: When using the emergency manual start handle, the soft start unit may display an “OCF” fault condition. This is normal. The unit is not malfunctioning. When the proper stop sequence is used according to paragraph E above, the fault condition will be cleared and the soft start unit will be ready for a normal start.

PART IV: INSTALLATION AND TEST PROCEDURE

A. INSTALLATION

The Fire Pump Controller has been assembled and wired at the factory in accordance with the highest workmanship standards. All circuits and functions have been thoroughly tested to assure correct operation when properly installed. The installer should be completely familiar with the external hookup of the pump junction box to the terminal bar in the Controller. All local electric codes should be used for proper installation, wiring and grounding of the controller prior to startup.

An optional weekly test drain solenoid valve may be provided to relieve water pressure to the pressure transducer thus initiating the start sequence. This test simulates an actual start demand. Since the Controller operates the drain valve only momentarily, a small amount of water is drained off. The water pressure sensing line to the Controller from the pump must be thoroughly flushed before connection to the Controller in order to remove chips, particles, or other matter, that could enter the plumbing components in the Controller.

Controllers configured with "**Automatic Stop**" enabled may be changed to "**Manual**" stop by disabling this feature in System Config Screen 104. If deluge valve switches are to be used for starting, enable the Deluge Valve Option in Config Screen 121 and connect the remote normally closed switch to terminals 74 and 111.

B. TEST PROCEDURE

All of the following tests should be made on each unit after installation. If each test is satisfactory, the operator may depend upon the panel operating properly when required. Also, any one or all of these tests may be carried out at any time after installation, if so desired. **NOTE: If the Supervisory Power Failure Start Option has been Enabled (Screen #116) and 115 Volts A.C. is not connected to Controller, the "System Fault" light will illuminate and the controller will start automatically after a time delay. The 115VAC must be turned on to prevent the pump from starting.**

Phase Reversal Alarm – Upon initial power up, if a phase reversal alarm should sound, the following process can be used to correct the alarm. If a test of the motor rotation indicates that the motor is turning opposite of the correct direction, the motor leads must be reversed to cure the condition. Turn the controller circuit breaker and isolation switch off and verify that incoming power on the load side of the controller isolation switch has been disconnected. Then reverse any two of the motor leads. Then turn the controller isolation switch and circuit breaker back on and check for correct rotation of the motor and then follow the procedure below to correct the Phase Reversal alarm.

If the motor is turning the correct direction but there is a Phase Reversal alarm then this can be corrected as follows. Press the Config button on the front of the OID. Press the Config (2) button again to access the User Preferences Setup screens. Press the Down arrow key until the OID reads "223 User Preferences – Reversed Phase". Press the Change/Enter button. The system will then ask for a password. Enter 1111. Press the Up or Down arrow key to change the setting in the lower left hand corner of the screen from "No" to "Yes" then press the Change/Enter button. After a few seconds the "Phase Reversal" LED will reset. Also, press the Silence\ Reset button for approx. 3 seconds to silence the audible alarm.

INPUT/OUTPUT STATUS INDICATOR LIGHTS

Light Emitting Diodes (L.E.D.) lights have been installed on the microprocessor module to indicate the status of each input and output terminal. Status indication for the standard functions is given below:

| <u>Terminal Number</u> <u>(Microprocessor Func #)</u> | <u>L.E.D. (light) "ON" Indication</u> |
|----------------------------------------------------------|-----------------------------------------------------------|
| (Out 01) | Alarm Horn |
| (Out 02) | Circuit Breaker Shunt Trip |
| (Out 03) | VFD line Contactor relay |
| (Out 04) | VFD load Contactor relay |
| (Out 05) | Run Enable signal to VFD |
| (Out 06) | Start/Stop signal to VFD |
| (In 01) | Emergency Start lever activated |
| (In 02) | Start Pushbutton |
| (In 03) | Stop Pushbutton |
| (In 05) | VFD Load Contactor closed |
| (In 06) | Transfer Switch position (if applicable) |
| (In 07) | Transfer Switch ready to transfer (if applicable) |
| (In 08) | Transfer Switch Emergency Iso Switch Open (if applicable) |
| (In 09) | VFD Fault Input |
| (In 19) | VFD Running |
| (In 20) | VFD\Bypass Selector Switch |
| (In 21) | Bypass Contactor Closed |

a. AUTOMATIC STARTING TESTS:

1. Set VFD\Bypass Switch to Bypass Mode.
2. Bleed off pressure in system until pressure drops below the low set point.
3. Pump should start according to the start mode (see Part III F-G) automatically and continue to run after pressure rises above the high set point, if arranged for "**Manual**" stop. If arranged for "**Automatic**" stop, pump will continue to run for time set on Auto Stop Timer and then stop.
4. Press the "**Stop**" push button to stop the pump.
5. Repeat tests for each demand switch such as deluge valve (if enabled), remote start, etc.

b. PERIODIC WEEKLY START TEST:

1. Pressure must be up and all other demand switches de-activated.
2. When the current day and time of day matches the settings in System Config screens 107 and 108, the solenoid drain valve will energize (if enabled and supplied, see screen #108) and the pump will start. It will continue to run for the amount of time set and then stop automatically.

c. SETTING PROGRAM WEEKLY TEST TIME: System Config screen 109 through 112.

- ### d. REMOTE START SWITCH CIRCUITS:
- Field wiring terminals are provided on the controller so that optional remote start switches such as Remote Pushbutton Stations, Deluge Valve Switch, Fire Alarm Switches, etc., may be used to start the pump. Two (2) sets of terminals are provided. Terminals #112 and #31 are used for remote manual start push buttons (close to start). Terminals #111 and #31 are used for remote Deluge Valve Switch or other remote automatic start switches (open to start). Upon automatic start from this type of switch, the pump will be stopped either automatically after the demand switch de-activates and Pump Auto Stop Timer times out, or manually at the Controller. Terminals #111 and #31 must have a

jumper installed if a remote Deluge switch is “Enabled” but not to be used. When the controller is shipped from the factory Deluge Valve start is Disabled (System Config screen 121).

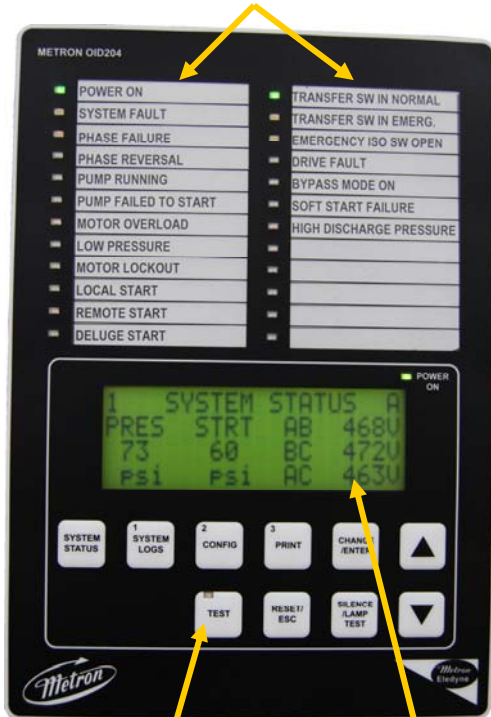
- e. **AC POWER FAILURE STARTING:** If this feature has been enabled it can be tested by disconnecting the supervisory power 115 V.A.C. to the Controller. After the preset time delay (which is specified in System Config screen 112), the Controller will commence starting of the pump. The "**System Fault**" LED will illuminate and the alarm will sound.
- f. **NORMAL OPERATION – AUTOMATIC:** The pump will automatically start upon drop in pressure or operation of other start switches. If the Auto Stop Timer is disabled (Manual Stop) the pump must be turned off at the Controller. When the Auto Stop Timer is enabled, upon termination of the demand signal, the pump will run for the length of time left on the Auto Stop Timer and then will stop automatically.
- g. **AN ADJUSTABLE SEQUENTIAL START TIMER IS SUPPLIED FOR MULTIPLE PUMP INSTALLATION:** Normally, the leading pump Controller will not have a delay timer and will commence starting of the pump immediately upon operation of a demand signal (other than Power Failure which is time delayed). The subsequent Controllers will have a time delay which is adjustable from 0 to 999 seconds. Each time delay should be set with progressively longer times on each subsequent pump. The recommended time interval is ten (10) to fifteen (15) seconds. This may be extended or shortened as required by the local authorities having jurisdiction.
- h. **PUMP ROOM ALARMS:** Field terminals may be provided for various inputs from pump room alarms. These alarms include: Low Pump Room Temperature, Reservoir Low, Reservoir Empty, Low Suction Pressure, Relief Valve Discharge and/or Flow Meter On etc. A maximum of eight (8) (or five (5) if a transfer switch is supplied), pump room alarms is available. Each auxiliary alarm is configurable so that the alarm horn may or may not sound and the light will come on when the alarm sensor contacts close. These pump room alarms can be silenced with the “Silence” push button on the OID if they have been configured as silenceable.
- i. **Variable Frequency Drive (VFD) –** The VFD constantly monitors the actual pressure in the system via the Pressure Transducer, and compares this signal to the set point value. If the actual pressure is less than the set point, the VFD will increase its output frequency to cause the motor to speed up. If the actual pressure is greater than the set point, the VFD will decrease its output frequency to slow the motor down. Consequently, the motor will run at whatever speed is necessary to maintain the set point pressure. All PID control is performed by the VFD. All parameters for PID control have been adjusted at the factory prior to shipment and should not require further adjustment. If adjustment is desired, it is strongly recommended that this only be carried out by qualified individuals with assistance from factory personnel. All motor specific data such as RPM, Volts, Frequency, Horsepower, FLA, etc... must be entered to the VFD at the time of initial installation, to ensure proper operation. The set point pressure may have to be reset in the field however. See the separate manual provided with the VFD unit for instructions on how to adjust this setting.

