ARMSTRONG

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INSTALLATION AND OPERATING INSTRUCTIONS

ECO*PAK MBS™

INTEGRATED BOILER PLANT PACKAGE

CONTROLLER

Armstrong Ultra Efficient Integrated Boiler Plant Controllers, ECO*PAK MBS™ Controllers, are completely factory-assembled, tested, and shipped to the job site as integral units ready to receive incoming power supply. These instructions describe the procedures to be followed during installation, commissioning and operation to ensure optimum performance and reliability. When contacting the factory for assistance, please provide the unit Serial Number and other pertinent data, such as ECO*PAK MBS™ Model no.

ARMSTRONG

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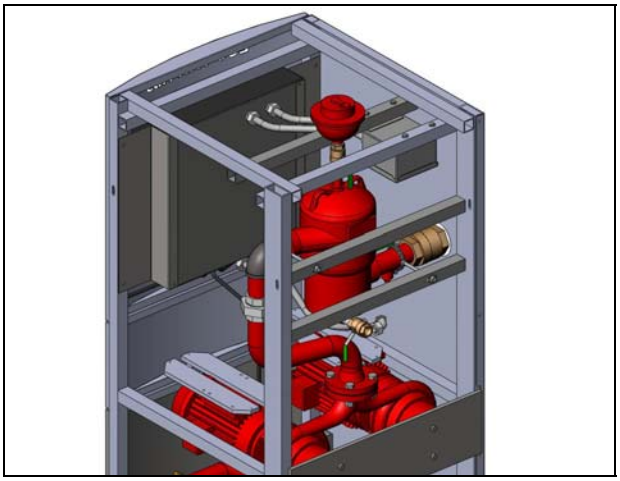
The **ECO*PAK MBS™ Integrated Controller** is powered through a step down transformer inside the cabinet. Internal wiring between the main panel and the service junction box located on the back of the package has been completed, tested and inspected in the factory prior to shipping. Connect the 3 phase power supply to the appropriate terminals inside the service junction box as shown below.

NOTE: All electrical wiring should be performed by a qualified electrician in accordance with the latest edition of the National Electrical Code, local codes and regulations.



Junction Box TB		
37	PH1	Incoming Power 208, 230, 460 or 575 VAC @ 60 Hz
38	PH2	
39	PH3	
40	GND	

FIELD DEVICES INSTALLATION INSTRUCTIONS

Before attempting to start configuring the ECO*PAK MBS™ Controller using the Operator Interface (HMI – touch-screen), make sure all the field installed devices such as temperature sensors, flow sensors are properly installed and wired to the ECO*PAK MBS™ Controller as per terminal block configuration. All field devices connections shall be wired inside the service junction box.

BUILDING AUTOMATION SYSTEM (BAS) CONNECTION

The ECO*PAK MBS™ Controller is provided with an RS 485 serial port to communicate serially to the BAS. The standard communication protocol is Modbus, BACnet and Lonoworks are options. Refer to wiring diagram for wiring instructions. Please refer to the ECO*PAK MBS™ Controller generic terminal block drawing for the different parameters and data points communicated to the BAS.

Junction Box TB		
1	+	Outside Air Temperature Sensor
2	-	
GND		
13	+	Flow Sensor (Optional)
14	-	
15	+	Remote Start/Stop BAS
16	-	
17	+	Gas Emergency Shutoff (Optional)
18	-	
21	+	General System Alarm
22	-	
23	+	Boiler Alarm
24	-	
25	+	Pump Alarm
26	-	
27	+	Sensor Alarm
28	-	
34	GND	BAS Communication
35	+	
6	-	

NOTE: Please fill in the ECO*PAK MBS™ *Pre-Commissioning Check List* (below) which will help you through the set-up procedure of the ECO*PAK MBS™ Controller. The main information required would be the ECO*PAK MBS™ bypass valve.

