MANUAL FOR MODEL MP300 to MP700
ELECTRIC MOTOR DRIVEN
FIRE PUMP CONTROLLERS

Starting Serial No. "RA"

This manual provides General Information, Installation, Operation, Maintenance and System Set-Up Information for METRON Model MP300 through MP700 Electric Motor Driven Fire Pump Controllers.

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PART I: GENERAL INFORMATION

The basic function of the model MP 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. 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. Includes an LED for Test Mode. Also features a 4 line by 20 character LCD for display

C. Alarms and Signal Lights - Three (3) Standard LED lights are provided to give visual signals for; **"Power On", "System Fault",** and **"Phase Reversal.** When a transfer switch is supplied, Three (3) additional LED lights are provided for **"Transfer Sw in Normal", "Transfer Sw in Emerg"** and **"Emerg Iso Switch Open".** Additional **"Pump Room Alarms"** are displayed on the OID as text messages. The most recent Event is displayed with additional events visible by using the Up and Down Arrow keys on the OID. 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"

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 109 to 112.

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 only after starting causes have returned to normal. This returns the controller to the standby, ready to start condition.

H. Cabinet - A heavy gauge steel cubicle encloses the controller. The OID, alarm horn and manual start/stop pushbuttons are mounted on the outer door.

PART III: OPERATION OF THE CONTROLLER

A. **Series MP300 Across the line Start**. When 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 green **"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 starting sequence based on the Model of the controller selected in Screen 301. If the pump fails to start after a set time delay (Screen #103), the **"Pump Failed to Start"** message will show on the LCD, and the alarm horn will sound. In addition, the **"System Fault"** light will illuminate.

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"** message will show on the LCD and the alarm will sound. If the motor current exceeds a set overload value (Screen #319) while the pump is running, the **"Motor Overload"** message will show on the LCD 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. 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 enabled the stop timer is preset at the factory to 10 minutes. Longer time settings can be set in System Config screen 105. 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 an alarm condition occur during the weekly test operation. See Section VI Screen 113 for more information.

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. **Series MP400 Primary Resistance Start:** There are two contactors supplied along with a set of starting resistors. The starting contactor is connected in series with the resistors to reduce the voltage to the motor for a preset time. After this preset time delay (See Screen #314) the main contactor will close in parallel with the starting contactor and resistors and thus apply full voltage to

the motor. If the motor is not connected for this test, there will be no voltage drop across the resistors and full voltage will appear at the output terminals of the contactors as soon as the starting contactor closes.

G. **Series MP420 Part-Winding Start:** There are two contactors for part-winding start. The start contactor will close immediately on demand and the other will close after a preset transition time delay (See Screen #314). Full voltage will be present at the output of both contactors.

H. **Series MP430 Wye-Delta Open Transition:** There are three contactors for wye-delta starting. The start contactor and the shorting contactor will close immediately on demand. This connects the motor leads in the wye configuration. After the transition time delay the shorting contactor opens and the run contactor closes, thus connecting the motor windings in the delta configuration. The motor will now run at full speed and deliver rated horsepower to the load.

I. **Series MP435 Wye-Delta Closed Transition:** The operation of the Series MP435 is almost the same as the Series MP430. There is an additional resistor contactor and a set of transition resistors which provides power to the motor windings during transition from the wye connection to the delta connection. After the transition time delay this contactor closes, which connects the resistors to the motor windings. After the resistor contactor closes the shorting contactor opens, which in turn allows the run contactor to close, thus connecting the motor windings in the delta configuration. The motor will now run at full speed and deliver rated horsepower to the load.

J. **Series MP450 Autotransformer Start:** There are three contactors for autotransformer starting. The start (autotransformer) contactor and the autotransformer neutral contactor will close immediately on demand. 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.

K. **Series MP700 Solid State Soft Start:** There are two contactors for solid state soft starting. The solid state starter line contactor will close immediately on demand 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 <u>not</u> 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.

A 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 124 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. If there are multiples sets of motor leads, i.e. Part Winding start or Wye-Delta start, then both sets of leads must be reversed. Be certain to change the same set of wires at the two contactors. 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 and then press Change/Enter. 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:

Terminal Number (Microprocessor Func #)	**L.E.D. (light) "ON" Indication**
(Out 02)	Circuit Breaker Shunt Trip
(Out 03)	Start Contactor relay (if applicable)
(Out 04)	Run Contactor relay
(Out 05)	Start signal to Soft Start (Model MP700 only)
(Out 06)	Power to Soft Start (Model MP700 only)
(In 01)	Emergency Start lever activated
(In 02)	Start Pushbutton
(In 03)	Stop Pushbutton
(In 04)	Run Contactor closed
(In 05)	Start 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)

a. **AUTOMATIC STARTING TESTS:**

1. Bleed off pressure in system until pressure drops below the low set point.
2. Pump should start 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.
3. Press the **"Stop"** push button to stop the pump.
4. 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 110 and 111, 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.
3. Should a remote manual start occur or a low pressure condition occur while the pump is running on Weekly Test, the pump will not stop until the Stop pushbutton is pressed or if set for Automatic Stop, the Minimum run timer times out.
4. The periodic Weekly Test function is factory set to No in Screen 109 due to Factory Mutual standard requirements. Contact the Metron Factory Service department for instructions to turn this function on if this is not a Factory Mutual job.

