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# Human Machine Interface Manual

## Two or Three Pump with Color Touch Screen

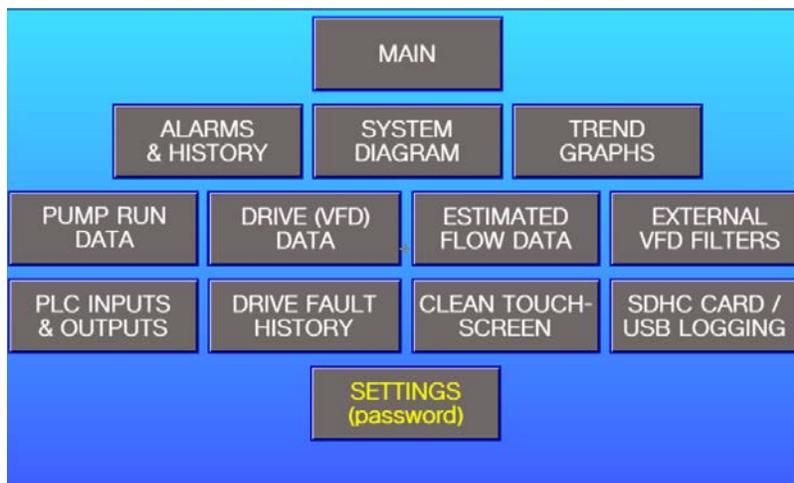
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Illustrations in this manual depict standard estimated flow rate and optional suction pressure measured by a transmitter. If an optional paddle wheel flow sensor is provided, it replaces estimated flow rate unless the flow sensor fails in which case the package switches to estimated flow rate. An optional surge protective device is also shown. In addition, the illustrations depict a three-pump system. Please see the data sheets to verify which features are included with your system.

## I. TERMINAL BASICS

The human machine interface (HMI) is used to control the pump operation, reset alarms as needed, change control set points, and monitor the system. A menu is provided to quickly navigate through the screens. This screen is shown below. If the drives are mounted outside the enclosure, the panel air filtration button is replaced with an external VFD filter button. The touch key for settings requires a password, while the other keys are open access. Most screens offer a help touch key in the top right corner.



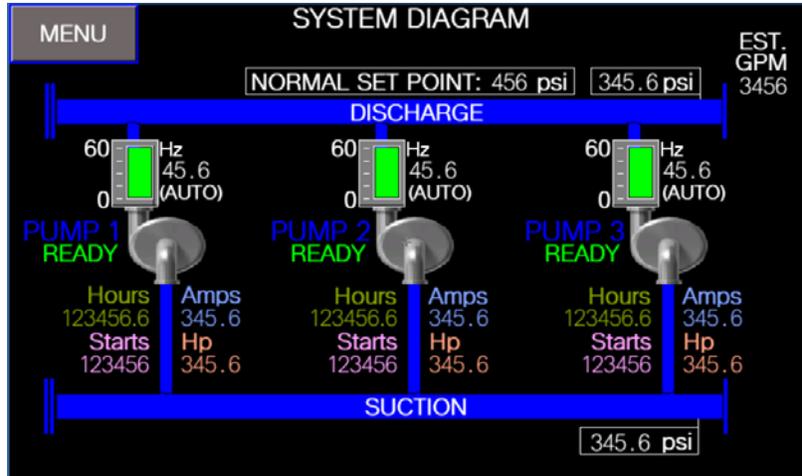
The HMI also has provision for a SDHC card (4 GB min. suggested, max 16 GB) to be inserted (on the back of the HMI). It allows for recording of system and alarm data as alarms occur and at a preset time interval (as set through the HMI). Under the SDHC card button, the operator may set the time interval to record data. Instructions for inserting or removing the SDHC card are shown at the end of this manual.

The main screen provides open access to the pump operation selection touch keys, alarm reset touch key, and the main menu.

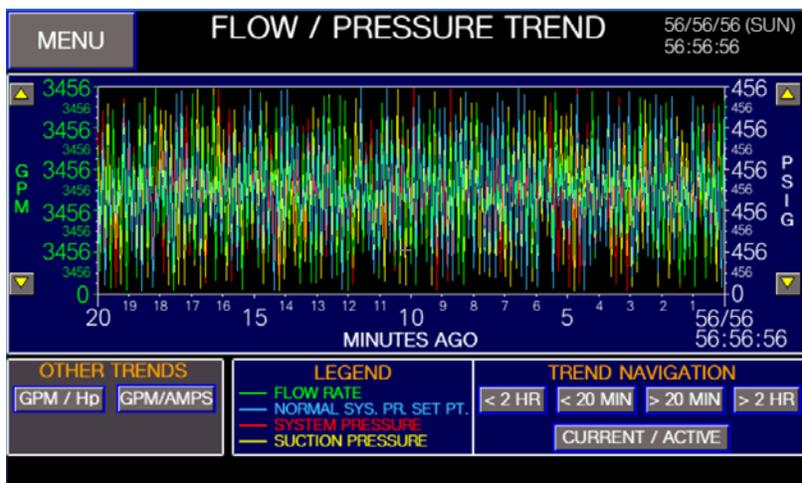
MENU	SYSTEM STATUS				HELP
ALL OK – NORMAL SHUTDOWN					
FLOW	SUCTION	SYSTEM	NORMAL		
3456 <sup>EST.</sup> <sub>GPM</sub>	345.6 <sup>PSI</sup>	345.6 <sup>PSI</sup>	456 <sup>PSI</sup>	SPEED: AUTO	
PUMP 1		PUMP 2		PUMP 3	
OFF		OFF		OFF	
HAND		HAND		HAND	
AUTO		AUTO		AUTO	
56/56/56 (SUN) 56:56:56 DAYLIGHT SAVING TIME DISABLED MANUAL ALTERNATION			PRESS TO RESET		TOTAL Hp: 234.56