Note: Once the start-up testing is complete, please fill in the critical settings label on the inside of the main door with the following information: Pressure Limit Set Point, Pump Start Pressure and Pump Stop Pressure.

PART V: OPERATOR INTERFACE DEVICE (OID) USE AND NAVIGATION

The Operator Interface Device (OID) provides visual indication of the alarms, status of system parameters, and an interface to change set points to configure the controller to operate appropriately for various installation requirements.

Labeled LED
Annunciator



System Operation and
Control Type Buttons

LCD Digital Display

Common Tasks Performed Using The OID

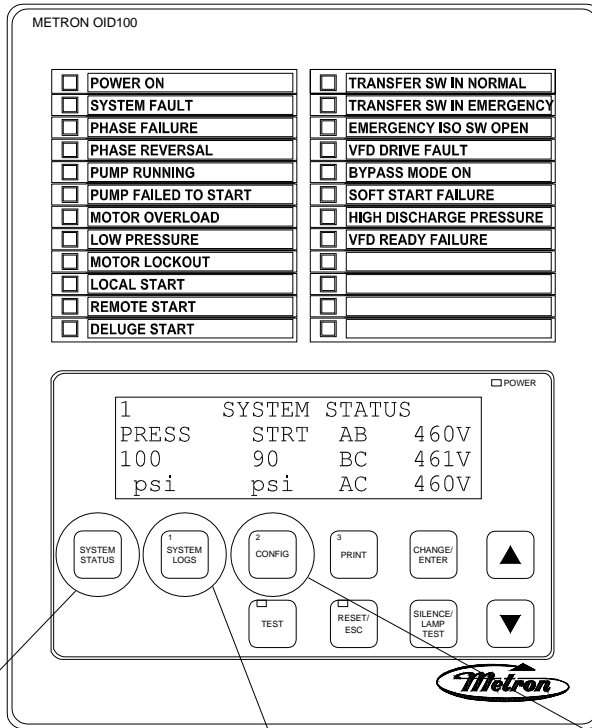
Silencing Horn: If a horn is sounding and the alarm is silenceable, a quick press of the [SILENCE/LAMP TEST] will silence the horn (less than 1 second press).

Resetting Alarms: If the alarm condition has cleared, press and hold the [RESET/ESC] button 2 to 5 seconds to reset alarms.

Test Mode: Pressing and holding the [TEST] button for two or more seconds will open the pressure drain solenoid, if supplied, thus dropping the pressure, which causes the controller to start the pump. Pressing and releasing the [TEST] button, if the solenoid drain valve is not supplied, will activate the start sequence through software control only.

Lamp Test: To illuminate and check all the OID LED's and the horn, press and hold the [SILENCE/LAMP TEST] button 5 or more seconds or until all the lights turn on.

OID Screen Map



1 SYSTEM STATUS B1
PRES STRT AB 460V
110 100 BC 461V
psi psi AC 460V

2 SYSTEM STATUS
Phase A 125 Amps
Phase B 124 Amps
Phase C 125 Amps

3 SYSTEM STATUS
Pump Countdown Tmr
0min Until Start
0min Until Stop

4 SYSTEM STATUS
Pump run Hr 0.0
of Starts 0
Fri12/15/05 09:51:38

5 SYSTEM STATUS
Controller Power
On Time: 18.5 Hrs
Mon10/20/04 17:53:26

6 SYSTEM STATUS
Firmware Ver SV 1.1
Commissioned Date:
10/15/04

SYSTEM LOGS
1) Event Log
2) Pressure Log

1 CONFIG
1) SYSTEM SETPOINTS
2) USER PREFERENCES
3) TECH SCREENS

2 CONFIG
1) ANALOG SIGNALS
2) AUXILLIARY ALARMS

1 EVENT LOG
System in Off
Mode Occurred
10/16/04 13:15:15

PRESSURE LOG
10/16/04 17:52:45
112 psi
Skip Rate:[EACH]

1 EVENT DETAILS
System in Off
Mode Occurred
10/16/04 13:15:15

PRESSURE LOG
10/16/04 17:52:30
112 psi
Skip Rate:[EACH]

1 EVENT DETAILS
Pressure: 83.2psi
System Auto:Yes
Pump Running:No

PRESSURE LOG
10/16/04 17:52:15
113 psi
Skip Rate:[EACH]

1 EVENT DETAILS
Phase A Amps 0
Phase B Amps 0
Phase C Amps 0

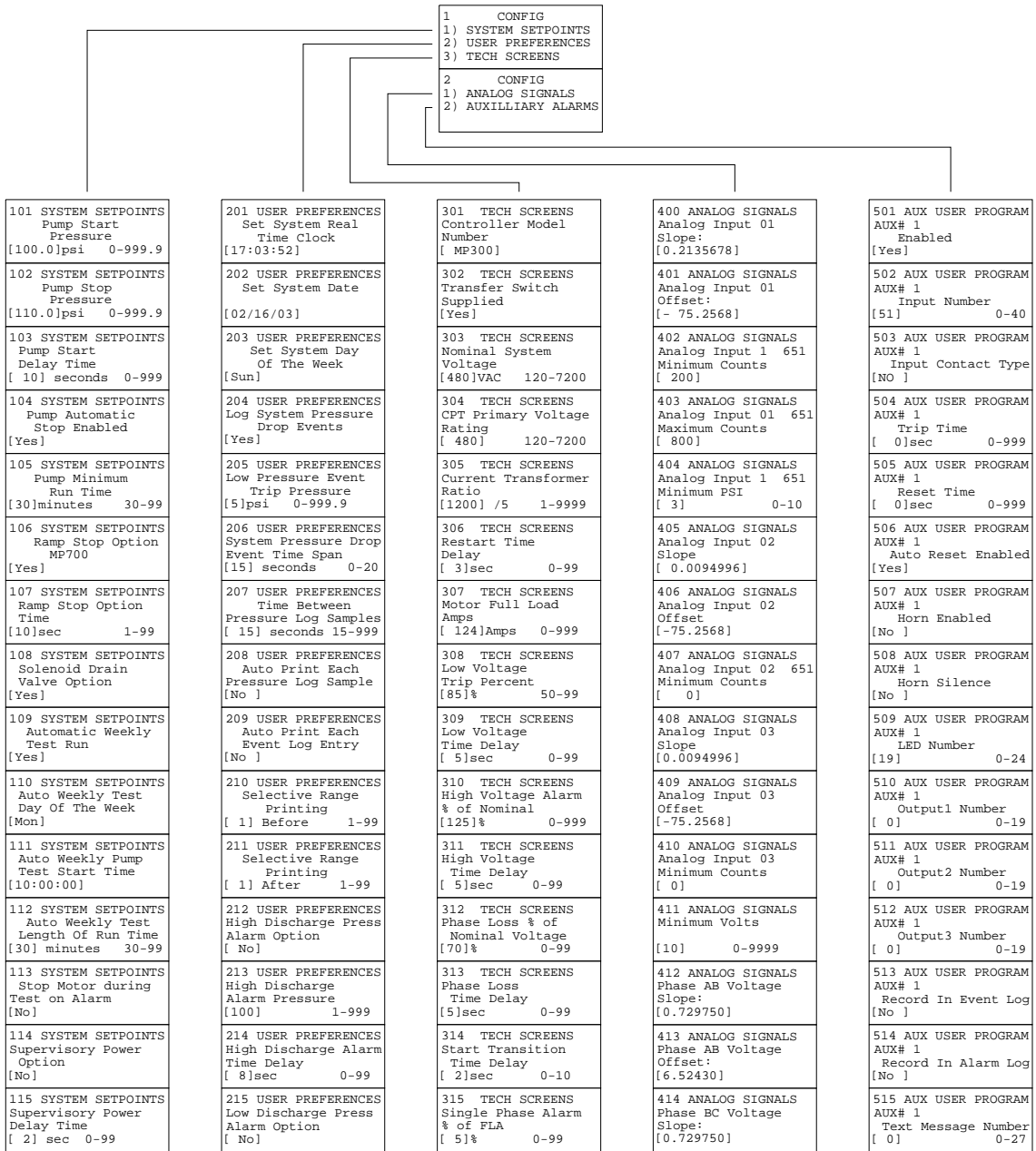
1 EVENT DETAILS
Phase AB Volt 460
Phase BC Volt 461
Phase AC Volt 464

2 EVENT LOG
Pump Failed To
Start Alarm Occurred
10/16/04 07:32:15

3 EVENT LOG
Supvr Power Failure
Alarm Cleared
10/16/04 07:09:48

Continued on next page.