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 #74 are used for remote manual start push buttons (close to start). Terminals #111 and #74 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 #74 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 124).

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 115), 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 stopped 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. See screen 103 to set the delay timer.

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 twelve (12) (or nine (9) if a transfer switch is supplied), pump room alarms are available. Each auxiliary alarm is configurable so that the alarm horn may or may not sound and an event message will be displayed on the OID (if configured) 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. **ELECTRIC MOTOR LOCKOUT** : Terminals 110 and 74 are provided to connect to an external switch to lock out the electric motor. This may be necessary to prevent the motor from starting when a diesel engine controller is used in conjunction with the electric motor controller or when a low suction cutoff panel is used, etc. The external switch will close to prevent the electric motor controller from starting automatically or stop it if it is already running under an automatic start condition. With the Electric Motor Lockout feature energized it is still possible to start the motor manually via the door mounted Start pushbutton or a remote start signal is received.

j. **DELUGE VALVE**: Terminals 111 and 74 are provided to connect a deluge valve Normally Closed (NC) switch. When this feature is activated in screen 124 the pump will start when this Normally Closed Switch Opens. If the Automatic Stop Feature is also activated, then the pump will stop when the switch recloses and the Automatic Stop timer has expired. If the Electric Motor Lockout is active the controller will not start with the deluge valve contact opening.

k. **REMOTE START**: Terminals 112 and 74 are provided to connect to a Normally Open (NO) Remote Start Switch to start the motor manually. When the motor is started via the Remote Start switch, it must be stopped manually at the controller.

l.

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.

Common Tasks Performed Using The OID

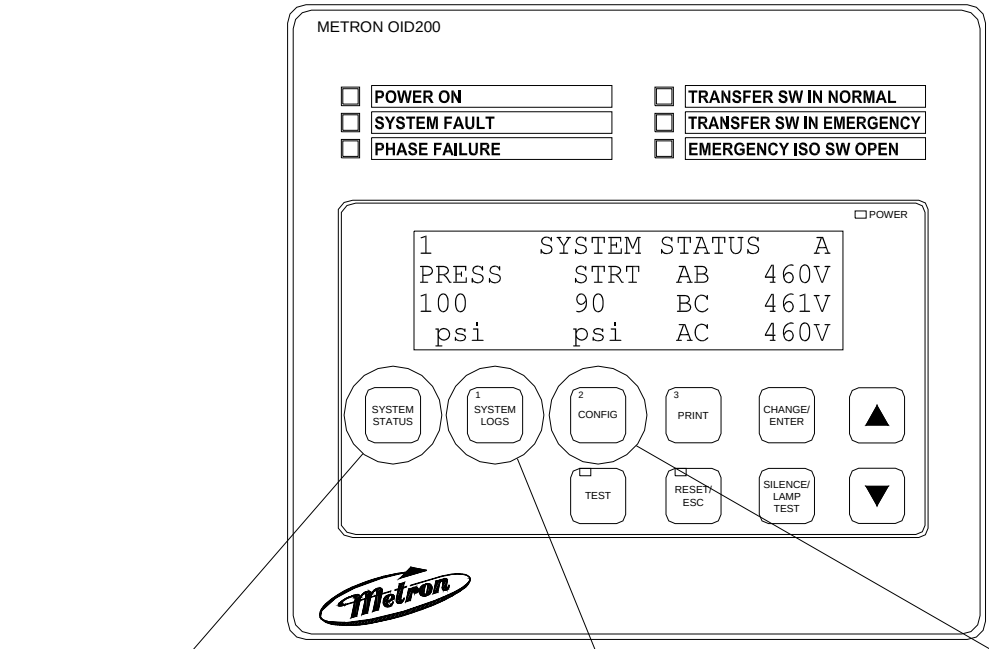
Silencing Horn: If a horn is sounding and the alarm is silenceable, a quick press of the [SILENCE/LAMP TEST] will silence the horn (less than 1 second press).

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 thus dropping the pressure, which causes the controller to start the pump. Pressing and releasing the [TEST] button if the pressure drain solenoid is not supplied, will initiate a pump start through software 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  A
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
Fri04/21/09 09:51:38
```

```
5   SYSTEM STATUS
  Controller Power
  On Time: 18.5 Hrs
Mon04/21/09 17:53:26
```

```
6   SYSTEM STATUS
Firmware Ver SV 4.13
Commissioned Date:
      04/15/09
```

```
    SYSTEM LOGS
1) Event Log
2) Pressure Log
```

```
#   1 EVENT LOG
   System in Off
   Mode Occurred
 04/21/09 13:15:15
```

```
#   1 EVENT DETAILS
   System in Off
   Mode Occurred
 04/21/09 13:15:15
```

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

```
# 1  EVENT DETAILS
AB   460V    0 Amps
BC   461V    0 Amps
AC   464V    0 Amps
```