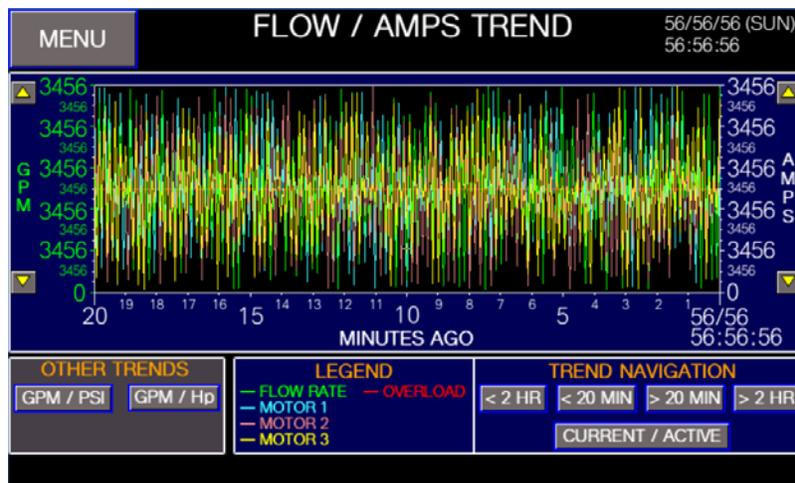
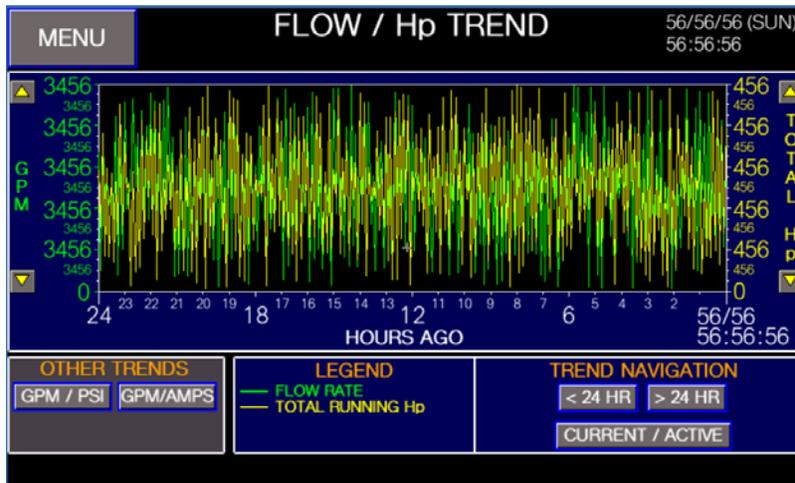
## II. MONITORING BUTTONS

A system diagram is provided for monitoring the status of the package. Pressing the screen returns the operator to the main screen above.



Three historic trend graphs are provided as shown below. On each graph, flow rate is green and measured by the scale on the left side of the graph. All other parameters are measured on the right side of the graph. The operator can navigate each historic trend graph to view different time periods using the older, newer, and current/active buttons. The flow/power graph shows data over the last 24 hours and data is stored for approximately the last 10 days. The flow/pressure and flow/amps graphs show data over the last 20 minutes and data is stored for approximately the last 24 hours. Pressing the current/active button returns the display to the most recent collected data. The current time is shown in the upper right corner of the screen and the time of the most recent collected data is shown in the lower right corner of the graph. The operator can change the scale of the display with the up and down buttons at the edge of the screen.





The alarm screen below shows the status of each alarm, the reset method, the last time of occurrence, and a count of how many occurrences there have been. The low suction, high system, and VFD fault alarms can be selected to have a limited auto-reset (3 auto-resets per hour, under SET POINTS > DEFAULTS/SETUP). The alarm status is color coded, so it is red when the alarm is active, yellow if the alarm is timing, and black if off. Pressing the reset push button once will silence the horn. After waiting 5 seconds, the button can be pressed again to reset the alarm, assuming the condition has cleared. The 5 second delay is a reminder to figure out the cause of the alarm and make sure the system is ready to return to service.

A low low system pressure alarm is provided that will shut down the station if the pumps are not able to create the required pressure. Also, a high flow rate alarm is available if a paddle wheel flow sensor is included. These alarms can be enabled or disabled on the alarm settings screen. If either alarm is disabled, that status will be shown on the alarm status screen below. The operator may also enable the horn for all alarms, only system shutdown alarms, or disable the horn.

MENU		ALARMS					HELP
ALARM	STATUS	RESET	HORN	LAST	COUNT		
LOW SUCTION PR./LEVEL	OFF	MANUAL	NO	56/56/56 56:56	23456		
LOW SYSTEM PRESSURE	OFF	MANUAL	NO	56/56/56 56:56	23456		
LOW LOW SYS. PRESS.	OFF	MANUAL	NO	56/56/56 56:56	23456		
HIGH SYSTEM PRESSURE	OFF	MANUAL	NO	56/56/56 56:56	23456		
VFD 1 FAULT	OFF	MANUAL	NO	56/56/56 56:56	23456		
VFD 2 FAULT	OFF	MANUAL	NO	56/56/56 56:56	23456		
VFD 3 FAULT	OFF	MANUAL	NO	56/56/56 56:56	23456		
SYSTEM PRESS. XMTR	OFF	AUTO	NO	56/56/56 56:56	23456		
SUCTION PRESS. XMTR	OFF	AUTO	NO	56/56/56 56:56	23456		
FLOW SENSOR	OFF	AUTO	NO	56/56/56 56:56	23456		
HIGH FLOW ALARM	OFF	MANUAL	NO	56/56/56 56:56	23456		
SURGE PROTECTOR	OFF	AUTO	NO	56/56/56 56:56	23456		
POWER FAILURE	OFF	AUTO	NO	56/56/56 56:56	23456		

EVENT HISTORY      PRESS TO RESET

MENU		EVENT HISTORY									
RECORD	ALARM	DATE	TIME	FLOW RATE (gpm)	SUC. PR. (psi)	SYS. PR. (psi)	SET. PT. (psi)	SPEED (Hz)	VFD #1 (A)	VFD #2 (A)	VFD #3 (A)
456		56/56/56	56:56:56	3456	345.6	345.6	456	45.6	45.6	45.6	45.6
456		56/56/56	56:56:56	3456	345.6	345.6	456	45.6	45.6	45.6	45.6
456		56/56/56	56:56:56	3456	345.6	345.6	456	45.6	45.6	45.6	45.6
456		56/56/56	56:56:56	3456	345.6	345.6	456	45.6	45.6	45.6	45.6
456		56/56/56	56:56:56	3456	345.6	345.6	456	45.6	45.6	45.6	45.6

NEWEST    NEWER    OLDER    OLDEST

ALARM LIST

The alarm history screen shows added system details when an alarm occurs. Five consecutive records are displayed at a time. There are 200 records in reverse chronological order so that record 0 is the most recent. The operator can press the white touch key to view a desired record or can use the four navigation buttons to quickly browse the database.