OID Screen Map (continued)



| |
|---------------------------------------------------------------------------------------|
| 116 SYSTEM SETPOINTS Supervisory Power Failure Startup [Yes] |
| 117 SYSTEM SETPOINTS Supervisory Power Fail Start Dly Time [1]minutes 0-500 |
| 118 SYSTEM SETPOINTS Pressure Transducer Failure Pump Start [No] |
| 119 SYSTEM SETPOINTS Shutdown On Low Intake Pressure/Lvl [No] |
| 120 SYSTEM SETPOINTS Shutdown On Low Intake Trip Time [0]seconds 0-999 |
| 121 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset [No] |
| 122 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset Time [0]seconds 0-999 |
| 123 SYSTEM SETPOINTS Pressure Switch Pump Start [No] |
| 124 SYSTEM SETPOINTS Deluge Valve Pump Start [No] |

| |
|---------------------------------------------------------------------------------|
| 216 USER PREFERENCES Low Discharge Alarm Pressure [100] 0-999 |
| 217 USER PREFERENCES Low Discharge Alarm Time Delay [15]sec 0-99 |
| 218 USER PREFERENCES No Load Amps % of FLA [5] 0-99 |
| 219 USER PREFERENCES No Load Time Time Delay [8]sec 0-99 |
| 220 USER PREFERENCES LCD Back Light Mode 0=Always on [0] 1=Power Save |
| 221 USER PREFERENCES Language Select [English] |
| 222 USER PREFERENCES Change User Password Level 1 [****] |
| 223 USER PREFERENCES Reversed Phase order (1-3-2) [No] |
| 224 USER PREFERENCES Save Aux alarms to SD memory card [No] |
| 225 USER PREFERENCES Load Aux alarms from SD memory card [No] |
| 226 USER PREFERENCES Pressure Units [psi] |
| 227 USER PREFERENCES Modbus address [001] 0-255 |
| 228 USER PREFERENCES Modbus Enabled (Disables Printer) [Yes] |
| 229 USER PREFERENCES Modbus/Printer Baud [38400] |
| 230 USER PREFERENCES Modbus Parity [Even] |

| |
|--------------------------------------------------------------------------|
| 316 TECH SCREENS Single Phase Loss Time Delay [5]seconds 0-99 |
| 317 TECH SCREENS Motor Run % of FLA [20]% 0-99 |
| 318 TECH SCREENS Use Motor Current for Pump Running Sig [Yes] |
| 319 TECH SCREENS Overload Alarm % of FLA [125]% 100-199 |
| 320 TECH SCREENS Overload Alarm Time Delay [3]sec 0-99 |
| 321 TECH SCREENS Start on Single Phase Loss [Yes] |
| 322 TECH SCREENS Motor Run Amps Time Delay [5]sec 0-99 |
| 323 TECH SCREENS Motor Start Time Delay [10]sec 0-99 |
| 323A TECH SCREENS Nominal Line Frequency [60] 50-70 |
| 324 TECH SCREENS Under Frequency % of Nominal [25] 0-99 |
| 325 TECH SCREENS Under Frequency Time Delay [5]sec 0-99 |
| 326 TECH SCREENS Over Frequency % of Nominal [25]% 0-999 |
| 327 TECH SCREENS Over Frequency Time Delay [5]sec 0-99 |
| 328 TECH SCREENS Alarm log 31/2 Event log 50/ 4 Pr. log 0/29333 |
| 329 TECH SCREENS System Commissioned Date [00/00/00] |
| 330 TECH SCREENS Change Tech Password [*****] |
| 331 TECH SCREENS Password Logout Time [5]min 1-15 |
| 332 TECH SCREENS VFD Line Isolation deactivation [10]min 1-15 |
| 333 TECH SCREENS Mode Select 0=US, 1=EU [0] |
| 334 TECH SCREENS Drive Ready Timer [12] seconds 0-99 |

| |
|---------------------------------------------------------------------|
| 415 ANALOG SIGNALS Phase BC Voltage Offset: [6.52430] |
| 416 ANALOG SIGNALS Phase AC Voltage Slope: [0.729750] |
| 417 ANALOG SIGNALS Phase AC Voltage Offset: [6.52430] |
| 418 ANALOG SIGNALS Minimum Amps [10] 0-9999 |
| 419 ANALOG SIGNALS Phase A Amps Slope: [2.9635] |
| 420 ANALOG SIGNALS Phase A Amps Offset: [36.9270] |
| 421 ANALOG SIGNALS Phase B Amps Slope: [2.9635] |
| 422 ANALOG SIGNALS Phase B Amps Offset: [36.9270] |
| 423 ANALOG SIGNALS Phase C Amps Slope: [2.9635] |
| 424 ANALOG SIGNALS Phase C Amps Offset: [36.9270] |
| ANALOG INPUT COUNTS 649 1176 1221 0 0 0 0 0 0 0 0 0 |
| Daughter board counts 649 1176 1221 0 0 0 0 0 |
| 425 FACTORY PRESETS SELECT YES TO LOAD DEFAULT SETTINGS No |
| 426 USER PREFERENCES Load all settings from SD Card [No] |
| 427 USER PREFERENCES Save all settings to SD Card [No] |

The [SYSTEM STATUS], [SYSTEM LOGS], and [CONFIG] buttons navigate the user to the top screen of a column of similarly grouped screens or menus.

SYSTEM STATUS: The [SYSTEM STATUS] button can be pressed at any time to return the screen to the home System Status screen #1. System Status screens display the real time information variables about the pump system.

SYSTEM LOGS: The [SYSTEM LOGS] button displays the System Logs menu. Once the menu is displayed, buttons with numbers on them can be used to enter the selected data log. See the following page for details on navigating the System Logs.

CONFIGURATION: The [CONFIG] button displays the Config menu which groups the different types of set points that configure the system to operate in the desired manner. Use the [UP] and [DOWN] buttons to scroll between the two menu screens. Buttons with numbers on them can be used to enter the selected configuration screen group. See the System Setpoint Definitions section for descriptions on the functionality of each set point.

| | | | |
|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SYSTEM STATUS | 1 SYSTEM STATUS B1 PRES STRT AB 460V 110 100 BC 461V psi psi AC 460V | 1 SYSTEM LOGS SYSTEM LOGS 1) Event Log 2) Pressure Log | 2 CONFIG 1 CONFIG 1) SYSTEM SETPOINTS 2) USER PREFERENCES 3) TECH SCREENS |
| 1 SYSTEM LOGS | 2 SYSTEM STATUS Phase A 125 Amps Phase B 124 Amps Phase C 125 Amps 3 SYSTEM STATUS Pump Countdown Tmr 0sec Until Start 0min Until Stop 4 SYSTEM STATUS Pump Run Hrs: 5.3 # Of Starts: 8 Mon 10/17/04 17:53:26 5 SYSTEM STATUS Controller Power On Time 18.5 Hrs 10/15/04 17:53:26 6 SYSTEM STATUS Firmware Ver SV 1.1 Commissioned Date: 11/15/02 | 2 CONFIG # 1 EVENT LOG System in Auto Mode Occurred 10/16/04 13:15:15 3 PRINT PRESSURE LOG 10/16/04 17:52:45 112 psi Skip Rate:[EACH] | 1 SYSTEM LOGS 101 SYSTEM SETPOINTS Pump Start Pressure [100.0]psi 0-999.9 2 CONFIG 201 USER PREFERENCES Set System Real Time Clock [17:03:52] 3 PRINT 301 TECH SCREENS Controller Model Number [MP300] |
| See the following page for an example of scrolling through the Alarm, Event, and Pressure Logs | | | 1 SYSTEM LOGS 401 ANALOG SIGNALS Analog Input 01 Slope: [0.21346771] 2 CONFIG 501 AUX USER PROGRAMS AUX# 1 Enabled [Yes] |

SYSTEM LOGS: The Model MP Electric controller has three separate data logs; 1) alarm log, 2) event log, and 3) pressure log. The alarm log is a subset of the event log and only displays the last ten alarms that have occurred or cleared. The event log records all alarm and system function type events

**1
SYSTEM
LOGS**

SYSTEM LOGS
1) Event Log
2) Pressure Log

SYSTEM LOGS: The [UP] and [DOWN] arrow buttons can be used to scroll through the three data logs. The [CHANGE/ENTER] button enters and exits the alarm/event details in either the Alarm or Event logs. In the Pressure Log the [CHANGE/ENTER] button changes the skip rate used to scroll through the logged pressure readings.

**1
SYSTEM
LOGS**

```
# 1 EVENT LOG
System in Auto
Mode Occurred
10/16/04 13:15:15
# 1 EVENT DETAILS
System in Auto
Mode Occurred
10/16/04 13:15:15
# 1 EVENT DETAILS
AB V 460 A 32
BC V 461 B 32
AC V 460 C 33
# 1 EVENT DETAILS
Pump Running: Yes

# 2 EVENT LOG
Pump Failed To
Start Alarm Occurred
10/16/04 07:32:15
# 3 EVENT LOG
Superv Power Failure
Alarm Cleared
10/16/04 07:09:48
```

**CHANGE/
ENTER**

**2
CONFIG**

```
PRESSURE LOG
10/16/04 17:52:45
112 psi
Skip Rate:[EACH ]
PRESSURE LOG
10/16/04 17:52:30
112 psi
Skip Rate:[EACH ]
PRESSURE LOG
10/16/04 17:52:15
113 psi
Skip Rate:[EACH ]
```

Printing System Log Data: The following applies if a printer has been connected to the RS485 port using the appropriate cable. When the [PRINT] button is pressed when looking at data in one of the three logs, a menu for what is to be printed is displayed. Pressing [1] prints just the alarm/event/pressure reading currently being displayed. Pressing [2] prints a range of data before and after the currently displayed alarm/event/pressure reading currently displayed. The range can be changed in the User Preferences setpoints 210 and 211. When the print button on the OID is pressed, data will be sent to the PC via the port you have connected to.

```
#1  EVENT LOG
Superv Power Failure
Alarm Occurred On
10/16/04 07:32:15
```

3 PRINT

```
PRINT OPTIONS
1) PRINT THIS EVENT
2) PRINT EVENT RANGE
   10 BEFORE,10 AFTER
```

Typical Event/Alarm Log Message Printout

```
#1  EVENT LOG
AC Power Restored
   Occurred On
   11/16/02 07:32:15
#2  EVENT LOG
AC Power Restored
   Occurred On
   11/16/02 07:32:15
```

```
#1  EVENT LOG
Superv Power Failure
Alarm Occurred On
10/16/04 07:32:15
```

CHANGE/ENTER

```
#1  EVENT DETAILS
Superv Power Failure
Alarm Occurred On
10/16/04 07:32:15
```

3 PRINT

```
PRINT OPTIONS
1) PRINT THIS EVENT
2) PRINT EVENT RANGE
   10 BEFORE,10 AFTER
```

```
#1  EVENT DETAILS
AB V 460      A  32
BC V 461      B  32
AC V 460      C  33
```

```
# 1  EVENT DETAILS
Pump Running: Yes
Pressure: 118 psi
```