ECO*PAK MBS™ Pre-Commissioning Check List

Armstrong Sales Order #: _____

Project Name: _____

Project Location: _____

Armstrong Service Dealer Name: _____

Requested Date of Site Visit:

To request a commissioning visit for your Armstrong IPP-MBS unit installation, please complete the following details and return to Armstrong, giving a minimum of 7 days prior notice

DETAILED TASK	CHECK	INITIALS	COMMENTS
Work to be completed in the boiler plant prior to Armstrong Service Technician arrival on site			
Piping system has been charged with water and pressure tested			
Piping system has been filled with water treatment chemicals			
Water mains/boosted cold water connected			
Electrical supply and external wiring (sensors) and safety interlock have been completed and tested			
Serial communication between BMS and MBS Integrated Controller wiring is done (if applicable)			
Confirm that BAS ready to send/receive commands to MBS Integrated Controller			
Turn on MBS Integrated Controller after power wiring installed, record start up message from panel (or program version)			
Send pictures to Armstrong showing all wiring are terminated in the MBS Integrated Controller as specified			
Flue system and ventilation is complete and complies with standards			
Plant room has been swept and is clear of combustible materials			
Adequate lighting and safe access is provided			
Condensate drain pipework connected to a suitable drain			
All circuit, zone, balancing and radiator valves are installed			
The correct gas supply to system is tested and purged up to the MBS isolating valve			
Sufficient load is available for a full load test			

NOTES:

Armstrong will confirm attendance of our commissioning engineer, and every effort will be made to accommodate date(s) requested above

Any postponement to the agreed date must be notified to Armstrong at least 48 hours prior

All prices quoted by Armstrong assume a single visit to site and do not include for abortive visits, waiting time, site induction courses, revisiting site for hand over / training sessions, or servicing during guarantee period

Signatures

Pre-Commissioning Prepared by: _____

Pre-Commissioning Reviewed by: _____

Project Manager Release: _____

DISPLAYS OVERVIEW

The ECO*PAK MBS™ integrated controller HMI is divided in four set of displays: System, Setup, Alarm, and Trend Data management.
The System Displays are used by the users to view and control the Boilers and Pumps. The Setup Screens are used to set, view, save, and restore the system specific settings (i.e. ECO*PAK MBS™ model, boilers parameters, pumps parameters, etc.). The Alarm screens are used to display the current alarms, store and display history alarms, give helpful information on each alarm and display events. The Trend Data screens are used to view real time trend charts and history trend charts, backup history data to USB.

The list of displays in each set is as follow:

System Displays:

- Main Menu
- System Overview
- Pump Overview
- Boiler Overview
- Pump 1 Control
- Pump 2 Control
- Boiler 1 Control
- Boiler 2 Control
- Boiler 3 Control
- Boiler 4 Control
- Login

The System Displays can be accessed without any password.

Alarm Displays:

- Alarm
- Alarm History
- Event

The Alarm Displays can be accessed and operated (such as pressing a “reset” button) without any password.

Setup Displays:

The Setup Displays are divided in three levels. All the three levels have the same number of displays with different level of access. Level 0 setup displays are for viewing only and no adjustment can be made. Level 1 setup displays can be used for changing the system setup, restoring the system factory defaults except for the PID parameters in the PID Setup Displays. Level 2 setup displays can be used for changing the system setup, and saving and restoring the system factory defaults. To access Level 1 and level 2 Setup Displays an operator need to enter the proper password.
The list of Setup Displays for every level is as follow:

- SHWT(System Hot Water Temperature) Set point Setup
- Pump Setup
- Pump PID Setup
- Boiler Setup
- Boiler Staging Setup
- Boiler PID Setup
- Gas Consumption Setup
- Sensor Setup 1
- Sensor Setup 2

- Frost Protection Setup
- Bypass Valve Setup
- Bypass Valve PID Setup
- BAS Setup
- Clock Setup
- ECO*PAK MBS™ System Schedule Setup

The Level 1 Setup Screens also have a set of “Restore Default Settings” to restore the default setup values on each screen. The Level 2 Setup Screens have a set of “Restore Default Settings” and “Save Default Settings” to restore or save the default values on each screen.