The pump run information, VFD output, alarm status, and alarm history screens display operational information as shown below:

MENU	DRIVE / VFD DATA (OUTPUT & MAINTENANCE)				
	Hertz	Volts	Amps	kW	Hp
VFD 1	234.56	2345.6	234.56	234.56	234.56
VFD 2	234.56	2345.6	234.56	234.56	234.56
VFD 3	234.56	2345.6	234.56	234.56	234.56
TOTAL			234.56	234.56	234.56
PEAK POWER: 234.56 Hp				<input type="button" value="RESET"/>	
OCCURRED AT: 56/56/56 56:56				<input type="button" value="LOG IN"/>	
SINCE: 56/56/56					
<input type="button" value="VFD LIFE CYCLE"/>					
FLOW	SUCTION	SYSTEM	SETPT.	SPEED	
3456 <sup>EST.</sup> <sub>GPM</sub>	345.6 <sup>PSI</sup>	345.6 <sup>PSI</sup>	456 <sup>PSI</sup>	45.6 <sup>HZ</sup>	

From the VFD Output screen, pressing the Maintenance button shows the operator parameters that give a general sign of the drive status. The inrush current limiting circuit and control circuit capacitor are rated through 100 %. If either parameter drops to 10 % or below, a banner will run on each screen of the HMI indicating the drive requires servicing soon by qualified personnel. There is also a banner indication when the drive fan needs cleaning or replacing. Once the problem has been corrected, the banner can be turned off with the reset push button. These three parameters give a general sense of the drive status. Other problems may develop with the drive that are not indicated by these parameters.

MENU	VFD LIFE CYCLE			HELP
	INRUSH CURRENT LIMITING CIRCUIT (%)	CONTROL CIRCUIT CAPACITOR (%)	COOLING FAN SPEED	
VFD 1	456	456	OK	
VFD 2	456	+ 456	OK	
VFD 3	456	456	OK	
<input type="button" value="VFD OUTPUT"/>				

On the pump run information screen, the operator can log in and determine whether pump service hours are monitored or not. If not, then the screen on the left below appears showing run hours and starts for each pump. If enabled, the screen on the right appears and the operator can choose the service interval for the pumps. Once the service run hours have elapsed, a banner will show the need to service the pump. This function is for display only and the pumps stay available for operation. Once a pump has been serviced, the timer should be reset. If enabled, a ten-event log is recorded for each pump. The log can be erased as shown below.

**PUMP RUN INFORMATION**

MENU LOG IN LOG OUT

DO NOT INDICATE SERVICE INTERVAL

	RUN HOURS <small>SINCE: 56/56/56 56:56</small>	STARTS <small>SINCE: 56/56/56 56:56</small>
PUMP 1	123456.6 <sup>+</sup>	123456
PUMP 2	123456.6	123456
PUMP 3	123456.6	123456

RESET RUN HOURS
RESET STARTS

**PUMP RUN INFORMATION**

MENU LOG IN LOG OUT HELP

DO NOT INDICATE SERVICE INTERVAL

PUMP SERVICE INTERVAL: 3456 HOURS  
(500 - 9000 hrs)

	RUN HOURS <small>SINCE: 56/56/56 56:56</small>	HOURS SINCE & DATE OF LAST SERVICE		STARTS <small>SINCE: 56/56/56 56:56</small>
PUMP 1	123456.6	123456 (56/56/56)	RESET	123456
PUMP 2	123456.6	123456 (56/56/56)	RESET	123456
PUMP 3	123456.6	123456 (56/56/56)	RESET	123456

RESET RUN HOURS
PUMP SERVICE LOG
RESET STARTS

**PUMP 1 SERVICE HISTORY**  
(LAST 10 SERVICE EVENTS)

MENU PUMP 2

PLEASE ENTER PERFORMED SERVICES

LOG IN
RESET PUMP 1 LOG
LOG OUT

SERVICE DATE	SERVICES PERFORMED	HOURS SINCE LAST SERVICE	TOTAL HOURS
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456
56/56/56	WEAR RING	123456	123456

PUMP RUN INFORMATION

The pump run hours and starts require a password to be reset (see the next section of this manual for the passwords).

Flow data (either direct measured or estimated) is available as shown below.

**MENU** ESTIMATED FLOW DATA

3456 GPM

EST. PEAK FLOW: 3456 GPM	
OCCURRED AT: 56/56/56 56:56	<b>RESET</b>
SINCE: 56/56/56	

EST. TOTAL GALLONS: + 123456	<b>RESET</b>
SINCE: 56/56/56	

EST. TODAY'S GALLONS: 123456	<b>RESET</b>
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**LOG IN** **LOG OUT**

**7 DAY HISTORY**

**MENU** SYSTEM WATER USAGE

DATE	GALLONS
56/56	123456
56/56	123456
56/56	123456
56/56	123456
56/56	123456
56/56	123456
56/56	123456
56/56	123456

**7 DAY AVG.** 123456

**7 DAY HISTORY**

DATE

**BACK**

The screen below shows the adjustable maintenance interval (90 – 180 days) to either clean or replace the control panel fan and exhaust filter pads. If the drives are mounted outside, it will indicate the fans and filter grates require inspection/cleaning. Once the servicing has been done, the counter can be reset. If the counter times out, a banner will run at the bottom of every screen indicating the need for servicing.

**MENU** EXTERNAL VFD FILTERS/FANS

**CLEAN VFD FILTER GRATES  
INTERVAL REMINDER**

456 DAYS  
(30 - 180)

CLEAN VFD FANS IN: 345.6 DAYS

**RESET**

**LOG IN** **LOG OUT**

**SETTINGS (password)**

The operator can view the on/off status of the PLC hardwired inputs and outputs as shown below.

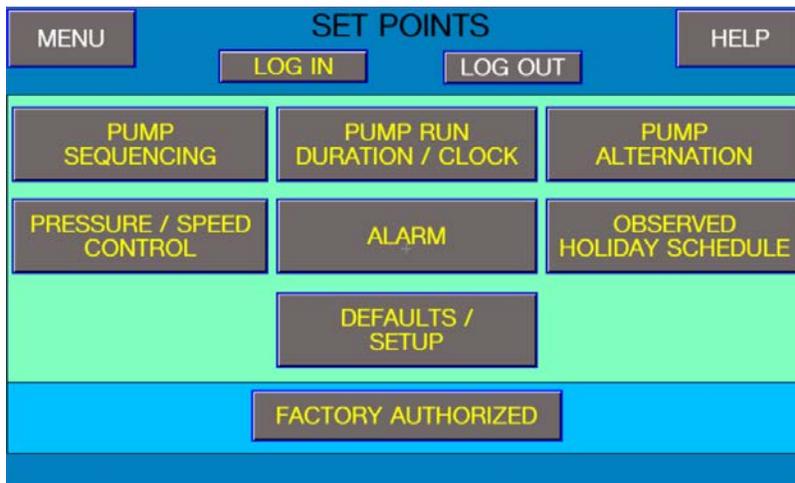
MENU	PLC DIGITAL INPUTS / OUTPUTS
	<b>INPUTS (ON)</b>
	X0 - PADDLE WHEEL FLOW SENSOR
	X1 - SYSTEM PRESSURE TRANSMITTER
	X2 - SUCTION PRESSURE TRANSMITTER
	X3 - LOW SUCTION SWITCH
	X4 - SURGE PROTECTIVE DEVICE OK
	<b>OUTPUTS (ON)</b>
	NO OUTPUTS ARE ON
	Y0 - ALARM HORN
	Y10 - LOW LOW SYSTEM PRESSURE ALARM AUX. CONTACT
	Y11 - LOW SYSTEM PRESSURE ALARM / MISC. SERVICE
	Y12 - LOW SUCTION / SUCTION TRANSMITTER ALARM
	Y13 - HIGH SYSTEM PRESSURE ALARM AUX. CONTACT
	Y14 - ANY PUMP DISABLED AUX. CONTACT

The last 8 faults for each drive can be accessed by the VFD fault history button. Data for each drive can be viewed by pressing the next button. Any current alarms will be highlighted as shown below.