Typical Event/Alarm Log Details Printout

```
#1  EVENT DETAILS
AC Power Restored
   Occurred On
   11/16/02 07:32:15
AB V 460      A  32
BC V 461      B  32
AC V 460      C  33
Pump Running:Yes
Pressure: 118 psi

#2  EVENT DETAILS
AC Power Restored
   Occurred On
   11/16/02 07:32:15
AB V 460      A  32
BC V 461      B  32
AC V 460      C  33
Pump Running:Yes
Pressure: 118psi
```

Typical Pressure Log Printout

```
PRESSURE LOG
01/01/03 17:52:45
600 psi
Skip Rate:[EACH ]
```

3 PRINT

```
PRINT OPTIONS
1) PRINT THIS ENTRY
2) PRINT ENTRY RANGE
   10 BEFORE,10 AFTER
```

```
PRESSURE LOG
01/01/03 17:52:30
599 psi
Skip Rate:[EACH ]
```

```
PRESSURE LOG
01/01/03 17:52:45
600 psi
01/01/03 17:52:30
599 psi
01/01/03 17:52:15
599 psi
01/01/03 17:52:00
601 psi
```

CONFIGURATION SCREENS: All parameters that control the operation of the controller can be viewed and changed within the Configuration set point screens. Each set point is protected by a user password to prevent unauthorized changes. The system set points are separated into five different group s.

| | | |
|-------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 2 CONFIG | 1 CONFIG | 1) SYSTEM SETPOINTS (Level 1 password): These setpoints adjust the conditions for starting and stopping the pump. |
| | 1) SYSTEM SETPOINTS 2) USER PREFERENCES 3) TECH SCREENS | 2) USER PREFERENCES (Level 1 password): These setpoints adjust settings not related to pump operation. |
| | 2 CONFIG | 3) TECH SCREENS (Level 2 password): These setpoints are for factory/technician purposes only and are used to fine tune special systems. |
| | 1) ANALOG SIGNALS 2) AUXILLIARY ALARMS | 1) ANALOG SIGNALS (Level 2 password): These setpoints calibrate the analog pressure, voltage and amp readings. |
| | | 2) AUXILLIARY ALARMS (Level 2 password): These 12 user programs are used to setup any auxiliary signals that need to be monitored. |

Changing Values:

- 1) Navigate to the configuration set point screen that contains the value that needs to be changed.
- 2) Press [CHANGE/ENTER]. If a password has not been entered for a while, the "ENTER PASSWORD" screen will be displayed. Use the [1] [2] and [3] buttons to enter the appropriate password.
- 3) Once the correct password level has been attained, the "CHANGE VALUE" screen for the value to be changed will be displayed. An underscore cursor will appear beneath the first digit on the entry.

Use [UP] or [DOWN] arrow buttons to scroll the value of the digit with the cursor. Press [CHANGE/ENTER] to accept each digit's entry. The cursor will move to the right so the next digit can be changed. Pressing [SILENCE/RESET/ESC] or the [SYSTEM STATUS] button will exit change mode without changing the original value.

Example of how to change a setpoint value:

| | | | |
|-------------------------------------------------------------------------|------------------|------------------------------|--------------------------------------------------------------------------|
| 101 SYSTEM SETPOINTS Pump Start Pressure [100.0]psi 0-999.9 | CHANGE/ ENTER | ENTER PASSWORD: **** _ | 101 CHANGE VALUE Pump Start Pressure [60] psi 0-999 _ |
|-------------------------------------------------------------------------|------------------|------------------------------|--------------------------------------------------------------------------|

Press the [1], [2], or [3] keys to enter the password.

Press the [UP] and [DOWN] arrow keys to change each digit at the cursor, press [CHANGE/ENTER] to accept the digit and move the cursor to the right. Press [SILENCE/RESET/ESC] to escape the change value screen and to keep the original value.

Printing Configuration Setpoints: The following applies if a printer has been installed or a PC is connected to the RS232 com port using a null modem cable. When the [PRINT] button is pressed while looking at a configuration setpoint screen, a menu for what is to be printed is displayed. Pressing [1] prints just the set point screen currently being displayed. Pressing [2] prints all the set points in the section of set points currently displayed. Pressing [3] prints all the set point screens of all five set point sections.

NOTE: when printing all set points, only Aux#01 User Programs 501 through 515 will be printed. To print any of the remaining eleven aux alarm settings, press [PRINT] when inside the appropriate Aux alarm and select [2] for “2) PRINT 500 SETPTS.” The 501 through 515 Aux User Programs for that aux alarm will be printed.

```
101 SYSTEM SETPOINTS
    Pump Start
    Pressure
[ 60] psi      0-999
```

3
PRINT

```
PRINT OPTIONS
1) PRINT THIS SETPT
2) PRINT 100 SETPTS
3) PRINT ALL SETPTS
```

Typical Configuration Setpoint Printout

```
101 SYSTEM SETPOINTS
    Pump Start
    Pressure
[ 60] psi      0-999

102 SYSTEM SETPOINTS
    Pump Stop
    Pressure
[ 90] psi      0-999

103 SYSTEM SETPOINTS
    Pump Start Delay
    Time
[ 10] seconds  0-999
    "          "
    "          "
    "          "

509 AUX USER PROGRAMS
Aux Alarm #01
2nd Control Output
[ 0]           12-25

510 AUX USER PROGRAMS
Aux Alarm #01
3rd Control Output
[ 0]           12-25
```


PART VI: SYSTEM SET POINT DEFINITIONS

Configure System Setpoints

| | |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>101 SYSTEM SETPOINTS Pump Start Pressure [60] psi 0-999</p> | <p>If system pressure is at or below this setting the pump will start if the system.</p> |
| <p>102 SYSTEM SETPOINTS Pump Stop Pressure [90] psi 0-999</p> | <p>If system pressure is at or above this setting and the pump is running, the pump can be stopped using the stop pushbutton or can automatically stop if auto stop is enabled in setting 104.</p> |
| <p>103 SYSTEM SETPOINTS Pump Start Delay Time [10] seconds 1-999</p> | <p>This time setting delays the start of the pump when a low pressure condition or deluge valve start signal is received. This setting is normally used for multiple pump installations where sequencing of pump starting is desired.</p> |
| <p>104 SYSTEM SETPOINTS Pump Automatic Stop Enabled [Yes]</p> | <p>When enabled, the pump will stop automatically after all starting demands have been satisfied. The timer set in 105 below must also time out before the pump will stop.</p> |
| <p>105 SYSTEM SETPOINTS Pump Minimum Run Time [10]minutes 1-99</p> | <p>The minimum run time that the pump must run before stopping automatically. Must be set to at least 10 minutes per NFPA 20. Only active if 104 above is set to Enabled.</p> |
| <p>106 SYSTEM SETPOINTS Ramp Stop Option Time M700 [Yes]</p> | <p>When set to "Yes" and the controller is set for Model MP700, the controller will stop the pump in a controlled ramp down over the time set in screen 107. When set to No, the controller will stop the pump and let it coast to a stop.</p> |
| <p>107 SYSTEM SETPOINTS Ramp Stop Option Time M700 [10] 0-99</p> | <p>The time that a Model MP700 controller will control the stopping of the motor in the ramp down mode. Note: This must be set to a time longer than the ramp stop time on the soft start unit.</p> |
| <p>108 SYSTEM SETPOINTS Solenoid Drain Valve Option [No]</p> | <p>The optional solenoid drain valve is used in the Manual Test Mode and the Automatic Weekly test mode to initiate starting of the pump by draining pressure off the sensing line.</p> |
| <p>109 SYSTEM SETPOINTS Automatic Weekly Test Run [No]</p> | <p>When this feature is enabled, the pump will start the pump at the predetermined time each week as set in the following screens and run it for the time set in screen 112.</p> |
| <p>110 SYSTEM SETPOINTS Auto Weekly Test Test Day Of The Week [Mon]</p> | <p>The day of the week that the pump will be started automatically each week if the option is enabled in screen 109.</p> |
| <p>111 SYSTEM SETPOINTS Auto Weekly Test Start Time [00:00:00]</p> | <p>The time of day that the pump will be started automatically each week if the option is enabled in screen 109.</p> |

| | |
|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>112 SYSTEM SETPOINTS Auto Weekly Test Length of Run Time [10] minutes 0-99</p> | <p>The length of time the pump will run when started on automatic weekly test. Must be set for a minimum of 10 minutes per NFPA 20..</p> |
| <p>113 SYSTEM SETPOINTS Stop Motor During Test on Alarm. [Yes]</p> | <p>When this feature is enabled, the controller will stop the pump during the automatically weekly test or the manual test mode should any alarm occur, such as motor overload.</p> |
| <p>114 SYSTEM SETPOINTS Supervisory Power Option [Yes]</p> | <p>When this option is enabled, the controller will monitor a separate 120VAC power source for availability and alarm on it's failure.</p> |
| <p>115 SYSTEM SETPOINTS Supervisory Power Delay Time [15] seconds 0-999</p> | <p>The amount of time the controller will wait until sounding the alarm on loss of the 120VAC Supervisory power source. This is used to override momentary outages.</p> |
| <p>116 SYSTEM SETPOINTS Supervisory Power Failure Startup [No]</p> | <p>When this option is enabled along with the Supervisory Power Option in screen 114, the controller will start the pump on loss of the Supervisory Power after the delays set in screen 117.</p> |
| <p>117 SYSTEM SETPOINTS Supervisory Power Start Time Delay [1]minutes 0-999</p> | <p>The amount of time the controller will delay starting of the pump on loss of the 120VAC Supervisory power source.</p> |
| <p>118 SYSTEM SETPOINTS Pressure Transducer Failure Pump Start [Yes]</p> | <p>If enabled, the controller will start the pump if a failure of the pressure transducer is detected.</p> |
| <p>119 SYSTEM SETPOINTS Shutdown on Low Intake Pressure/Lvl [No]</p> | <p>If enabled, the controller will stop the pump when a normally closed contact closes indicating low suction pressure or low reservoir/tank level.</p> |
| <p>120 SYSTEM SETPOINTS Shutdown on Low Intake Trip Time [5]seconds 0-99</p> | <p>The time delay that the Low Intake condition must be active before pump will stop on the condition.</p> |
| <p>121 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset [No]</p> | <p>If enabled, the pump will restart if there is a demand, after the Low Intake condition is cleared. If set to No, the Reset button must be pressed before the pump will restart.</p> |
| <p>122 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset Time [5]seconds 0-99</p> | <p>The time delay that the Low Intake condition must be cleared before the pump will be allowed to be restarted automatically. This prevents cycling of the pump on and off.</p> |
| <p>123 SYSTEM SETPOINTS Pressure Switch Pump Start [No]</p> | <p>When this is set to Yes and a mechanical pressure switch is connected to the field terminals, the pump will start when this switch closes.</p> |

124 SYSTEM SETPOINTS

Deluge Valve

Pump Start

[No]

If enabled this setting activates the logic to monitor an optional deluge valve dry contact opening (ie normally closed contact that opens to start pump) that will start the pump.