```
#   2 EVENT LOG
  Pump Failed To
Start Alarm Occurred
 04/21/09 07:32:15
```

```
#   3 EVENT LOG
Supvr Power Failure
Alarm Cleared
 04/21/09 07:09:48
```

```
   PRESSURE LOG
04/21/09  17:52:45
112 psi
 Skip Rate:[EACH  ]
```

```
   PRESSURE LOG
04/21/09  17:52:30
112 psi
 Skip Rate:[EACH  ]
```

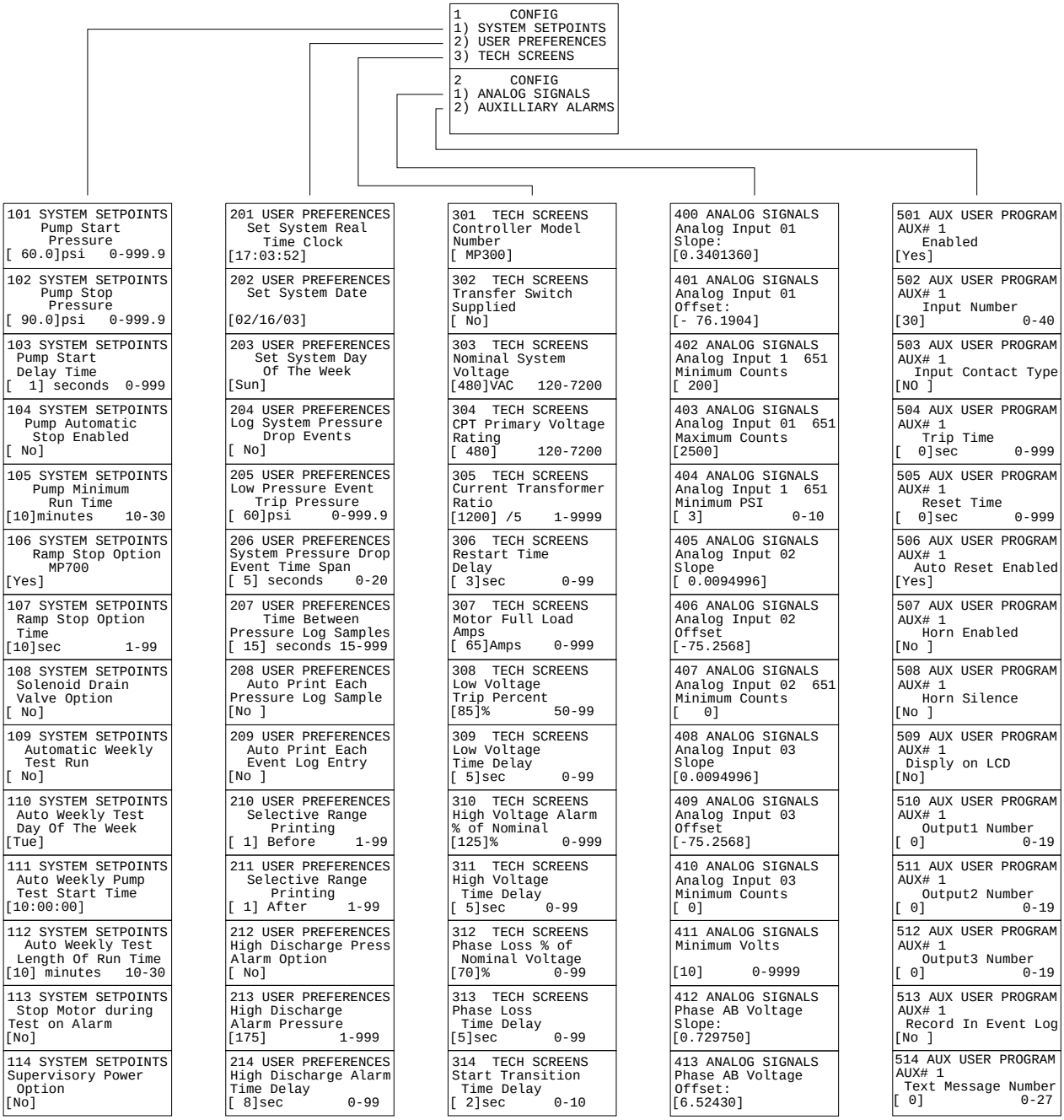
```
   PRESSURE LOG
04/21/09  17:52:15
113 psi
 Skip Rate:[EACH  ]
```

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