MENU	VFD 1 FAULT HISTORY		VFD 2
DATE	TIME	FAULT	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	
56/56/56	56:56	E.PUE - RS-485 Communication Fault	

### III. SET POINT & CONTROL BUTTONS

The operator is given the following menu for changing set points:



There are two levels of passwords. Those touch keys in the lighter colored field toward the top of the screen have a password of "0001". The factory authorized touch key in the darker colored field is for factory trained personnel only. It is used for setup of components, transmitter scaling, etc. Please contact your local SyncroFlo sales representative if you need access. The operator must press the "LOGIN" button at the top of the screen to enter the password. It is recommended to logout when done making changes. Otherwise, the operator will automatically be logged out after 10 minutes.

White touch keys always denote numeric data entry points. Numeric values with a colored background are for display only. Most screens with set points will have a button labeled "PRESS TO CHANGE SET POINTS". Screens will appear that allow numeric entry and show the numeric entry range as well as last setting for each of the adjustable set points. The operator can return by pressing the blue bar or X in the upper right corner. A few other screens with only a set point or two will have the numeric entry range displayed.

There are multiple ways of sequencing the lag pumps as shown below. The operator has the option to enable estimated flow sequencing or not. Selecting the pump run duration/clock touch key allows the operator to control when or if the lead pump can have a normal, low demand shut down or run continuously. For a three-pump system, the operator can choose if only 2 pumps are allowed to run (lag 2 lockout). For a two-pump system, the operator can choose if only 1 pump is allowed to run (lag 1 lockout). With automatic alternation enabled, each of the pumps will be able to serve as the lead pump. The lead pump may be able allowed to stop anytime it is not needed to run, run continuously, or be allowed to stop only during certain time frames as shown below.

**PUMP SEQUENCING**

MENU HELP

PRESS TO CHANGE SET POINTS

	PRESSURE	POWER	EST. FLOW
LAG ON DELAY:	56 SEC.	56 SEC.	56 SEC.
LAG 1 ON:	56 PSI < SET PT. & SPEED >= 56 Hz	345.6 Hp	3456 GPM
LAG 1 OFF:	>= 456 PSIG	345.6 Hp	3456 GPM
LAG 2 ON:	SAME AS LAG 1 ON	345.6 Hp	3456 GPM
LAG 2 OFF:	SAME AS LAG 1 OFF	345.6 Hp	3456 GPM

SETTINGS (password) LOCKOUT LAG 2: NO HIGH SUCTION STOP: OFF >= 456 PSIG

The operator can enable daylight saving time (DST), as shown below.

**PUMP RUN DURATION/CLOCK**

MENU HELP

PRESS TO CHANGE SET POINTS

**PUMP RUN DURATION**

PUMP MINIMUM RUN TIME: 456 SEC.

MRT AUTO-ADJUST: OFF

RUN TIME EVENER: OFF

**LEAD PUMP LOW DEMAND STOP NEVER**

SCHEDULE LEAD PUMP STOP

BEFORE LEAD STOP, CHARGE TANK: NO 456 PSI

CHARGE DURATION AFTER MRT EXPIRED: 456 SEC.

MAX Hp ALLOWED DURING CHARGE: 34.56

SETTINGS (password) CLOCK / DST DAYLIGHT SAVING TIME DISABLED PRESS TO CHANGE DAYLIGHT SAVING TIME DISABLED MM DD YY HH MM SS  
56 / 56 / 56 56 : 56 : 56

The operator can select when the lead pump is allowed to shut down by pressing the SCHEDULE LEAD PUMP STOP touch key. The following screen is then displayed:

**LEAD PUMP LOW DEMAND STOP**

MENU HELP

ALWAYS NEVER

WEEKDAYS

	12	1	2	3	4	5	6	7	8	9	10	11
AM	RUN											
PM	RUN											

WEEKEND & OBSERVED HOLIDAYS

	12	1	2	3	4	5	6	7	8	9	10	11
AM	RUN											
PM	RUN											

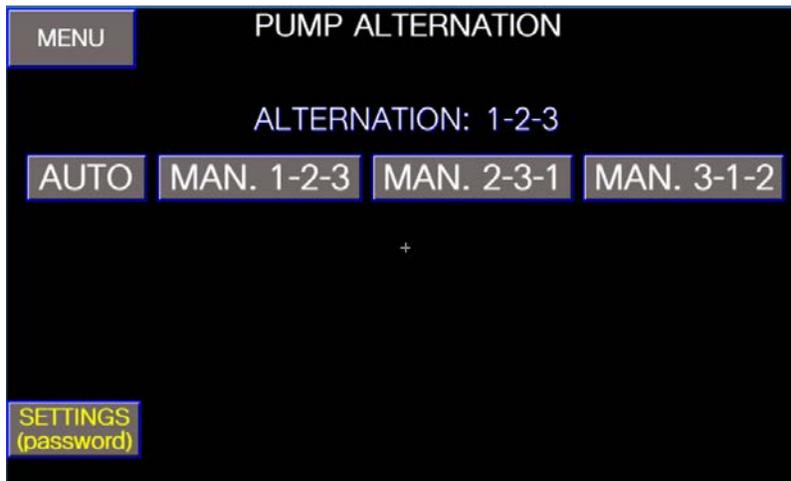
BACK HOLIDAY SCHED. LEAD STOP-HOLIDAYS DISABLED

If a button is toggled to RUN, the lead pump will continue operation during the given hour. If the button is toggled to STOP, the lead pump will be allowed to stop under low demand conditions. ALWAYS and NEVER buttons are also included to quickly change all of the buttons at once.

A twelve-day observed holiday schedule can be set as shown below. The holiday schedule can be applied to the lead pump low demand stop schedule, the energy mode schedule, both schedules, and neither schedule. If the holiday schedule is being used, on the 15<sup>th</sup> of December, a banner will run reminding the operator to set the holidays for the upcoming year. The banner can be turned off by pressing the reset push button.



The operator can enable manual modes of alternation as shown below. Typically, the system should be left in automatic alternation to help ensure even wear on the pumps.