Configure User Preferences

| | |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 201 USER PREFERENCES Set System Real Time Clock [17:03:52] | Set the current controller clock (24 hour clock). |
| 202 USER PREFERENCES Set System Date [12/31/99] | Set the current controller date. |
| 203 USER PREFERENCES Set System Day Of The Week [Monday] | Set the local day of the week. |
| 204 USER PREFERENCES Log System Pressure Drop Events [Yes] | When this feature is enabled, the controller will log the current system pressure in the event log when system pressure has dropped below the set pressure value. Typically set to "No" as not to needlessly fill up the event log. |
| 205 USER PREFERENCES System Pressure Drop Needed to Log Event [60.0]psi 0-999 | The desired pressure setting that will cause a log of system pressure in addition to the normal periodic logging of system pressure. |
| 206 USER PREFERENCES System Pressure Drop Event Time Span [5] seconds 0-20 | The amount of time the pressure must be above the pressure setting in screen 205 before the Pressure Drop Event is logged as being cleared. |
| 207 USER PREFERENCES Time Between Pressure Log Samples [15] seconds 15-999 | The frequency at which system pressure is automatically logged. Normally set to 15 seconds. Lower values will increase the number of logged pressures and fill up the memory in a shorter period of time. |
| 208 USER PREFERENCES Auto Print Each Pressure Log Sample [No] | When set to Yes, each pressure log entry will be printed as it occurs. This should be set to No to save printer paper and wear on the printer. |
| 209 USER PREFERENCES Auto Print Each Event Log Entry [No] | When set to Yes, each event log entry will be printed as it occurs. This should be set to No to save printer paper and wear on the printer. |
| 210 USER PREFERENCES Selective Range Printing [1] Before 1-99 | This setting will determine the start point of print range of the pressure, alarm, or event log based on which log entry is currently being viewed. |
| 211 USER PREFERENCES Selective Range Printing [1] After 1-99 | This setting will determine the stop point of print range of the pressure, alarm, or event log based on which log entry is currently being viewed. |
| 212 USER PREFERENCES High Discharge Pressure Alarm Option [No] | This setting is used to monitor the system pressure and sound an alarm if it rises above a preset pressure. |

**Configure User Preferences
(continued)**

213 USER PREFERENCES
High Discharge Pressure
Alarm Pressure
[185] psi 0-999

The pressure at or above which will cause a High Pressure alarm condition indicating that the VFD is running at full speed and possibly over pressurizing the system.

214 USER PREFERENCES
High Discharge Alarm
Pressure Time Delay
[5]seconds 0-99

The amount of time the pressure must be at or above the set pressure before the alarm condition is activated.

215 USER PREFERENCES
Low Discharge Pressure
Alarm Option
[Yes]

This setting is used to monitor the system pressure and turn on the LOW PRESSURE LED and sound an alarm if it drops below a preset pressure.

216 USER PREFERENCES
Low Discharge Pressure
Alarm Pressure
[45] psi 0-999

The pressure at or below which will cause a Low Pressure alarm condition and switch from VFD to Bypass Mode

217 USER PREFERENCES
Low Discharge Alarm
Pressure Time Delay
[5]seconds 0-99

The amount of time the pressure must be at or below the set pressure before the alarm condition is activated.

218 USER PREFERENCES
No Load Amps %
Of FLA
[10] 0-99

The % of motor full load current at which or below that will cause an event to be logged indicating a No Load Motor Condition.

218 USER PREFERENCES
No Load Time
Delay
[5]seconds 0-99

The amount of time the motor current must be at or below the set level before the event condition is logged.

220 USER PREFERENCES
LCD Back Light Mode
0=Always on
[0] 1=Power Save

Set to Always on or to Power Save if it is desired to have the backlight automatically shut off when no buttons have been pressed for a preset period of time.

221 USER PREFERENCES
Language Select
[English]

Set to English or Spanish

222 USER PREFERENCES
Change User Password
Level 1
[****]

Used to set the password necessary to access the System config screens.

223 USER PREFERENCES
Reversed Phase
Order (1-3-2)
[No]

Used to change the phase sequence sensing of the incoming power. If a Phase reversal alarm occurs on initial installation and the motor is turning the correct direction, change this setting to YES to reset the alarm indication.

| | |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 224 USER PREFERENCES Save Aux alarms to SD memory card [No] | Used to save auxiliary alarm configuration parameters to the SD card |
| 225 USER PREFERENCES Load Aux alarms from SD memory card [No] | Used to load auxiliary alarm configuration parameters from the SD card |
| 226 USER PREFERENCES Pressure Units [psi] | Used to determine the units for display of pressure |
| 227 USER PREFERENCES Modbus Address [1] 0-255 | Sets the Modbus Address when turned on via screen 228 |
| 228 USER PREFERENCES Modbus Enabled (Disables Printer) [Yes] | Turns on the Modbus protocol via the RS485 and turns off the ASCII text output for the printer. |
| 229 USER PREFERENCES Modbus/Printer Baud [9600] | Baud Rate for the Modbus or Printer, depending on which is selected in screen 228 |
| 230 USER PREFERENCES Modbus Parity [None] | Parity setting for the Modbus, either Even, Odd or None |

PART VII: ALARM AND EVENT LOG MESSAGES

The following is a sample of the possible messages that could be recorded within the event log.

| | |
|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase Failure Alarm Occurred/ Alarm Cleared | Phase Failure declared when all three phases of the incoming power is present not within the limits set in the configuration screens. |
| Pump Failed to Start Alarm Occurred Start Alarm Cleared | Controller attempted to start pump but the pump failed to start (ie a pump run signal was never received). Press the reset button to reset this alarm. |
| Pressure Transducer Alarm Occurred/ Alarm Cleared | The pressure signal from the pressure transducer has fallen outside normal operating range potentially indicating a problem with the transducer or its wiring. |
| Stop pushbutton Pressed in | An operator pressed the Stop pushbutton. |
| Pump Started / running Stopped | Pump was started or stopped in either Automatically or Manually. |
| Motor Lockout Sig Occurred Cleared | A remote motor lockout signal was received or cleared. |
| Remote Start Sig Occurred Cleared | A remote start signal was received or cleared. |
| Auto Test Start Occurred | An automatic pump test sequence was started by either the weekly program clock function or a user pressing the [TEST] button for 2 or more seconds |
| Alarm Reset Button Occurred | A user did an alarm reset by pressing and holding the [SILENCE/RESET/ESC] button for 2 to 5 seconds. |
| Low Pressure Start Occurred Cleared | A low pressure start was attempted because of a low pressure reading from the transducer or optional pressure switch. |
| Low Press Condition Occurred Cleared | System pressure dropped below the start pressure or the optional pressure switch indicates a low pressure condition. This can be logged in all modes of operation. |
| Deluge Start Occurred Cleared | A deluge start signal was received. |
| Controller Reboot Occurred | Power was restored to the microprocessor. |
| Pressure Drop Occurred Cleared | If setpoint #204 is set to yes, this event gets recorded when the system pressure drops below the setting in setpoint #205. |
| Low Intake Pressure Shutdown Occurred Shutdown Cleared | If the low intake shutdown option is enabled in setpoint #119, a low suction signal will stop the pump. |
| Auxiliary Alarm Occurred Cleared | Indicates one of the aux alarms occurred as programmed in the user programs and was set to record in the event or alarm log but the text message assigned was 0. See Aux Alarm Text List Messages below for possible auxiliary alarm messages. |

PART VIII: SD CARD FILE FORMAT

The controller is equipped with an SD (Secure Digital) memory card on the motherboard to store the Pressure log, Event log, Operators Manual in PDF format, Auxiliary Alarm configuration information and the controller drawings in PDF format. The SD card is located on the right hand edge of the motherboard and is removed by pressing in on the right edge of the card to release from the card holder. When the SD card is removed, data is still being recorded on temporary flash memory on the motherboard. Once the card is replaced, the stored data will be written back to the SD Card. When the SD card is removed, the LCD display will indicate that the card is missing and that it should be replaced. If the card is not replaced within approximately 1 minute, the alarm will sound and the System Fault LED will come on. Once the SD card is replaced, the System Fault LED will go out but the Alarm Silence button must be pressed to silence the alarm horn. The data stored on the SD card is in standard ASCII text format and can be read by a computer equipped with an appropriate SD card reader. These are readily available at any electronics store. The data on the SD card is in the following format:

Pressure Log: The pressure log provides a continuous pressure record for 30 days. The pressure log samples shall be time and date stamped and stored in permanent non-volatile SD memory card. The pressure log can be searched by each sample, by minute, or by hour through the OID.