```
2     CONFIG
1) ANALOG SIGNALS
2) AUXILLIARY ALARMS
```

Continued on next page.

OID Screen Map (continued)



115 SYSTEM SETPOINTS
Supervisory Power
Delay Time
[2] sec 0-99

116 SYSTEM SETPOINTS
 Supervisory Power
Failure Startup
[Yes]

117 SYSTEM SETPOINTS
Supvervisory 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]

215 USER PREFERENCES
Low Discharge Press
Alarm Option
[No]

216 USER PREFERENCES
Low Discharge
Alarm Pressure
[100]   0-999

217 USER PREFERENCES
Low Discharge Alarm
Time Delay
[8]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 all settings
to SD memory card
[No]

225 USER PREFERENCES
Load all settings
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]

315 TECH SCREENS
Single Phase Alarm
% of FLA
[5]%   0-99

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
   Single Phase
    Operation
[No]

333 TECH SCREENS
   Foam Pump mode

[NA]

334 TECH SCREENS
 Dump Valve Timeout

[10]

414 ANALOG SIGNALS
Phase BC Voltage
Slope:
[0.729750]

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

Daughter board
counts
 649 1176 1221   0
   0   0   0   0

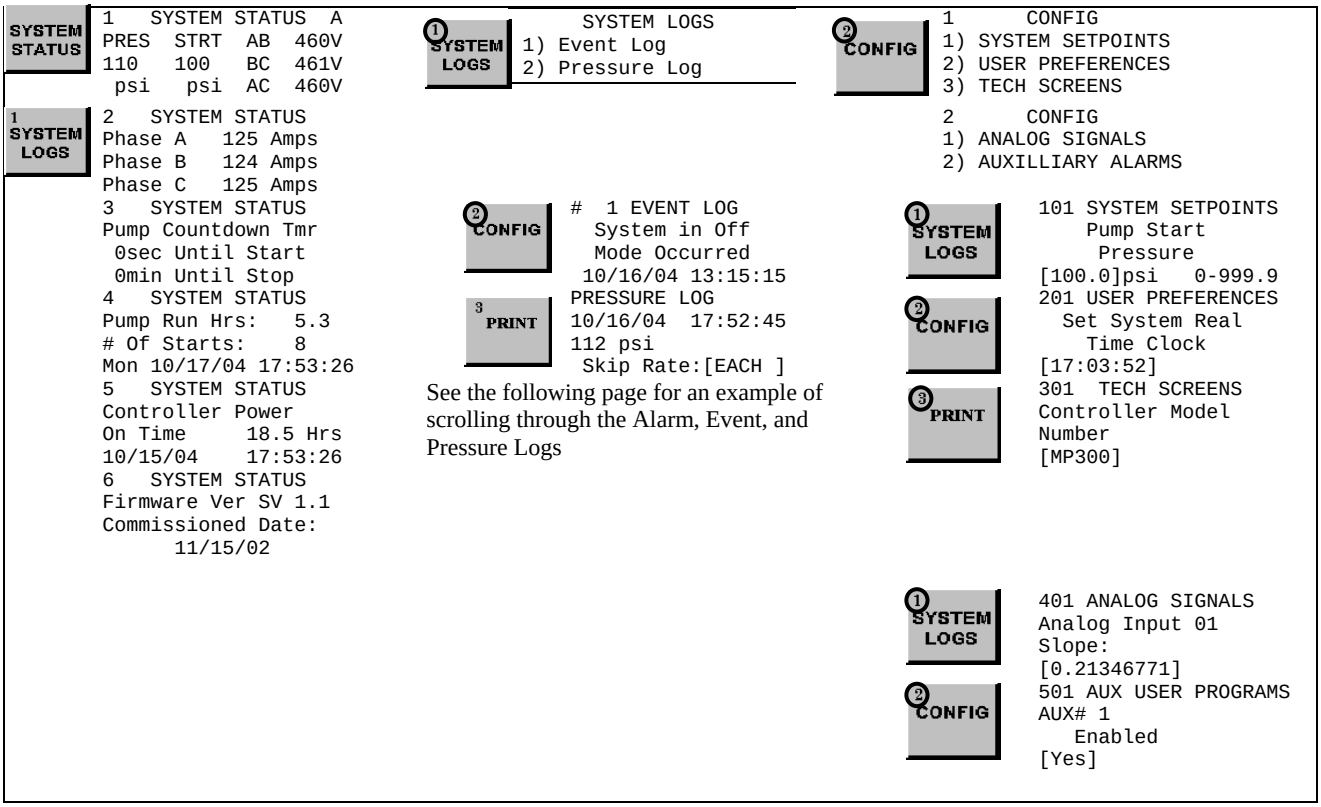
425 ANALOG SIGNALS
Set Volts/Amps Slope
Offset to Fact
Dflt[Yes]

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 LOGS: The Model MP Electric controller has two separate data logs; 1) event log, and 2) pressure log. The event log records all alarm and system function type events. The pressure log records the system pressure at periodic intervals.

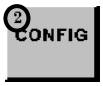
```
    SYSTEM LOGS
1) Event Log
2) Pressure Log
```

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

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

```
#   1 EVENT DETAILS
   System in Off
   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
```

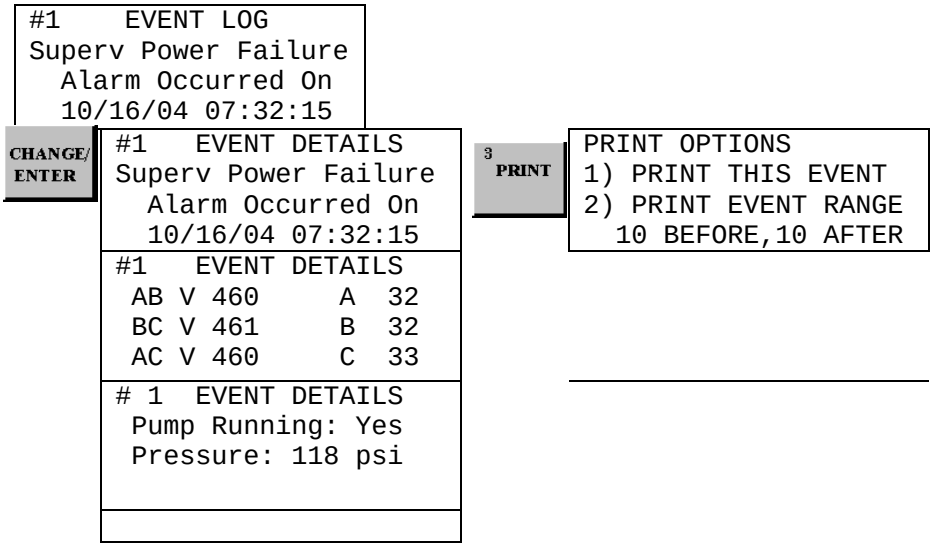