Below are the screens for controlling the operating pressure of the system and speed control. On the speed control screen, the operator can select either manual or auto speed control. The system should typically run in automatic speed control to maintain the system pressure set point. The control adjustment parameters shown below can be used to change the system response (quicken or slow). If change is needed, change only one parameter at a time and take notes. Be sure not to increase either

the proportional or derivative gain too much or system oscillation (hunting) can occur.

The operator can also adjust the carrier frequency from the drive to the motor. The value can be increased to decrease any objectional motor noise. It is recommended slowly increasing the value only as much as needed to reach an acceptable sound level.

MENU	PRESSURE / SPEED CONTROL				HELP
ENERGY MODE IS INACTIVE					
ENERGY MODE					
FLOW	SUCTION	SYSTEM	NORMAL SETPOINT	SPEED:AUTO	
3456 <sup>EST.</sup> GPM	345.6 <sup>PSI</sup>	456 <sup>PSI</sup>	456 <sup>PSI</sup>	45.6 <sup>HZ</sup>	
CONTROL: <b>AUTOMATIC</b>			AUTOMATIC ADJUSTMENT		
MINIMUM: 56 Hz			PROPORTIONAL GAIN: 3456		
MAXIMUM: 56 Hz			INTEGRAL TIME: 456		
MANUAL: 56 Hz			DERIVATIVE GAIN: 456		
LAG ON: (w/ PR. SEQ.) 56 Hz			DERIVATIVE TIME: 56		
VFD CARRIER FREQUENCY / MOTOR NOISE ADJUSTMENT: 56					
SETTINGS	PRESS TO CHANGE SET POINTS				

MENU	ENERGY MODE				HELP
ENERGY MODE IS INACTIVE					
FLOW	SUCTION	SYSTEM	NORMAL SETPOINT	SPEED:AUTO	
3456 <sup>EST.</sup> GPM	345.6 <sup>PSI</sup>	345.6 <sup>PSI</sup>	456 <sup>PSI</sup>	45.6 <sup>HZ</sup>	
ENERGY MODE: <b>ALWAYS DISABLED</b>					
SCHEDULE ENERGY MODE			PRESS TO CHANGE SET POINTS		
<b>AUTO OFF</b>			<b>MANUAL OFF</b>		
SYSTEM DUTY			REDUCE NORMAL SET POINT: 56 PSI		
FLOW: 3456 GPM			ON <= 56 GPM FOR 56 SEC.		
FRICTION: 56 PSI			OFF > 56 GPM		
SETTINGS	PRESSURE / SPEED CONTROL	SET POINT CURVE			

The operator can enable applying the observed holiday schedule to the energy mode schedule. Like the lead pump low demand stop schedule, a 24-hour weekday and weekend/observed holiday schedule is offered. The operator can have energy mode always enabled, always off, or scheduled per the screen below.

MENU		ENERGY MODE SCHEDULE											
		ALWAYS ENABLED						ALWAYS DISABLED					
		WEEKDAYS											
		12	1	2	3	4	5	6	7	8	9	10	11
AM		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
PM		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
		WEEKEND & OBSERVED HOLIDAYS											
		12	1	2	3	4	5	6	7	8	9	10	11
AM		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
PM		OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
BACK		HOLIDAY SCHED.						ENERGY MODE-HOLIDAYS DISABLED					

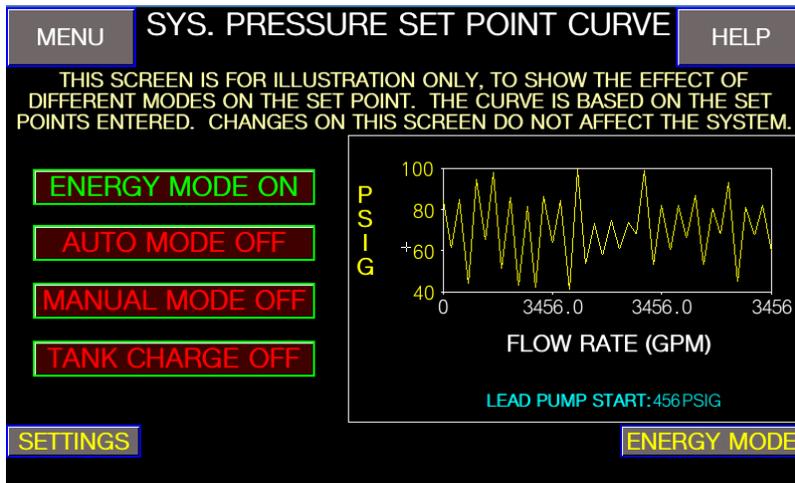
Due to lower system friction losses at reduced flow, less pressure is needed from the booster package at low flows. To conserve energy, two versions of energy mode are offered. The operator may choose either automatic or manual mode.

Automatic energy mode reduces the system pressure set point across the entire system design flow rate. Pipe friction varies with the system flow rate squared, so is very small at low flow rates and rapidly increases as flow nears the system design flow rate. At very low flow, the system pressure set point is the normal system pressure set point minus the friction set point required at full system design flow (as system flow rate reduces to zero, so does the piping friction). At very low flow, very little of those friction losses occur so the required system pressure can be lowered correspondingly. At full system design flow, the entire system duty friction must be overcome to deliver pressure at the furthest fixture so the normal system pressure set point will be used. Any flow beyond the system design flow will also maintain the normal system pressure set point. The system pressure set point is calculated based on the system duty flow rate and system duty friction set points.

If manual energy mode is enabled, at low system demand the normal system set point will be reduced by the amount entered. With only the lead pump running, when system demand recedes to less than the ON set point for the duration of the adjustable time delay, manual energy mode will turn on. When system demand exceeds the OFF set point (5 gpm greater than the ON set point) or if a lag pump starts, manual energy mode will turn off and the normal system pressure set point will be used to control system pressure. Manual energy mode is intended only for small flows within the lead pump's capacity (maximum on set point is 50 gpm).

The operator has the option to enable either energy mode continuously (always on), during the hours as designated above, or never (always off, in which case the normal system pressure set point is always followed). Only one energy mode can be selected, automatic or manual.