PressXXX.txt file

Data is stored in a standard comma delimited file as follows:

07/27/07, 11:07:52, 060
 Date Time Pressure

Each file starting with "Press" contains one days worth of pressure data.

Event Log: The event log will store up to 3000 of the most current events.

Events.txt file

Data is stored in a standard comma delimited file as follows:

07/27/07 ,11:09:26 ,Pump Failed to Start ,Occurred ,.208 ,.209 ,.208
 Date Time Event Action A-B Voltage B-C Voltage A-C Voltage

.0000 .0000 .0000 .096 0 .003
 Phase 1 Amps, Phase B Amps Phase C Amps Pressure Pump Running Text Message #

| Aux Alarm Text List Messages | |
|------------------------------|----------------------|
| 0 | Auxiliary Alarm |
| 1 | Low Pump Room Temp |
| 2 | Reservoir Low |
| 3 | Reservoir Empty |
| 4 | Reservoir High |
| 5 | Flow Meter On |
| 6 | Relief Valve Open |
| 7 | Low Suction Pressure |
| 8 | High Pump Room Temp |
| 9 | Low Firewater Press |
| 10 | Low Purge Pressure |
| 11 | Low Gear Oil Press |
| 12 | High Gear Oil Temp |
| 13 | High Vibration |
| 14 | Gas Detection |
| 15 | Emergency Power On |
| 16 | Pump Room Door Ajar |

| List of possible internal variables used as inputs for aux alarm user programs. | |
|---------------------------------------------------------------------------------|--------------------------------|
| 30 | Pump Running |
| 31 | Power Available |
| 32 | Phase Reversal |
| 33 | Motor Overload |
| 34 | Remote Start |
| 35 | Local Start |
| 36 | Pump On Demand, Fire Condition |
| 37 | System Fault |
| 38 | Auto Mode |
| 39 | Drive Fault |
| 40 | Not Used |
| 41 | Pressure Transducer Fault |
| 42 | Pump Failed to Start |
| 43 | Low Intake Shutdown Alarm |
| 44 | Supervisory Power Failure |
| 45 | Soft Start Fault |
| 46 | Low Pressure |
| 47 | Auto Weekly Test Start |
| 48 | Under Frequency |
| 49 | Over Frequency |
| 50 | Low Zone/Hi Zone Contacts |
| 51 | High Discharge Pressure |
| 52 | No Load Condition |
| 53 | High Voltage |
| 54 | Low Voltage |
| 55 | Test Mode |
| 56 | Bypass Active |

Appendix A

Factory default settings for VFD Fire Pump Controller

****For use with Square D ATV61 Series VFD****

First – Set Access Level to ‘Expert’

1.1 Simply Start

Acceleration = 5.0 Sec

Deceleration = 5.0 Sec

Low Speed = 35Hz (This is the minimum Hz that must be set in the field for the drive to produce shut off pressure at no flow.

Actual set point will be determined during startup and system operation)

1.4 Motor Control Logic

Standard Motor Frequency 60Hz

Rated Motor Voltage XX - Motor Nameplate Volts

Rated Motor Current XX – Motor Nameplate Amps

Rated Motor Speed XX – Motor Nameplate Speed

Max Frequency 60Hz (Note: This will change to 72Hz when changing the Standard Frequency Setting. This changes the speed reference for 4-20mA to 0-72Hz.)

1.5 Inputs/Outputs

2/3Wire Control 2 Wire

2 Wire Type Level

AI2 Configuration

AI2 Range 0-100%

AI2 Minimum = 4.0 ma

AI2 Filter = 4.0 Sec

R1 Configuration

R1 Assignment No Drive Fault

1.7 Application Function

Reference Switch

Ref 1B Switching Ch1 Active

Ref 1B Channel No

PID Regulator

PID Feedback Ass. AI2

Min. PID Feedback 0

Max. PID Feedback 3000

Min. PID Reference 0

Max. PID Reference 3000

Act. Internal PID Reference Yes

Internal PID Reference Set to System PSI Set Point Operating Pressure (i.e. 100 PSI = 1000 setting)

PID Prop Gain 5.0

PID Integral Gain 0.50

PID Derivative Gain 3.0

PID Ramp 5.0 Sec

Min fbk Alarm 0

Max fbk Alarm 1000

PID Error Alarm 100

6.0 Monitoring Config.

- 6.2 Motor Sensor Type
- Display Value Type
- Parameter Selector
 - List
 - Output Frequency
 - Motor Current
 - Motor Speed
 - Motor Voltage
 - Psi – See Below

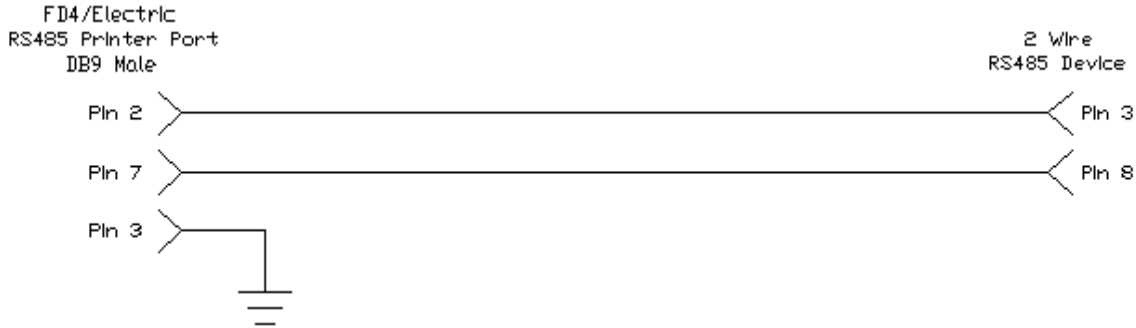
7.0 Display Config

- 7.1 User Parameters
 - Parameter Selection
 - Monitoring – PID feedback
 - Customize Selection
 - PID Feedback
 - Username – psi
 - Divisor - 10

Appendix B

RS485 Port Usage For Serial Modbus RTU protocol:

The Modbus option on the fire pump controller boards can be enabled by disabling the printer option to the onboard RS485 port. All communications to this port will be in a 2 wire RS485 format. 255 controllers can communicate on a single network. The pinout cabling required for connection to the port is as follows. It is necessary to apply a terminating resistor to both ends of the network. Note-Only 50 Modbus registers can be polled at time from the controller. I/O servers must be set up accordingly.



Modbus Setup From Controller Interface:

From the 200 series user preference configuration screens the Modbus setting can be access from screens 220 through 223. Screen 220 is used to set the Modbus address 1-255. All Modbus devices on a network must have a unique address.

Screen 221 is used to enable/disable the Modbus option. If ‘Yes’ is selected the Modbus will be enabled and the RS485 port can no longer be used as a printer port.

Screen 222 is used to set the baud rate for the RS485 port. The baud rates possible are 2400, 4800, 9600, 19200, and 38400 bits/second. Note that the baud rate setting is for the RS485 port in general and applies for Modbus and printer usage.

Screen 223 is used to set the Modbus parity. Valid selections are ‘Even’, ‘Odd’, and ‘None’. This setting must match the parity setting of all other Modbus devices on the network.

Modbus Register Usage Description:

The historical event and pressure logs, real time clock, and user set points can be accessed and controlled through the Modbus registers listed below.

Register 40001 is a write to controller only register where commands can be entered to accomplish the following as seen in figure 1.1. Depending on the Modbus I/O server used, either the individual bits in register 40001 can be toggled or integer values can be written. Either way, the controller automatically zeros register 40001 after a valid command is received.

| Modbus Registers | Usage Notes For Read/Write Registers |
|------------------|----------------------------------------------------------------------------------------------------------------------------|
| 040001:0 | Bit 0 Of Modbus Register 040001 - Must Write a 1 Into Register 040001 To Set Clock |
| 040001:1 | Bit 1 Of Modbus Register 040001 - Must Write a 2 Into Register 040001 To Start Pump |
| 040001:2 | |
| 040001:3 | Bit 3 Of Modbus Register 040001 - Must Write an 8 Into Register 040001 To Increment Event Historical Log Pointer |
| 040001:4 | Bit 4 Of Modbus Register 040001 - Must Write a 16 Into Register 040001 To Decrement Event Historical Log Pointer |
| 040001:5 | Bit 5 Of Modbus Register 040001 - Must Write a 32 Into Register 040001 To Increment PSI Historical Log Pointer |
| 040001:6 | Bit 6 Of Modbus Register 040001 - Must Write a 64 Into Register 040001 To Decrement PSI Historical Log Pointer |
| 040001:7 | Bit 7 Of Modbus Register 040001 - Must Write a 128 Into Register 040001 To Set Event Historical Log To Most Current Record |
| 040001:8 | Bit 8 Of Modbus Register 040001 - Must Write a 256 Into Register 040001 To Set PSI Historical Log To Most Current Record |

Figure 1.1

Real Time Event Monitoring:

All events listed below in figure 1.2 are real time and can be viewed in Modbus register 40002. Figure 1.2 depicts the 16 bit breakdown and cross reference. This is not to be confused with the historical event log.