```
   PRESSURE LOG
10/16/04  17:52:45
112 psi
 Skip Rate:[EACH  ]
   PRESSURE LOG
10/16/04  17:52:30
112 psi
 Skip Rate:[EACH  ]
   PRESSURE LOG
10/16/04  17:52:15
113 psi
 Skip Rate:[EACH  ]
```

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.

Typical Event Log Message Printout

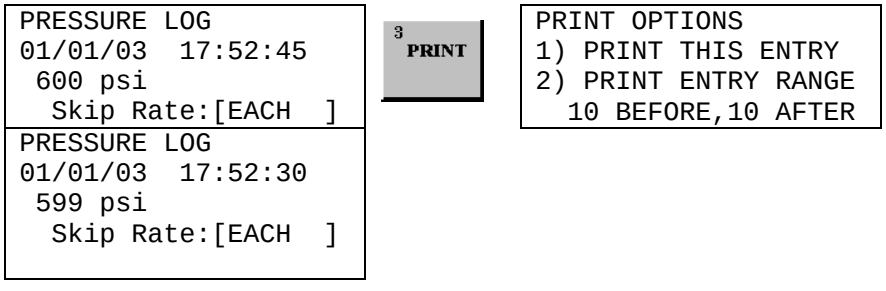
```
#1    EVENT LOG
  AC Power Restored
     Occurred On
  11/16/02 07:32:15
#2    EVENT LOG
  AC Power Restored
     Occurred On
  11/16/02 07:32:15
```



Typical Event 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
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.

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

```
2      CONFIG
1) ANALOG SIGNALS
2) AUXILLIARY ALARMS
```

1) SYSTEM SETPOINTS (Level 1 password): These setpoints adjust the conditions for starting and stopping the pump.
2) USER PREFERENCES (Level 1 password): These setpoints adjust settings not related to pump operation.
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 (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 [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
```

```
ENTER PASSWORD:
****
```

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

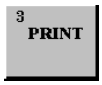
```
101 CHANGE VALUE
    Pump Start
     Pressure
[ 60] psi      0-999
```

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 [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
```




```
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
      "      "
      "      "
      "      "
511  AUX USER PROGRAMS
Aux# 1
     Output2 Number
[ 0]               0-19