Trend Data Displays:

The Trend Data Displays include 5 real time data trend charts and a history data menu. Through the history data menu, the history data trend charts can be accessed and backed up.
The list of Setup Displays for every level is as follow:

- Trend Menu
- Temperature Trend
- System Flow Trend
- Boiler Flame Trend
- Pump Speed Trend
- System Pressure Trend
- History Trend - Menu
- History Trend - Temperature
- History Trend - System Flow
- History Trend - Boiler Flame
- History Trend - Pump Speed
- History Trend - System Pressure

The Trend Data Displays can be accessed without any password.

SYSTEM FUNCTIONS

The System functions of the HMI operator interface include the Operator Displays, the Installer Displays, and the Factory Displays. To access the Installer Displays, the user is required a level 1 password. To access the Factory Displays, the user is required a level 2 password. There is no password requirement to access the Operator Displays.

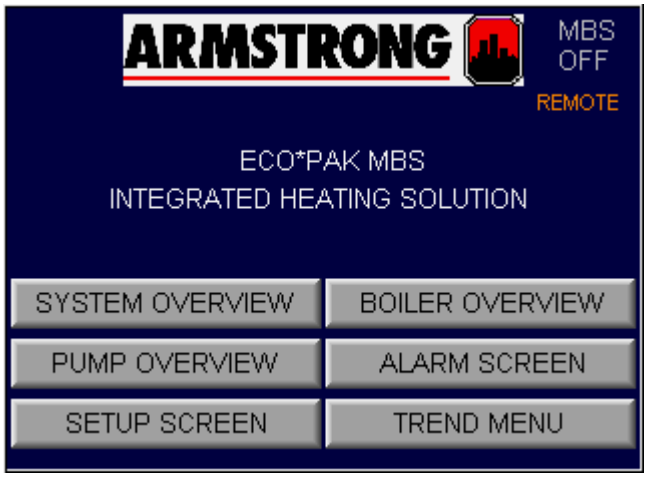
OPERATOR DISPLAYS

Operator Displays include system displays, alarm management displays, trend displays and level 0 setup displays. These displays can be accessed without any password, and level 0 setup displays are for viewing only.

1.1.0 System Displays

See the following table

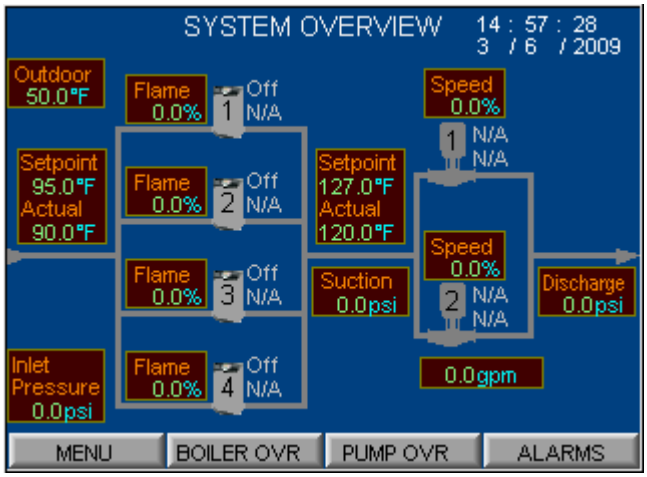
1.1.0 MAIN MENU



This is the screen the operator sees when powering up the unit.