| Description | Modbus Registers | Usage Notes For Read Only Registers |
|----------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------|
| Bit 0 'Motor Running' | 040002:0 | Bit 0 Of Modbus Register 040002 - Indicates The 'Motor Running' Event |
| Bit 1 'Power Available' | 040002:1 | Bit 1 Of Modbus Register 040002 - Indicates The 'Power Available' Event |
| Bit 2 'Phase Reversal' | 040002:2 | Bit 2 Of Modbus Register 040002 - Indicates The 'Phase Reversal' Event |
| Bit 3 'Controller Not in Auto' | 040002:3 | Bit 3 Of Modbus Register 040002 - Indicates The 'Controller Not in Auto' Event |
| Bit 4 'System Fault' | 040002:4 | Bit 4 Of Modbus Register 040002 - Indicates The 'System Fault' Event |
| Bit 5 'Motor Overload' | 040002:5 | Bit 5 Of Modbus Register 040002 - Indicates The 'Motor Overload' Event |
| Bit 6 'Pump Failed to Start' | 040002:6 | Bit 6 Of Modbus Register 040002 - Indicates The 'Pump Failed to Start' Event |
| Bit 7 'Low Pressure' | 040002:7 | Bit 7 Of Modbus Register 040002 - Indicates The 'Low Pressure' Event |
| Bit 8 'Soft Start Fault' | 040002:8 | Bit 8 Of Modbus Register 040002 - Indicates The 'Soft Start Fault' Event |
| Bit 9 'Supervisory Power Failure' | 040002:9 | Bit 9 Of Modbus Register 040002 - Indicates The 'Supervisory Power Failure' Event |
| Bit 10 'VFD Drive Fault' | 040002:10 | Bit 10 Of Modbus Register 040002 - Indicates The 'VFD Fault' Event |
| Bit 11 'Pump Running in Bypass Mode' | 040002:11 | Bit 11 Of Modbus Register 040002 - Indicates The 'Pump is running in Bypass Mode' |
| Bit 12 'Transfer Switch in Normal' | 040002:12 | Bit 12 Of Modbus Register 040002 - Indicates The 'Transfer Switch is in the Normal Position' |
| Bit 13 'Transfer Switch in Emergency' | 040002:13 | Bit 13 Of Modbus Register 040002 - Indicates The 'Transfer Switch is in the Emergency Position' |
| Bit 14 'Emergency Isolation Switch Open' | 040002:14 | Bit 14 Of Modbus Register 040002 - Indicates The 'Emergency Isolation Switch is Open' |
| Bit 15 Not Used | 040002:15 | Bit 15 Of Modbus Register 040002 - Not Used |
| **All Data In Modbus Register 40002 Is Real Time** | | |

Figure 1.2

Setting And Reading The Real Time Clock Through Modbus:

Modbus registers 40003 through 40009 are real time clock read registers as seen in figure 1.3. To set the clock current values must be entered into registers 40011 through 40017. Any of these registers left to zero will result in an incorrect clock setting. Once desired clock date and time values are entered bit 0 of register 40001 must be toggled for the controller to accept the values. This can be done by setting bit 0 high or writing a 1 to register 40001. The controller will then accept the new values.

| Description | Modbus Registers | Usage Notes For Read/Write Registers |
|---------------------------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------|
| Real Time Clock Month | 040003 | PLC Read Real Time Clock Month 1-12 |
| Real Time Clock Day | 040004 | PLC Read Real Time Clock Day 1-31 |
| Real Time Clock Year | 040005 | PLC Read Real Time Clock Year 00-99 |
| Real Time Clock Hour | 040006 | PLC Read Real Time Clock Hour 1-24 |
| Real Time Clock Minute | 040007 | PLC Read Real Time Clock Minute 0-59 |
| Real Time Clock Second | 040008 | PLC Read Real Time Clock Seconds 0-59 |
| Real Time Clock Day Of Week | 040009 | PLC Read Real Time Clock Day Of Week 0-6 "Sunday = 0" |
| **Must Have All Fields Filled To Set PLC Clock, Null Fields Will Write 0's To The Clock** | | |
| **Once Desired Clock Values Are Entered, Toggling Bit 0 Of Modbus Register 040001 Or PLC Address V9001.0 Will Set Clock** | | |
| Real Time Clock Set Month | 040011 | PLC Set Real Time Clock Month 1-12 |
| Real Time Clock Set Day | 040012 | PLC Set Real Time Clock Day 1-31 |
| Real Time Clock Set Year | 040013 | PLC Set Real Time Clock Year 00-99 "Cannot Enter 2006, Must Enter 06" |
| Real Time Clock Set Hour | 040014 | PLC Set Real Time Clock Hour 1-24 |
| Real Time Clock Set Minute | 040015 | PLC Set Real Time Clock Minute 0-59 |
| Real Time Clock Set Second | 040016 | PLC Set Real Time Clock Second 0-59 |
| Real Time Clock Set Day Of Week | 040017 | PLC Set Real Time Clock Day Of Week 0-6 "Sunday = 0" |

Figure 1.3

Most Current And Historical Alarms and Events:

The most recent event or alarm date time stamped can be viewed from Modbus registers 40019 through 40025. Register 40019 contains a number representing the most current alarm or event and if it is an occurring or clearing event. The meaning of this number can be cross referenced from figures 1.6 through 1.9. Date and time for the event or alarm are viewed in registers 40020 through 40025. See figure 1.4 for register interpretation.

| Description | Modbus Registers | Usage Notes For Read Only Registers |
|----------------------------|------------------|------------------------------------------------------|
| Most Current Event Number | 040019 | Most Current Event That Happened 1-143 (Index Below) |
| Most Current Event Month | 040020 | Most Current Event Month 1-12 |
| Most Current Event Day | 040021 | Most Current Event Day 1-31 |
| Most Current Event Year | 040022 | Most Current Event Year 00-99 |
| Most Current Event Hours | 040023 | Most Current Event Hours 1-24 |
| Most Current Event Minutes | 040024 | Most Current Event Minutes 0-59 |
| Most Current Event Seconds | 040025 | Most Current Event Seconds 0-59 |

Figure 1.4

The historical events and alarms can be viewed from Modbus registers 40026 through 40033. Here it is possible to scroll through the entire log and set the log pointer to the most current record. Register 40026 contains a number representing the actual log number entry location in the controller. Register 40027 contains a number representing the event or alarm that can be indexed using figures 1.6 through 1.9. Registers 40028 through 40033 show the date and time stamp information for the log record being pointed to.

To maneuver through the log:

 Toggling bit 3 or writing an 8 to register 40001 will increment the log by one entry.

 Toggling bit 4 or writing a 16 to register 40001 will decrement the log by one entry.

 Toggling bit 7 or writing a 128 to register 40001 will set the log to view the most current log entry.

It is recommended to set the log to the most current entry before scrolling. Upon doing this the historical log should show the same data from registers in Figure 1.4. When scrolling, it is possible to move forward and backward through roughly a full weeks worth of data.

| <i>Description</i> | <i>Modbus Registers</i> | <i>Usage Notes For Read Only Registers</i> |
|------------------------------------|-------------------------|--------------------------------------------------------------|
| Event Historical Log Index | 040026 | Event Historical Log Index Value For Record Being Pointed To |
| Event Historical Log Event Number | 040027 | Event Historical Log Event That Occurred 1-143 |
| Event Historical Log Event Month | 040028 | Event Historical Log Month Event Occurred 1-12 |
| Event Historical Log Event Day | 040029 | Event Historical Log Day Event Occurred 1-31 |
| Event Historical Log Event Year | 040030 | Event Historical Log Year Event Occurred 00-99 |
| Event Historical Log Event Hours | 040031 | Event Historical log Hour Event Occurred 1-24 |
| Event Historical Log Event Minutes | 040032 | Event Historical Log Minute Event Occurred 0-59 |
| Event Historical Log Event Seconds | 040033 | Event Historical Log Second Event Occurred 0-59 |

Figure 1.5

| Event/Alarm Description | Event Index # |
|---------------------------------------|---------------|
| MB DB Comm Fault Alarm Occurred | 0 |
| MB DB Comm Fault Alarm Cleared | 1 |
| Memory Card Missing Alarm Occurred | 2 |
| Memory Card Missing Alarm Cleared | 3 |
| Pressure Trans Fault Alarm Occurred | 4 |
| Pressure Trans Fault Alarm Cleared | 5 |
| CPT Power Fail Alarm Occurred | 6 |
| CPT Power Fail Alarm Cleared | 7 |
| Supervisory Power Fail Alarm Occurred | 8 |
| Supervisory Power Fail Alarm Cleared | 9 |
| High Voltage Alarm Occurred | 10 |
| High Voltage Alarm Cleared | 11 |
| Low Voltage Alarm Occurred | 12 |
| Low Voltage Alarm Cleared | 13 |
| Phase Loss Alarm Occurred | 14 |
| Phase Loss Alarm Cleared | 15 |
| Motor Fault Alarm Occurred | 16 |
| Motor Fault Alarm Cleared | 17 |
| Failed to Start Alarm Occurred | 18 |
| Failed to Start Alarm Cleared | 19 |
| Over Frequency Alarm Occurred | 20 |
| Over Frequency Alarm Cleared | 21 |
| Motor Running Amps Alarm Occurred | 22 |
| Motor Running Amps Alarm Cleared | 23 |
| Motor Quit Alarm Occurred | 24 |
| Motor Quit Alarm Cleared | 25 |
| General Power Fault Alarm Occurred | 26 |
| General Power Fault Alarm Cleared | 27 |
| Motor Overload Alarm Occurred | 28 |
| Motor Overload Alarm Cleared | 29 |
| Motor Overcurrent Alarm Occurred | 30 |
| Motor Overcurrent Alarm Cleared | 31 |
| Emergency Start Event Occurred | 32 |
| Emergency Start Event Cleared | 33 |
| Start Pushbutton Event Occurred | 34 |
| Start Pushbutton Event Cleared | 35 |
| Stop Pushbutton Event Occurred | 36 |
| Stop Pushbutton Event Cleared | 37 |
| Run Contactor Signal Occurred | 38 |
| Run Contactor Signal Cleared | 39 |
| Start Contactor Signal Occurred | 40 |
| Start Contactor Signal Cleared | 41 |