512  AUX USER PROGRAMS
Aux# 1
     Output3 Number
[ 0]               0-19
```

PART VI: SYSTEM SET POINT DEFINITIONS

Configure System Setpoints

101 SYSTEM SETPOINTS Pump Start Pressure [60] psi 0-999	If system pressure is at or below this setting the pump will start. The start pressure should never be set higher than the stop pressure. There should be approximately 5 psi difference between the pump start pressure and the pump stop pressure.
102 SYSTEM SETPOINTS Pump Stop Pressure [90] psi 0-999	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.
103 SYSTEM SETPOINTS Pump Start Delay Time [10] seconds 1-999	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.
104 SYSTEM SETPOINTS Pump Automatic Stop Enabled [Yes]	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. Requires Tech password to change. Please consult factory.
105 SYSTEM SETPOINTS Pump Minimum Run Time [10]minutes 1-99	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.
106 SYSTEM SETPOINTS Ramp Stop Option Time M700 [Yes]	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.
107 SYSTEM SETPOINTS Ramp Stop Option Time M700 [10] 0-99	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.
108 SYSTEM SETPOINTS Solenoid Drain Valve Option [No]	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.
109 SYSTEM SETPOINTS Automatic Weekly Test Run [No]	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. Requires Tech Password to change, please consult factory.
110 SYSTEM SETPOINTS Auto Weekly Test Test Day Of The Week [Mon]	The day of the week that the pump will be started automatically each week if the option is enabled in screen 109.
111 SYSTEM SETPOINTS Auto Weekly Test Start Time [00:00:00]	The time of day that the pump will be started automatically each week if the option is enabled in screen 109.

112 SYSTEM SETPOINTS Auto Weekly Test Length of Run Time [10] minutes 0-99	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..
113 SYSTEM SETPOINTS Stop Motor During Test on Alarm. [Yes]	When this feature is enabled, the controller will stop the pump during the automatically weekly test or the manual test mode should the “Motor Overload” or “Phase Failure” alarm occur. Note:If the system pressure is below the “stop” setpoint in (screen 102) the pump will continue to run in the event there is a demand for fire water.
114 SYSTEM SETPOINTS Supervisory Power Option [Yes]	When this option is enabled, the controller will monitor a separate 120VAC power source for availability and alarm on it’s failure.
115 SYSTEM SETPOINTS Supervisory Power Delay Time [15] seconds 0-99	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.
116 SYSTEM SETPOINTS Supervisory Power Failure Startup [No]	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.
117 SYSTEM SETPOINTS Supervisory Power Start Time Delay [1]minutes 0-500	The amount of time the controller will delay starting of the pump on loss of the 120VAC Supervisory power source.
118 SYSTEM SETPOINTS Pressure Transducer Failure Pump Start [No]	If enabled, the controller will start the pump if a failure of the pressure transducer is detected.
119 SYSTEM SETPOINTS Shutdown on Low Intake Pressure/Lvl [No]	If enabled, the controller will stop the pump when a normally closed contact closes indicating low suction pressure or low reservoir/tank level. *This option voids the FM approval of the controller if it is turned on.*
120 SYSTEM SETPOINTS Shutdown on Low Intake Trip Time [5]seconds 0-99	The time delay that the Low Intake condition must be active before pump will stop on the condition.
121 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset [No]	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.
122 SYSTEM SETPOINTS Low Intake Shutdown Auto Reset Time [5]seconds 0-99	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.
123 SYSTEM SETPOINTS Pressure Switch Pump Start [No]	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.

124 SYSTEM SETPOINTS Deluge Valve Pump Start [No]	If enabled this setting activates the logic to monitor an optional deluge valve normally closed dry contact that will start the pump when it opens.

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 PREFFENCES
  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
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 PREFFENCES Low Discharge Pressure Alarm Option [No]	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
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 [5] 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.
219 USER PREFERENCES No Load Time Delay [3]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 0=English [0] 1=Spanish	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 all settings to SD memory card [No]	Used to save all configuration parameters to the SD card

225 USER PREFERENCES Load all settings from SD memory card [No]	Used to load all the 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 or Odd

PART VII: EVENT LOG MESSAGES

The following is a sample of the possible messages that could be recorded within either the alarm or event logs.

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). The reset button on the OID must be pressed 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 either by an automatic means or the manual start pushbutton or it has stopped.
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 while in Auto mode 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 and the pump has started.
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 is 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 an 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

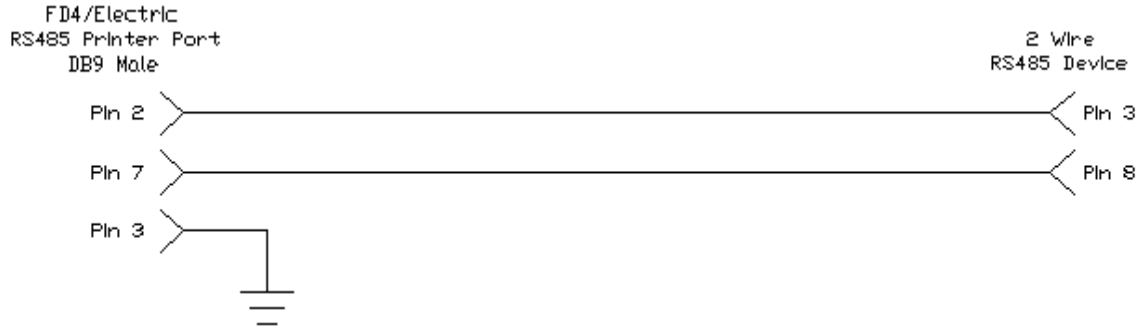
0	Auxiliary Alarm
1	Low Pump Room Temp
2	Reservoir Low
3	Reservoir Empty
4	Reservoir High
5	Flow Meter On
6	Relief Valve Open
7	Low Suction Pressure