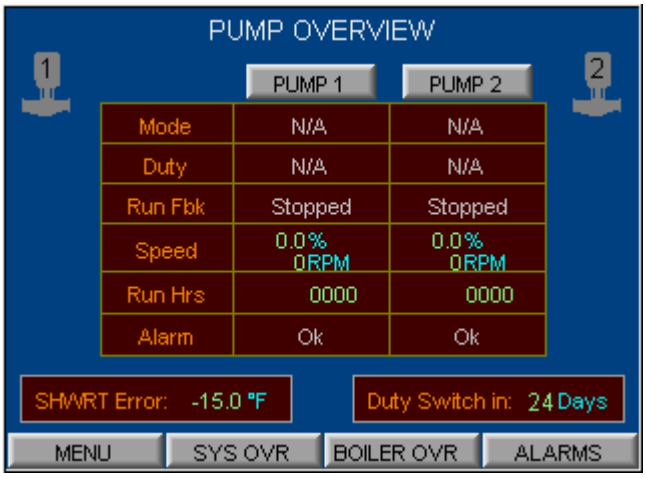
1. Press “SYSTEM OVERVIEW” to view the layout of the system, temperature setpoint and actual temperature value, system flow, inlet pressure, discharge and suction pressure, bypass valve opening (if available), pumps speed and boilers flame
2. Press “PUMP OVERVIEW” to view pumps status, speed, run time and alarm
3. Press “BOILER OVERVIEW” to view boilers status, run time, flame and total output capacity
4. Press “ALARM SCREEN ” to view any alarm condition that might have occurred
5. Press “SETUP SCREEN” for boiler, pump, sensor, bypass valve, frost protection and system schedule setup (password protected)
6. Press “TREND MENU” to view temperature trends, system flow trends, boiler flame trends, pump speed trends, system pressure trends

1.1.1 SYSTEM OVERVIEW



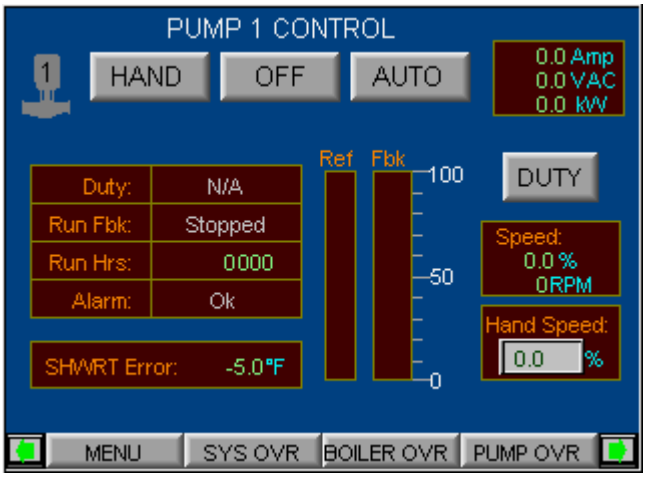
1. Outdoor air temperature is displayed.
2. System Hot Water Return Temperature (SHWRT) set-point and actual value are displayed
3. System Hot Water Supply Temperature (SHWST) set-point and actual value are displayed
4. Pumps’ running status, duty/standby and speed are displayed
5. Boilers’ running status, duty/lag and flame are displayed
6. The strainer inlet pressure, suction pressure and discharge pressure are displayed
7. Flow is displayed if flow sensor is enabled in “flow sensor setup” screen
8. Bypass valve opening value is displayed if bypass valve is enabled in “bypass valve setup” screen
9. Pressing the boiler icons will change current screen to boiler control screen
10. Pressing the pump icons will change current screen to pump control screen
11. Press the buttons on the menu at the bottom to bring up the desired screen

1.1.2 PUMP OVERVIEW



1. "Mode" displays pump operation mode: Hand, Off, or Auto
2. "Duty" shows which pump is duty and which one is standby
3. "Run Fbk" shows whether the pump is running or stopped
4. Speed is displayed in both % value of full speed and absolute RPM
5. Run Hours are displayed and can be reset in pump control screen
6. Alarm will be displayed if there is a problem with the pump
7. Pressing "Pump 1" button will bring up the "pump 1 control" screen to view and control pump parameters
8. Press the buttons on the menu at the bottom to bring up the desired screen