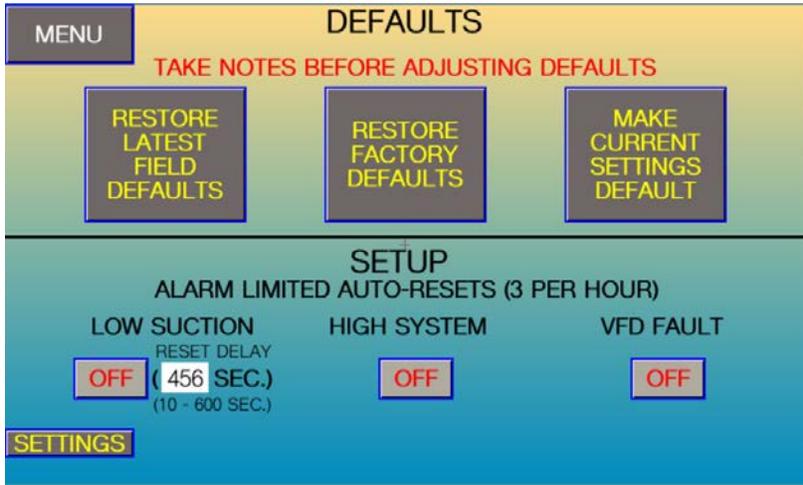
The Set Point Curve button at the bottom right corner of the Energy Mode screen, brings up the screen below. The screen is for illustration only, where the operator can enable different energy modes and the tank charge feature to see the effects on the system pressure set point across the system design flow rate. The set point curve displayed will be based on the actual set points entered on the Energy Mode screen. The lead pump start pressure is also shown at the bottom of the graph. To change operation of the system, the operator should go back to the Energy Mode screen.



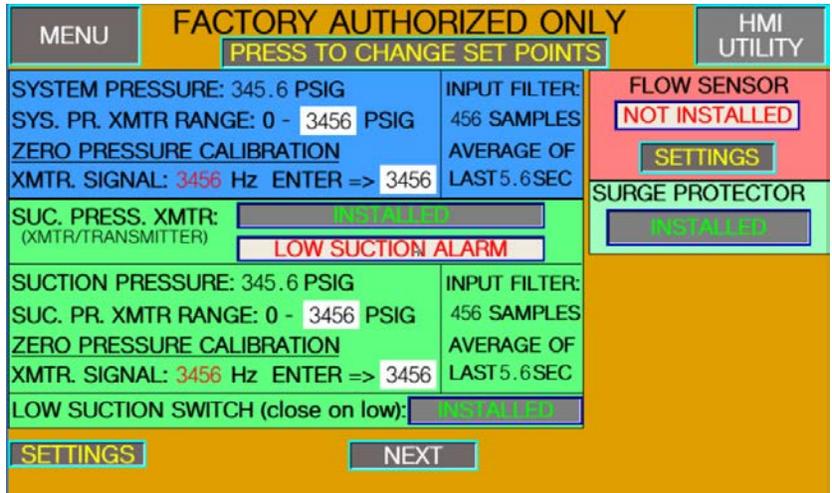
The operator can enable or disable the low low system pressure alarm as shown below. The low low system pressure alarm will stop the package if a pump is running and cannot reach the set point. The package will remain off until the alarm is manually reset. If this alarm is disabled, the disabled status will be shown on the alarm status screen. The operator can change the pressure alarm set point below as shown. Suction pressure can be set as low as 0.1 psig. The high flow rate alarm is available only if a paddle wheel flow sensor is supplied.

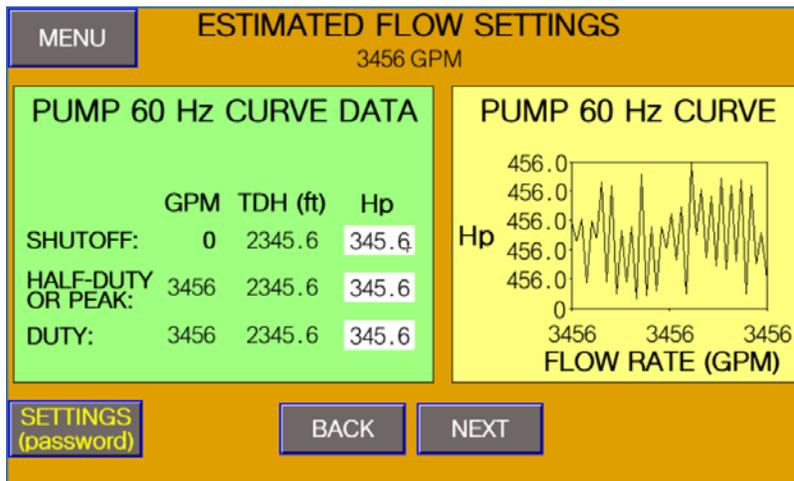
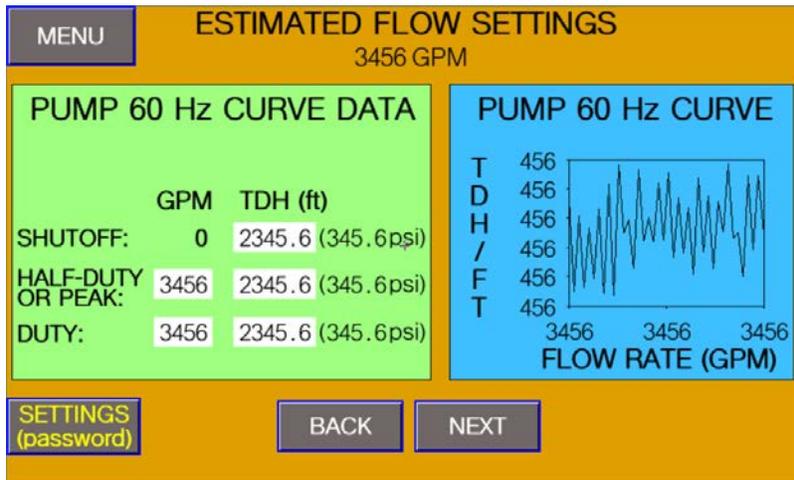
ALARMS	
PRESS TO CHANGE SET POINTS	
LOW SUCTION PRESSURE:	345.6 PSIG FOR 56 SEC.
LOW SYSTEM PRESSURE: (below set point)	456 PSID FOR 56 SEC.
LOW LOW SYSTEM PRESS. STOP (below set point):	456 PSID FOR 56 SEC.
	+ <b>ALARM IS DISABLED</b>
HIGH SYSTEM PRESSURE: (above set point)	456 PSID FOR 56 SEC.
HIGH FLOW (1 PUMP):	456 GPM FOR 56 SEC.
	<b>ALARM IS DISABLED</b>

Great care should be taken when changing the default set points on the screen below. Please take notes before proceeding. Anytime changes are made to the set points and the operator wishes to keep those values, the "MAKE CURRENT SETTINGS DEFAULT" key should be pressed. This basically sets a marker that can be gone back to in the future by pressing the "RESTORE LATEST FIELD DEFAULTS" key. This marker is updated anytime this key is pressed. The operator may also press the "RESTORE FACTORY DEFAULTS" key to adjust most system parameters back to factory original. The operator may also select whether to allow limited auto-reset (3 auto-resets per hour) of the low suction, high system, and VFD fault alarms.