8	High Pump Room Temp
9	Low Firewater Press
10	Low Purge Pressure
11	Low Gear Oil Press
12	High Gear Oil Temp
13	High Vibration
14	Gas Detection
15	Emergency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

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
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	MP600_Tripped

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 227 through 230. Screen 227 is used to set the Modbus address 1-255. All Modbus devices on a network must have a unique address.

Screen 228 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 229 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 230 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 through 40006. 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 Transfer Switch in Normal	040002:10	Bit 10 Of Modbus Register 040002 - Indicates the 'Transfer Switch is in the Normal Position'
Bit 11 Transfer Switch in Emergency	040002:11	Bit 11 Of Modbus Register 040002 - Indicates the 'Transfer Switch is in the Emergency Position'
Bit 12 Emergency Isolation Switch Open	040002:12	Bit 12 Of Modbus Register 040002 - Indicates the 'Emergency Isolation Switch is Open'
Bit 13 Not Used	040002:13	Bit 13 Of Modbus Register 040002 - Not Used
Bit 14 Not Used	040002:14	Bit 14 Of Modbus Register 040002 - Not Used
Bit 15 Not Used	040002:15	Bit 15 Of Modbus Register 040002 - Not Used
All Data In Modbus Register 40002 Is Real Time		

Description	Modbus Registers	Usage Notes For Read Only Registers
Bit 0 NOT USED	040003:0	Bit 0 Of Modbus Register 040003
Bit 1 NOT USED	040003:1	Bit 1 Of Modbus Register 040003
Bit 2 NOT USED	040003:2	Bit 2 Of Modbus Register 040003
Bit 3 NOT USED	040003:3	Bit 3 Of Modbus Register 040003
Bit 4 NOT USED	040003:4	Bit 4 Of Modbus Register 040003
Bit 5 NOT USED	040003:5	Bit 5 Of Modbus Register 040003
Bit 6 NOT USED	040003:6	Bit 6 Of Modbus Register 040003
Bit 7 NOT USED	040003:7	Bit 7 Of Modbus Register 040003
Bit 8 NOT USED	040003:8	Bit 8 Of Modbus Register 040003
Bit 9 NOT USED	040003:9	Bit 9 Of Modbus Register 040003
Bit 10 NOT USED	040003:10	Bit 10 Of Modbus Register 040003
Bit 11 NOT USED	040003:11	Bit 11 Of Modbus Register 040003
Bit 12 NOT USED	040003:12	Bit 12 Of Modbus Register 040003

Description	Modbus Registers	Usage Notes For Read Only Registers
Bit 0 'Dump Valve'	040004:0	Bit 0 Of Modbus Register 040004 - Indicates 'Dump Valve On' Event
Bit 1 'Motor Lockout Input'	040004:1	Bit 1 Of Modbus Register 040004 - Indicates 'Engine Lockout Input' Event
Bit 2 'Stop Push button'	040004:2	Bit 2 Of Modbus Register 040004 - Indicates 'Stop push button pressed' Event
Bit 3 'SD Card Missing'	040004:3	Bit 3 Of Modbus Register 040004 - Indicates ' SD Card Missing' Event
Bit 4 'Reset button'	040004:4	Bit 4 Of Modbus Register 040004 - Indicates 'Reset push button pressed' Event
Bit 5 NOT USED	040004:5	Bit 5 Of Modbus Register 040004 - NOT USED
Bit 6 'OID LED 13'	040004:6	Bit 6 Of Modbus Register 040004 - Indicates 'OID Lamp 13 on'
Bit 7 'OID LED 14'	040004:7	Bit 7 Of Modbus Register 040004 - Indicates 'OID Lamp 14 on'
Bit 8 'OID LED 15'	040004:8	Bit 8 Of Modbus Register 040004 - Indicates 'OID Lamp 15 on'
Bit 9 NOT USED	040004:9	Bit 9 Of Modbus Register 040004
Bit 10 NOT USED	040004:10	Bit 10 Of Modbus Register 040004
Bit 11 NOT USED	040004:11	Bit 11 Of Modbus Register 040004
Bit 12 NOT USED	040004:12	Bit 12 Of Modbus Register 040004
Bit 13 NOT USED	040004:13	Bit 13 Of Modbus Register 040004
Bit 14 NOT USED	040004:14	Bit 14 Of Modbus Register 040004
Bit 15 NOT USED	040004:15	Bit 15 Of Modbus Register 040004

Description	Modbus Registers	Usage Notes For Read Only Registers
Bit 0 'R1'	040005:0	Bit 0 Of Modbus Register 040005 - Indicates 'Relay 1 On'
Bit 1 'R2'	040005:1	Bit 1 Of Modbus Register 040005 - Indicates 'Relay 2 On'
Bit 2 'R3'	040005:2	Bit 2 Of Modbus Register 040005 - Indicates 'Relay 3 On'
Bit 3 'R4'	040005:3	Bit 3 Of Modbus Register 040005 - Indicates 'Relay 4 On'
Bit 4 'R5'	040005:4	Bit 4 Of Modbus Register 040005 - Indicates ' Relay 5 On'
Bit 5 'R6'	040005:5	Bit 5 Of Modbus Register 040005 - Indicates 'Relay 6 On'
Bit 6 'R7'	040005:6	Bit 6 Of Modbus Register 040005 - Indicates 'Relay 7 On'
Bit 7 'R8'	040005:7	Bit 7 Of Modbus Register 040005 - Indicates 'Relay 8 On'
Bit 8 'R9'	040005:8	Bit 8 Of Modbus Register 040005 - Indicates 'Relay 9 On'
Bit 9 'R10'	040005:9	Bit 9 Of Modbus Register 040005 - Indicates 'Relay 10 On'
Bit 10 'R11'	040005:10	Bit 10 Of Modbus Register 040005 - Indicates 'Relay 11 On'
Bit 11 'R12'	040005:11	Bit 11 Of Modbus Register 040005 - Indicates 'Relay 12 On'
Bit 12 'R13'	040005:12	Bit 12 Of Modbus Register 040005 - Indicates 'Relay 13 On'
Bit 13 'R14'	040005:13	Bit 13 Of Modbus Register 040005 - Indicates 'Relay 14 On'
Bit 14 'R15'	040005:14	Bit 14 Of Modbus Register 040005 - Indicates 'Relay 15 On'
Bit 15 'R16'	040005:15	Bit 15 Of Modbus Register 040005 - Indicates 'Relay 16 On'

Description	Modbus Registers	Usage Notes For Read Only Registers
Bit 0 'R17'	040006:0	Bit 0 Of Modbus Register 040006 - Indicates 'Relay 17 On'
Bit 1 'R18'	040006:1	Bit 1 Of Modbus Register 040006 - Indicates 'Relay 18 On'
Bit 2 'R19'	040006:2	Bit 2 Of Modbus Register 040006 - Indicates 'Relay 19 On'
Bit 3 'R20'	040006:3	Bit 3 Of Modbus Register 040006 - Indicates 'Relay 20 On'
Bit 4 'R21'	040006:4	Bit 4 Of Modbus Register 040006 - Indicates ' Relay 21 On'
Bit 5 'R22'	040006:5	Bit 5 Of Modbus Register 040006 - Indicates 'Relay 22 On'
Bit 6 'R23'	040006:6	Bit 6 Of Modbus Register 040006 - Indicates 'Relay 23 On'
Bit 7 'R24'	040006:7	Bit 7 Of Modbus Register 040006 - Indicates 'Relay 24 On'
Bit 8	040006:8	Bit 8 Of Modbus Register 040006 - NOT USED
Bit 9	040006:9	Bit 9 Of Modbus Register 040006 - NOT USED
Bit 10	040006:10	Bit 10 Of Modbus Register 040006 - NOT USED