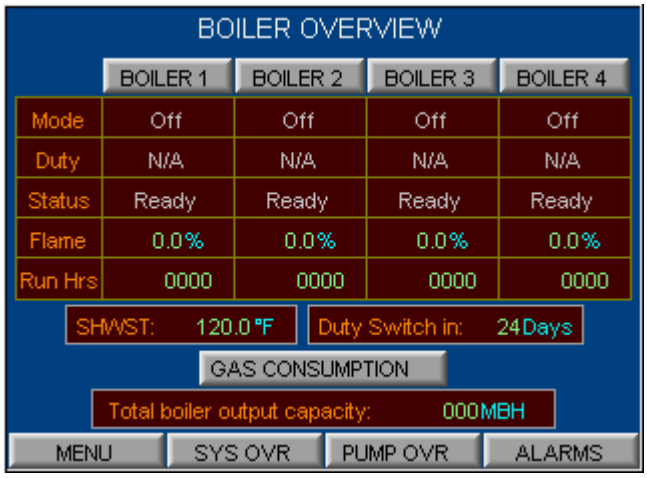
1.1.3 PUMP 1 CONTROL screen



This screen is to control the pump, Hand, Off, Auto, Duty mode and hand speed

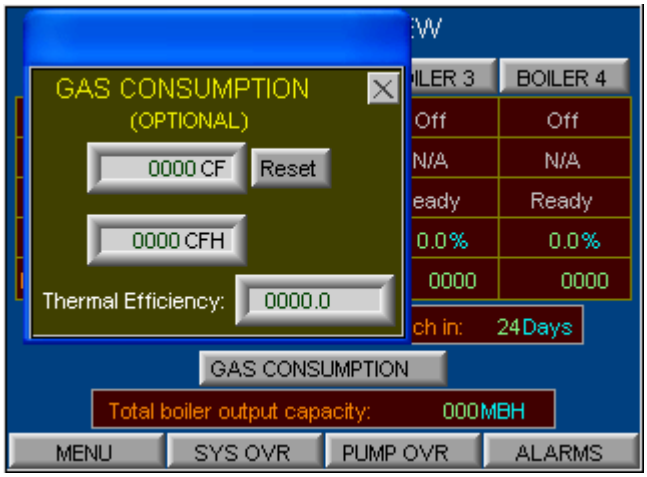
1. Press the "HAND", "OFF", "AUTO" buttons to select the desired mode
2. The pump mode is displayed under these buttons, no display means "N/A"
3. Press "DUTY" button to set the Pump as duty pump (the other pump will become Stand-by)
4. When in "Hand" mode, enter the desired speed in the "Hand Speed" box
5. When in "Auto" mode, the speed of the pump is automatically determined by the controller
6. Pump duty is displayed (Duty or Standby)
7. Pump status is displayed (Running or Stopped)
8. Run Hours indicates the pump total running time since the last reset and can be reset by pressing the displaying area
9. Alarm will be displayed if there is a problem with the pump
10. Controller output speed (Referential speed sent to the VFD) is displayed in % value of pump full speed
11. Pump actual speed (Feedback from the VFD) is displayed in % value of pump full speed
12. SHWRT error, VFD amps, voltage and power is displayed
13. Press the buttons on the menu at the bottom to bring up the desired screen

1.1.4 BOILER OVERVIEW



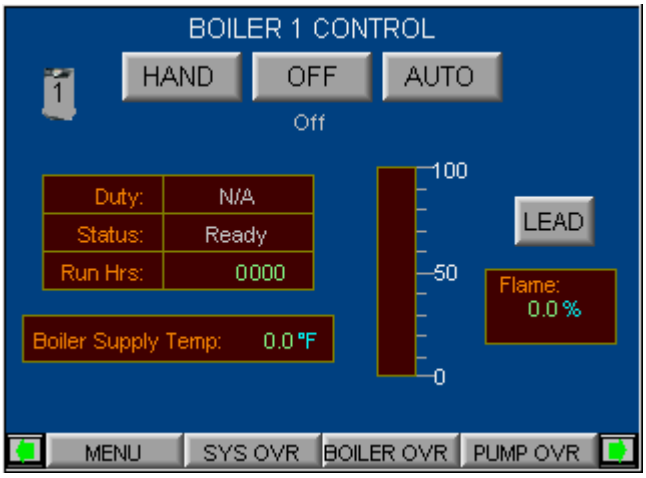
1. Pressing “BOILER N” button will bring up the boiler n control screen to view and control boiler parameters
2. “Mode” shows boilers operation mode: Hand, Off, or Auto
3. “Duty” shows boilers working sequence: Lead, Lag1, Lag2, Lag3
4. “Status” shows the boilers run status: Not Ready, Ready, Enabled, Started, Running and Alarm
5. Flame is displayed in % value of full value
6. Boiler run time is displayed
7. System Hot Water Supply Temperature (SHWST) is displayed
8. The remaining time to switch the lead boiler is displayed
9. “Gas consumption” button is displayed when gas pulses are enabled
10. Pressing “Gas consumption” button will bring up the “Gas consumption” pop-up box to view and reset the total gas consumption
11. Total boiler output capacity is displayed when flow sensor is enabled
12. Press the buttons on the menu at the bottom to bring up the desired screen