Figure 1.6

| Event/Alarm Description | Event Index # |
|----------------------------------------|---------------|
| ATS Emergency Power Event Occurred | 42 |
| ATS Emergency Power Event Cleared | 43 |
| No Load Condition Occurred | 44 |
| No Load Condition Cleared | 45 |
| Emergency Iso Switch Occurred | 46 |
| Emergency Iso Switch Cleared | 47 |
| VFD Fault Alarm Occurred | 48 |
| VFD Fault Alarm Cleared | 49 |
| Motor Lockout Signal Occurred | 50 |
| Motor Lockout Signal Cleared | 51 |
| Deluge Signal Occurred | 52 |
| Deluge Signal Cleared | 53 |
| High Discharge Pressure Alarm Occurred | 54 |
| High Discharge Pressure Alarm Cleared | 55 |
| Pressure Switch Signal Occurred | 56 |
| Pressure Switch Signal Cleared | 57 |
| Phase Reversal Alarm Occurred | 58 |
| Phase Reversal Alarm Cleared | 59 |
| Under Frequency Alarm Occurred | 60 |
| Under Frequency Alarm Cleared | 61 |
| Remote Start Signal Occurred | 62 |
| Remote Start Signal Cleared | 63 |
| Aux 4 Message Occurred | 64 |
| Aux 4 Message Cleared | 65 |
| Aux 5 Message Occurred | 66 |
| Aux 5 Message Cleared | 67 |
| Aux 6 Message Occurred | 68 |
| Aux 6 Message Cleared | 69 |
| High Discharge Pressure Alarm Occurred | 70 |
| High Discharge Pressure Alarm Cleared | 71 |
| Low Discharge Pressure Alarm Occurred | 72 |
| Low Discharge Pressure Alarm Cleared | 73 |
| Motor Running Alarm Occurred | 74 |
| Motor Running Alarm Cleared | 75 |
| Motor Single Phase Alarm Occurred | 76 |
| Motor Single Phase Alarm Cleared | 77 |
| Mode Change Signal Occurred | 78 |
| Mode Change Signal Cleared | 79 |
| System In Auto Event Occurred | 80 |
| System In Auto Event Cleared | 81 |
| System In Off Event Occurred | 82 |
| System In Off Event Cleared | 83 |
| System In Manual Event Occurred | 84 |
| System In Manual Event Cleared | 85 |

Figure 1.7

| Event/Alarm Description | Event Index # |
|---------------------------------------------|---------------|
| Auto Test Start Event Occurred | 86 |
| Auto Test Start Event Cleared | 87 |
| Alarm Reset Button Pressed Event Occurred | 88 |
| Alarm Reset Button Pressed Event Cleared | 89 |
| Low Pressure Start Event Occurred | 90 |
| Low Pressure Start Event Cleared | 91 |
| Low Pressure Condition Event Occurred | 92 |
| Low Pressure Condition Event Cleared | 93 |
| Deluge Start Event Occurred | 94 |
| Deluge Start Event Cleared | 95 |
| Motor Tripped Event Occurred | 96 |
| Motor Tripped Event Cleared | 97 |
| Controller Reboot Event Occurred | 98 |
| Controller Reboot Event Cleared | 99 |
| Pressure Drop Event Occurred | 100 |
| Pressure Drop Event Cleared | 101 |
| N/A | 102 |
| N/A | 103 |
| N/A | 104 |
| N/A | 105 |
| Low Intake Pressure Shutdown Event Occurred | 106 |
| Low Intake Pressure Shutdown Event Cleared | 107 |
| Auxiliary Alarm Occurred | 108 |
| Auxiliary Alarm Cleared | 109 |
| Low Pump Room Temp Alarm Occurred | 110 |
| Low Pump Room Temp Alarm Cleared | 111 |
| Reservoir Low Alarm Occurred | 112 |
| Reservoir Low Alarm Cleared | 113 |
| Reservoir Empty Alarm Occurred | 114 |
| Reservoir Empty Alarm Cleared | 115 |
| Reservoir High Alarm Occurred | 116 |
| Reservoir High Alarm Cleared | 117 |
| Flow Meter On Alarm Occurred | 118 |
| Flow Meter On Alarm Cleared | 119 |
| Relief Valve Open Alarm Occurred | 120 |
| Relief Valve Open Alarm Cleared | 121 |
| Low Suction Pressure Alarm Occurred | 122 |
| Low Suction Pressure Alarm Cleared | 123 |
| High Pump Room Temp Alarm Occurred | 124 |
| High Pump Room Temp Alarm Cleared | 125 |
| Low Firewater Pressure Alarm Occurred | 126 |
| Low Firewater Pressure Alarm Cleared | 127 |
| Low Purge Pressure Alarm Occurred | 128 |
| Low Purge Pressure Alarm Cleared | 129 |

Figure 1.8

| Event/Alarm Description | Event Index # |
|--------------------------------------|---------------|
| Low Gear Oil Pressure Alarm Occurred | 130 |
| Low Gear Oil Pressure Alarm Cleared | 131 |
| High Gear Oil Temp Alarm Occurred | 132 |
| High Gear Oil Temp Alarm Cleared | 133 |
| High Vibration Alarm Occurred | 134 |
| High Vibration Alarm Cleared | 135 |
| Gas Detection Alarm Occurred | 136 |
| Gas Detection Alarm Cleared | 137 |
| Emergency Power On Event Occurred | 138 |
| Emergency Power On Event Cleared | 139 |
| Pump Room Ajar Alarm Occurred | 140 |
| Pump Room Ajar Alarm Cleared | 141 |
| Low Intake Alarm Occurred | 142 |
| Low Intake Alarm Cleared | 143 |

Figure 1.9

Most Current And Historical Pressure Readings:

The most recent system pressure with date time stamp can be viewed from Modbus registers 40034 through 40040. Register 40034 contains a number representing the most current pressure read by the controller. The value is scaled and should match the pressure displayed on the main status screen on the controller OID. Date and time stamp for the pressure reading is viewed in registers 40035 through 40040. See figure 1.10 for register interpretation. The pressure log must be set up to log on an interval for these pressure readings to be logged.

| Description | Modbus Registers | Usage Notes For Read Only Registers |
|---------------------------|------------------|----------------------------------------------|
| Most Current PSI Pressure | 040034 | Most Current PSI 0-300 PSI (Real Time Value) |
| Most Current PSI Day | 040035 | Most Current PSI Month 1-12 |
| Most Current PSI Month | 040036 | Most Current PSI Day 1-31 |
| Most Current PSI Year | 040037 | Most Current PSI Year 00-99 |
| Most Current PSI Hours | 040038 | Most Current PSI Hours 1-24 |
| Most Current PSI Minutes | 040039 | Most Current PSI Minutes 0-59 |
| Most Current PSI Seconds | 040040 | Most Current PSI Seconds 0-59 |

Figure 1.10

The historical pressure readings can be viewed from Modbus registers 40041 through 40048. Here it is possible to scroll through the entire log and set the log pointer to the most current record. Register 40041 contains a number representing the actual log number entry location in the controller. Register 40042 contains a number representing the logged pressure reading. Registers 40043 through 40048 show the date and time stamp information for the log record being pointed to.

To maneuver through the log:

Toggling bit 5 or writing a 32 to register 40001 will increment the log by one entry.

Toggling bit 6 or writing a 64 to register 40001 will decrement the log by one entry.

Toggling bit 8 or writing a 256 to register 40001 will set the log to view the most current log entry.

It is recommended to set the log to the most current entry before scrolling. Upon doing this the historical log should show the same data from registers in Figure 1.10. When scrolling, it is possible to move forward and backward through roughly a full weeks worth of data.

| Description | Modbus Registers | Usage Notes For Read Only Registers |
|-----------------------------|------------------|------------------------------------------------------------|
| PSI Historical Log Index | 040041 | PSI Historical Log Index Value For Record Being Pointed To |
| PSI Historical Log Pressure | 040042 | PSI Historical Log PSI That Occurred 0-300 PSI |
| PSI Historical Log Day | 040043 | PSI Historical Log Day PSI Occurred 1-12 |
| PSI Historical Log Month | 040044 | PSI Historical Log Month PSI Occurred 1-31 |
| PSI Historical Log Year | 040045 | PSI Historical Log Year PSI Occurred 00-99 |
| PSI Historical Log Hours | 040046 | PSI Historical Log Hour PSI Occurred 1-24 |
| PSI Historical Log Minutes | 040047 | PSI Historical Log Minute PSI Occurred 0-59 |
| PSI Historical Log Seconds | 040048 | PSI Historical Log Second PSI Occurred 0-59 |

Figure 1.11

z

Miscellaneous Floating Point Readings:

System pressure, pump start pressure, controller 3 phase voltage, motor 3 phase amps and pump run hours can all be read from the controller Real or Floating Point registers. These are Modbus registers 40200 through 40216. These registers will be double word and a separate poll definition must be used. No more that 50 registers can be pulled at a time. All available floating point registers are shown in Figure 1.12 and do not require scaling.

| Description | Modbus Registers | Usage Notes For Read Only Registers |
|---------------------------|------------------|------------------------------------------------------|
| Most Current PSI Pressure | 040200 | Most Current Pressure 0-300 PSI Floating Point Value |
| Start PSI Pressure | 040202 | Start Pressure 0-300 PSI Floating Point Value |
| Phase AB Volts | 040204 | Phase AB Voltage 0-600 Floating Point Value |
| Phase BC Volts | 040206 | Phase BC Voltage 0-600 Floating Point Value |
| Phase AC Volts | 040208 | Phase AC Voltage 0-600 Floating Point Value |
| Phase A Amps | 040210 | Phase A Amps 0-1200 Floating Point Value |
| Phase B Amps | 040212 | Phase B Amps 0-1200 Floating Point Value |
| Phase C Amps | 040214 | Phase C Amps 0-1200 Floating Point Value |
| Pump Run Hours | 040216 | Pump Run Hours Floating Point Value |

Figure 1.12