Bit 11	040006:11	Bit 11 Of Modbus Register 040006 - NOT USED
Bit 12	040006:12	Bit 12 Of Modbus Register 040006 - NOT USED
Bit 13	040006:13	Bit 13 Of Modbus Register 040006 - NOT USED
Bit 14	040006:14	Bit 14 Of Modbus Register 040006 - NOT USED
Bit 15	040006:15	Bit 15 Of Modbus Register 040006 - NOT USED

Figure 1.2

Setting And Reading The Real Time Clock Through Modbus:

Modbus registers 40007 through 40013 are real time clock read registers as seen in figure 1.3. To set the clock current values must be entered into registers 40014 through 40020. 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 Only Registers
Real Time Clock Month	040007	PLC Read Real Time Clock Month 1-12
Real Time Clock Day	040008	PLC Read Real Time Clock Day 1-31
Real Time Clock Year	040009	PLC Read Real Time Clock Year 00-99
Real Time Clock Hour	040010	PLC Read Real Time Clock Hour 1-24
Real Time Clock Minute	040011	PLC Read Real Time Clock Minute 0-59
Real Time Clock Second	040012	PLC Read Real Time Clock Seconds 0-59
Real Time Clock Day Of Week	040013	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 040001Or PLC Address V9001.0 Will Set Clock
Real Time Clock Set Month	040014	PLC Set Real Time Clock Month 1-12
Real Time Clock Set Day	040015	PLC Set Real Time Clock Day 1-31
Real Time Clock Set Year	040016	PLC Set Real Time Clock Year 00-99 "Cannot Enter 2006, Must Enter 06"
Real Time Clock Set Hour	040017	PLC Set Real Time Clock Hour 1-24
Real Time Clock Set Minute	040018	PLC Set Real Time Clock Minute 0-59
Real Time Clock Set Second	040019	PLC Set Real Time Clock Second 0-59
Real Time Clock Set Day Of Week	040020	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 40021 through 40027. Register 40021 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 40022 through 40027. See figure 1.4 for register interpretation.

Description	Modbus Registers	Usage Notes For Read Only Registers
Most Current Event Number	040021	Most Current Event That Happened 1-169 (Index Below)
Most Current Event Month	040022	Most Current Event Month 1-12
Most Current Event Day	040023	Most Current Event Day 1-31
Most Current Event Year	040024	Most Current Event Year 00-99
Most Current Event Hours	040025	Most Current Event Hours 1-24
Most Current Event Minutes	040026	Most Current Event Minutes 0-59
Most Current Event Seconds	040027	Most Current Event Seconds 0-59

Figure 1.4

The historical events and alarms can be viewed from Modbus registers 40028 through 40035. Here it is possible to scroll through the entire log and set the log pointer to the most current record. Register 40028 contains a number representing the actual log number entry location in the controller. Register 40029 contains a number representing the event or alarm that can be indexed using figures 1.6 through 1.9. Registers 40030 through 40035 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 1.5. 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*
Event Historical Log Index	040028	Event Historical Log Index Value For Record Being Pointed To
Event Historical Log Event Number	040029	Event Historical Log Event That Occurred 1-21
Event Historical Log Event Month	040030	Event Historical Log Month Event Occured 1-12
Event Historical Log Event Day	040031	Event Historical Log Day Event Occured 1-31
Event Historical Log Event Year	040032	Event Historical Log Year Event Occurred 00-99
Event Historical Log Event Hours	040033	Event Historical log Hour Event Occurred 1-24
Event Historical Log Event Minutes	040034	Event Historical Log Minute Event Occurred 0-59
Event Historical Log Event Seconds	040035	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
Soft Start Fault Alarm Occurred	48
Soft Start 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 Ocurred	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
Hight 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
Dump Valve Occurred	144
Dump Valve Cleared	145

Figure 1.9

Most Current And Historical Pressure Readings:

The most recent system pressure with date time stamp can be viewed from Modbus registers 40036 through 40042. Register 40036 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 40037 through 40042. 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	040036	Most Current PSI 0-300 PSI (Real Time Value)
Most Current PSI Month	040037	Most Current PSI Month 1-12
Most Current PSI Day	040038	Most Current PSI Day 1-31
Most Current PSI Year	040039	Most Current PSI Year 00-99
Most Current PSI Hours	040040	Most Current PSI Hours 1-24
Most Current PSI Minutes	040041	Most Current PSI Minutes 0-59
Most Current PSI Seconds	040042	Most Current PSI Seconds 0-59

Figure 1.10

The historical pressure readings can be viewed from Modbus registers 40043 through 40050. Here it is possible to scroll through the entire log and set the log pointer to the most current record. Register 40043 contains a number representing the actual log number entry location in the controller. Register 40044 contains a number representing the logged pressure reading. Registers 40045 through 40050 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 1.11. 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	040043	PSI Historical Log Index Value For Record Being Pointed To
PSI Historical Log Pressure	040044	PSI Historical Log PSI That Occurred 0-300 PSI
PSI Historical Log Month	040045	PSI Historical Log Month PSI Occured 1-12
PSI Historical Log Day	040046	PSI Historical Log Day PSI Occured 1-31
PSI Historical Log Year	040047	PSI Historical Log Year PSI Occurred 00-99
PSI Historical Log Hours	040048	PSI Historical Log Hour PSI Occurred 1-24
PSI Historical Log Minutes	040049	PSI Historical Log Minute PSI Occurred 0-59
PSI Historical Log Seconds	040050	PSI Historical Log Second PSI Occurred 0-59

Figure 1.11

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