1.1.5 GAS CONSUMPTION POP-UP screen



1. The box to the left of “Reset” button displays the total gas consumption in cubic feet
2. The middle box displays gas consumption rate in cubic feet / per hour
3. The right bottom box displays the thermal efficiency
4. Pressing cross mark button will close this pop-up

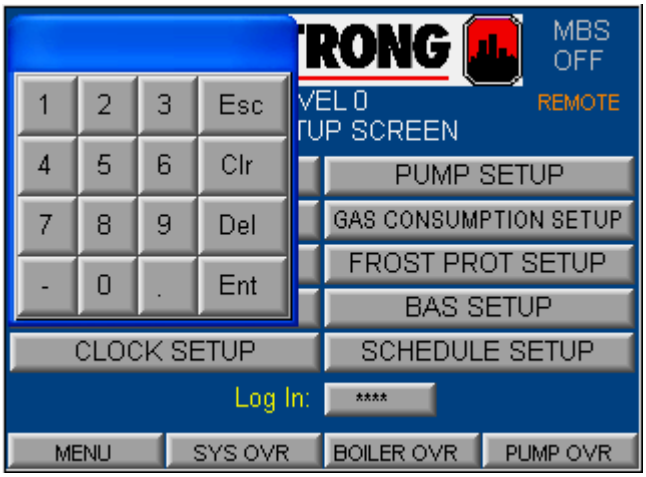
1.1.6 BOILER 1 CONTROL screen



This screen is to control the boiler, Hand, Off, Auto and Duty mode

1. Press the “HAND”, “OFF”, “AUTO” buttons to select the desired mode
2. The boiler mode is displayed under these buttons, no display means “N/A”
3. Press “LEAD” button to set current boiler as lead (the other boilers will reorganize as lag 1, 2 and 3)
4. When in Hand, the system will automatically start the duty pump. The boiler will start when flow is detected and the flame will be modulated to maintain the SHWST set point
5. The boiler’s duty is displayed (Lead, Lag1, Lag2, Lag3)
6. The Boiler’s status is displayed: Not Ready, Ready, Enabled, Started, Running and Alarm
7. Run time indicates the boiler’s total running time. It can be reset by pressing the displaying area
8. Flame is displayed in % value of full value
9. The calculated boiler supply temperature is displayed besides “Boiler Supply Temp:”
10. Press the buttons on the menu at the bottom to bring up the desired screen