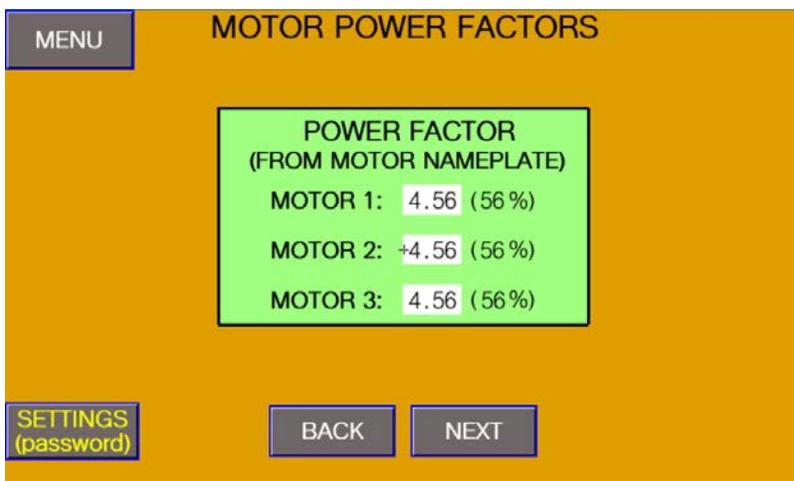


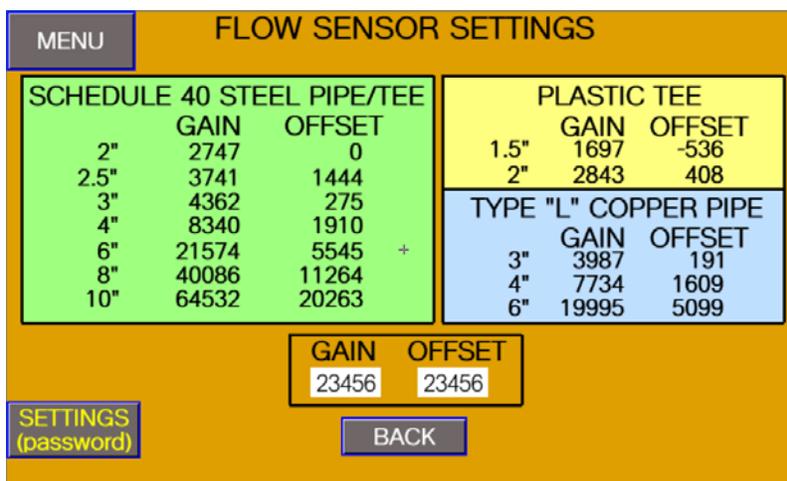
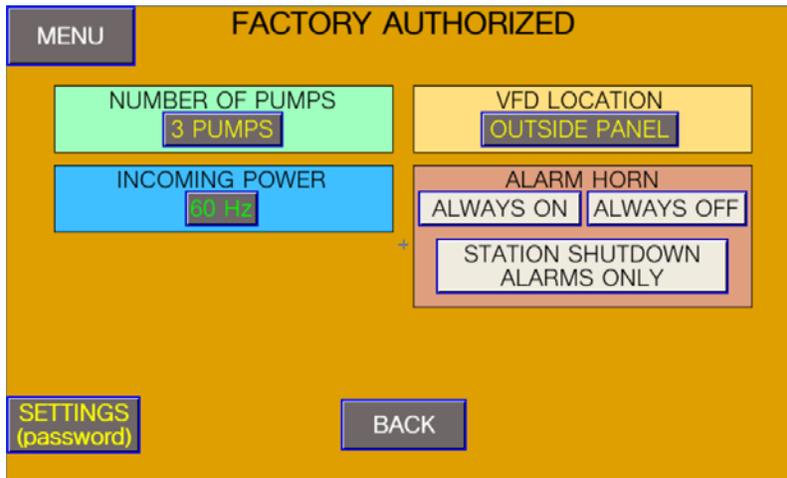
The factory authorized touch key gives access to a special setup screen which typically needs to be accessed only during startup (or if a transmitter is replaced) and has already been configured for the system. The transmitter ranges can be set, the operator may select whether a suction pressure switch or transmitter is used, and the transmitter can be calibrated when sensing atmospheric pressure. The estimated flow set points can be set based on full speed (60 Hz) pump curve data. This data is required for energy mode operation if a paddle wheel flow sensor is not installed and functional. The operator can adjust the scale of the trend graphs as shown in the yellow box below.



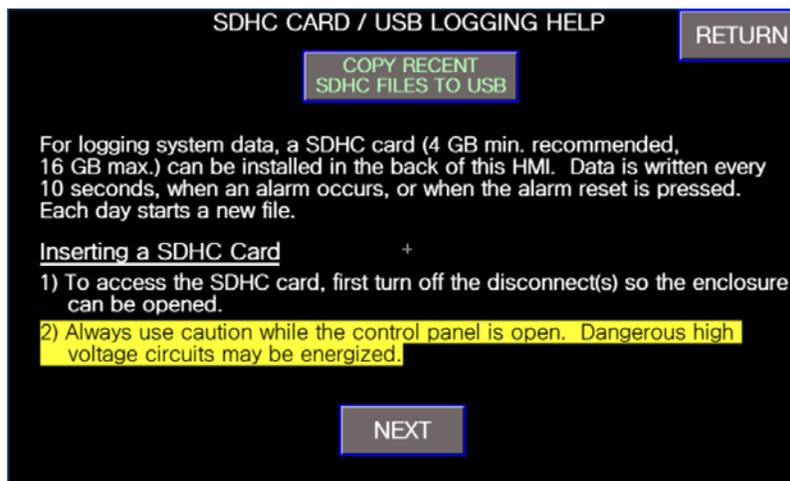


Motor power factor information is used to improve the accuracy of the power usage estimate.





The following screens are instructions on inserting and removing the SDHC card:



SDHC CARD / USB LOGGING HELP

RETURN

- 3) On the back of the HMI, open the SDHC card cover on the top right side of the HMI (viewed from the back). The SDHC card can then be inserted (arrow side first).
- 4) Close the cover and the green Access light to the left should illuminate. "Logging every 10 seconds" will appear in the lower right corner of each screen.
- 5) Close the enclosure door and turn the disconnect(s) back on.

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Removing a SDHC Card

- 1) To access the SDHC card, first turn off the disconnect(s) so the enclosure can be opened.
- 2) Always use caution while the control panel is open. Dangerous high voltage circuits may be energized.

BACK      NEXT

SDHC CARD / USB LOGGING HELP

RETURN

- 3) On the back of the HMI, open the SDHC card cover on the top right side of the HMI (viewed from the back). Next, press the SDHC card gently to the left until you feel a click and let go. The card can now be pulled out. After removing the card, close the cover again.
- 4) The data is saved in .CSV format which can be imported into Excel. Most laptops are provided with a SDHC card reader. If not, an external SDHC card reader is inexpensive and widely available.

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BACK

If it is impractical to access the SDHC card, it is possible to transfer up to the last 21 days of data to a USB stick using the USB port on the panel face under the HMI. The screen below describes the process.