1.1.7 LOGIN screen

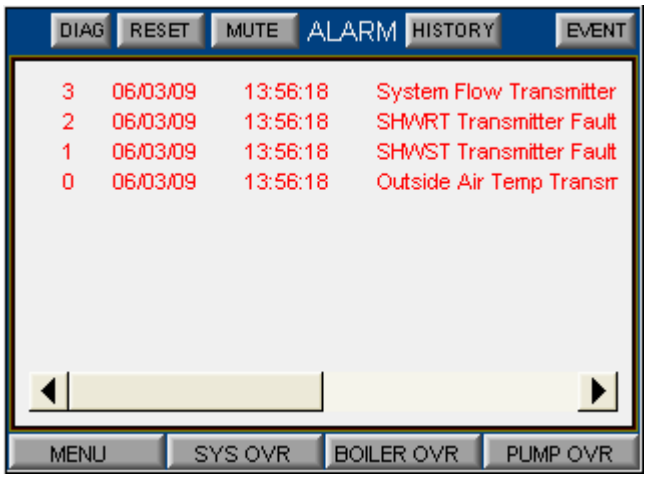


1. In order to be able to modify any of the Setup parameters you must Login with the proper password
2. There are 3 level setup screens. Level 1 and level 2 require operator to input password. Level 0 will allow viewing the setup values only. Level 1 will allow changes to setup values and to restore the system factory defaults except for the PID parameters. Level 2 will allow changes to all the setup values, and to save or restore all the system factory defaults. All the three levels will allow controlling the pumps or boilers
3. From MAIN MENU screen, pressing the “SETUP SCREEN” button will call up this screen
4. Pressing the password area to the right of “Log In:” will pop-up this keypad, input the password through the keypad, press “Ent” button in the keypad will return to this screen or go to the screen corresponding to the password