## USB DOWNLOAD ACCESS BUTTON & INSTRUCTIONS

RETURN

### DOWNLOAD SDHC CARD TO PANEL DOOR USB PORT

Please take a picture of the instructions below which will be needed to download to the USB.

- 1) Press the download to USB button.
- 2) The screen is labeled Select Drive. There are two buttons displayed. The top button is the source data selection and is labeled "A: SD Card". Press it.
- 3) Press Project 1.
- 4) Press CSV\_21DAY\_LOG\_FOR\_USB.
- 5) The files are date stamped on the right. Use the UP and DOWN arrows to navigate to the daily file you wish to download to the USB drive and press the file name. Only one file may be chosen at a time. Daily files for the last 21 days can be copied.
- 6) Press the Copy button.
- 7) Now press the bottom button which is labeled "E: USB drive".
- 8) Press the Execute button at the bottom.
- 9) Press YES when asked if you want to copy the file.
- 10) PLEASE WAIT AND DON'T PRESS ANY BUTTONS UNTIL YOU ARE FURTHER PROMPTED.
- 11) A window will appear stating Process Completed when the file has been written to the USB.
- 12) If instead a Processing Failure window appears, press OK. Remove the USB for 2 seconds and plug it back in. Repeat steps 8 - 11. After a second try the file should be completely copied. Each file is 4.6 MB.
- 13) Close the window by pressing the X in the upper right corner.
- 14) To select another file to copy, start again at step 3.
- 15) If done, close each window as described in step 13 and then remove the USB.

The data is stored in daily files on the SDHC card. When imported into Excel, the data appears as a database of numbers. From left to right, each column of data is the following:

- A: HMI Time / Date Stamp
- B: Event Code
- C: Month
- D: Day
- E: Year
- F: Hours
- G: Minutes
- H: Seconds
- I: System Pressure (psig)
- J: System Pressure Set Point (psig)
- K: Pumps Running
- L: Suction Pressure (psig)
- M: VFD 1 Hertz X 100
- N: VFD 1 Volts X 10
- O: VFD 1 Amps X 100
- P: VFD 1 kW X 100
- Q: VFD 2 Hertz X 100
- R: VFD 2 Volts X 10
- S: VFD 2 Amps X 100
- T: VFD 2 kW X 100
- U: VFD 3 Hertz X 100 (if applicable)
- V: VFD 3 Volts X 10 (if applicable)
- W: VFD 3 Amps X 100 (if applicable)

X: VFD 3 kW X 100 (if applicable)  
Y: Pump 1 in Hand  
Z: Pump 1 in Auto  
AA: Pump 2 in Hand  
AB: Pump 2 in Auto  
AC: Pump 3 in Hand (if applicable)  
AD: Pump 3 in Auto (if applicable)  
AE: Manual Speed Control  
AF: Automatic Alternation  
AG: Energy Mode Active  
AH: Low Suction Alarm Reset Enabled  
AI: High System Alarm Reset Enabled  
AJ: VFD Alarm Reset Enabled  
AK: VFD 1 Communications Error  
AL: VFD 2 Communications Error  
AM: VFD 3 Communications Error (if applicable)  
AN: Total Horsepower X 100  
AO: Lag Pressure Sequencing Delay (sec x 10)  
AP: Pump Start Deadband (psig)  
AQ: Lag Power Sequencing Delay (sec x 10)  
AR: Lag 1 On Horsepower X 100  
AS: Lag 1 Off Horsepower X 100  
AT: Lag 2 On Horsepower X 100 (if applicable)  
AU: Lag 2 Off Horsepower X 100 (if applicable)  
AV: Lag Flow Sequencing Delay (sec x 10)  
AW: Lag 1 On Flow (gpm)  
AX: Lag 1 Off Flow (gpm)  
AY: Lag 2 On Flow (gpm – if applicable)  
AZ: Lag 2 Off Flow (gpm – if applicable)  
BA: VFD Minimum Speed (Hz x 100)  
BB: VFD Maximum Speed (Hz x 100)  
BC: VFD Manual Speed (Hz x 100)  
BD: Lag Pump on VFD Speed (Hz x 100)  
BE: Proportional Gain  
BF: Integral Time Constant  
BG: Derivative Gain  
BH: Derivative Time Constant  
BI: Manual Energy Mode Deadband (psig)  
BJ: Manual Energy Mode Delay (sec x 10)  
BK: Manual Energy Mode On (gpm)  
BL: Manual Energy Mode Off (gpm)  
BM: Auto Energy Mode Friction (psid)  
BN: Auto Energy Mode System Flow (gpm)  
BO: Tank Charge Active  
BP: VFD Speed (Hz x 100)  
BQ: Flow Rate (gpm)  
BR: Low Low System Pressure Alarm Enabled  
BS: Low Low System Pressure Alarm Deadband (psig)  
BT: Low Low System Pressure Alarm Delay (sec x 10)

The Event Codes (column A) are as follows:

- 1 – Low Suction Pressure/Level Alarm
- 2 – Low System Pressure Alarm
- 3 – High System Pressure Alarm
- 4 – VFD 1 Fault
- 5 – VFD 2 Fault
- 6 – VFD 3 Fault (if available)
- 7 – System Pressure Transmitter Alarm
- 8 – Suction Pressure Transmitter Alarm (optional)
- 9 – Power Failure
  
- 20 – Alarms Cleared
- 21 – Reset Attempt (not cleared)
- 22 – Low PLC Battery
- 23 – Low HMI Battery
- 24 – Low Low System Pressure Alarm
- 25 – Low Low System Pressure Alarm Function Disabled
- 26 – Low Low System Pressure Alarm Function Enabled
- 27 – SPD (surge protective device) Failure (optional)
- 28 – Paddle Wheel Flow Sensor Failure (optional)
- 29 – Low Suction Alarm Limited Auto-Reset
- 30 – High System Pressure Alarm Limited Auto-Reset
- 31 – System Pressure Transmitter Alarm Auto-Reset
- 32 – Suction Pressure Transmitter Alarm Auto-Reset
- 33 – VFD 1 Fault Auto-Reset
- 34 – VFD 2 Fault Auto-Reset
- 35 – VFD 3 Fault Auto-Reset
- 36 – System Pressure Set Point Changed
- 37 – High Flow Rate Alarm (paddle wheel flow sensor must be supplied)
- 38 – High Flow Rate Alarm Disabled
- 39 – High Flow Rate Alarm Enabled
- 43 – System Pressure Set Point has changed, so if a local Hydrocumulator is supplied check its air charge so it matches the new system pressure set point.

Keep in mind that data is recorded both on an event (alarm or reset) basis and on a time basis. Therefore, an event may show up many times in succession, but its occurrence is marked by the first record.