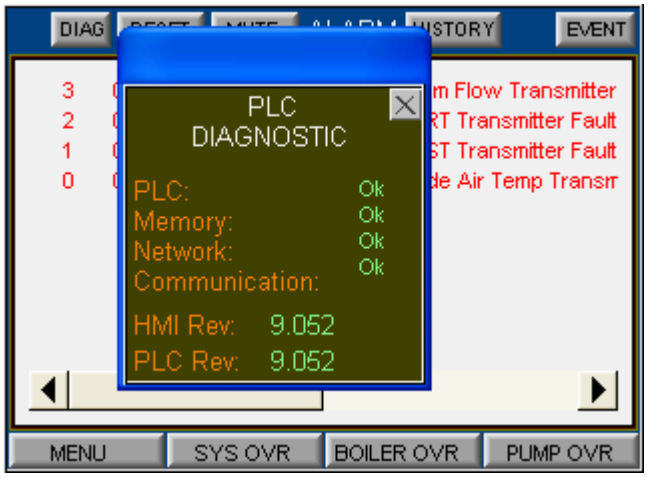
1.2 Alarm Management Displays

See the following table

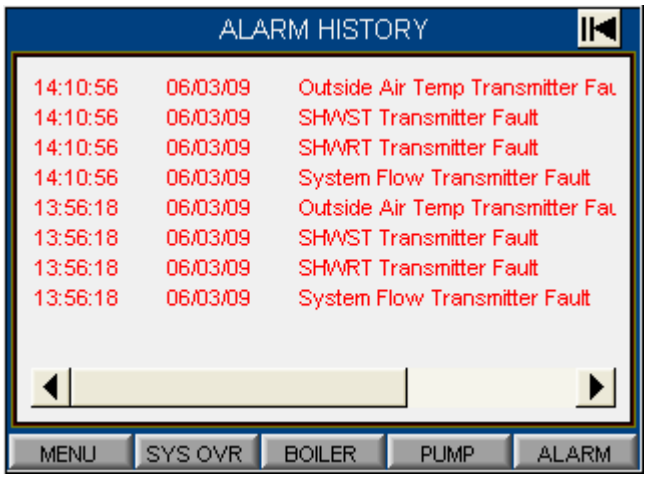
1.2.1 ALARMS screen



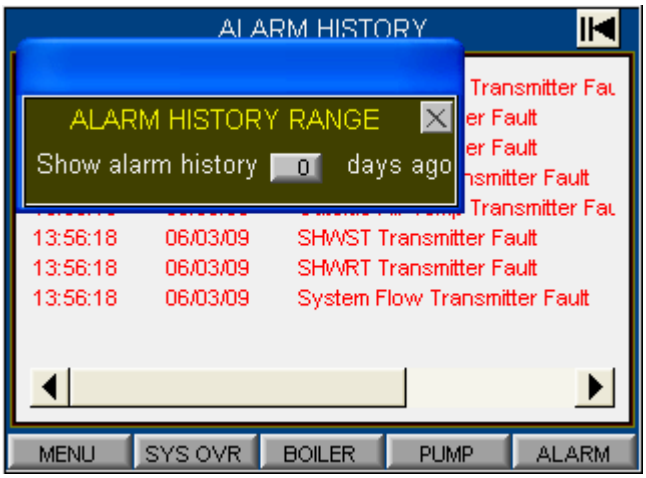
1. All alarms will be displayed in chronological order
2. The last alarm will be at the top of the screen
3. Press “DIAG” to pop up the PLC DIAGNOSTIC box
4. Press “RESET” to reset all active alarms
5. Pressing the “MUTE” button will silence the alarm Horn and stop the flashing of alarm light
6. Press the up and down arrow buttons to view more alarms
7. Press the left and right arrow buttons to view more content of alarms
8. Press the “HISTORY” button to bring up the Alarm History screen
9. Press the “EVENT” button to bring up the Event screen
10. Press the buttons on the menu at the bottom to bring up the desired screen



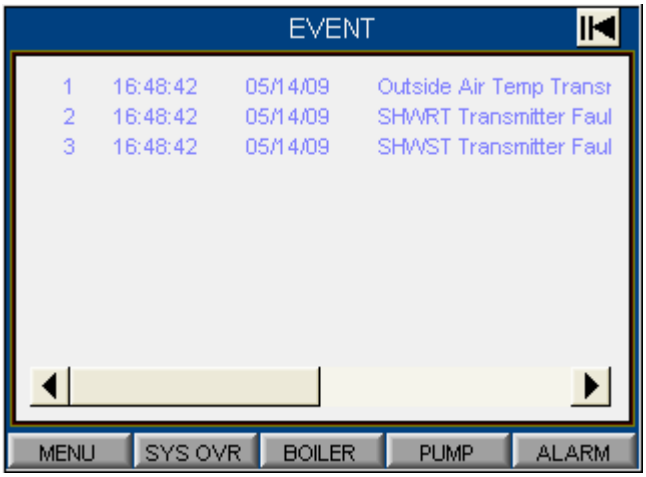
1.2.2 ALARM HISTORY screen



1. The history alarms saved in the internal memory of the HMI are displayed
2. Press the top-right button (black arrow) to select the history alarm to display. The selected number indicates the number of days before today. The history alarms will be displayed for that day
3. Press the up and down arrow buttons to view more alarms
4. Press the left and right arrow buttons to view more content of alarms
5. Press the buttons on the menu at the bottom to bring up the desired screen



1.2.3 EVENT screen



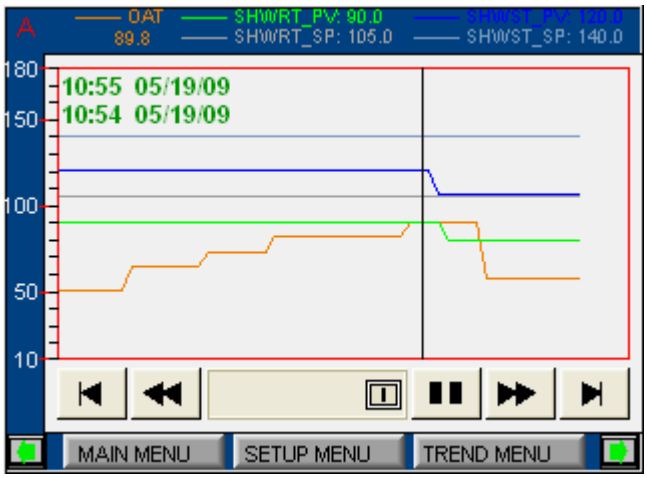
1. The events saved in the internal memory of the HMI are displayed
2. Press the top-right button (black arrow) to select the event to display. The selected number indicates the number of days before today. The event will be displayed for that day
3. Pressing the event displayed will bring up the event Information screen
4. Press the up and down arrow buttons to view more alarms
5. Press the left and right arrow buttons to view more content of alarms
6. Press the buttons on the menu at the bottom to bring up the desired screen

1.3 Trend Displays

1.3.0 TREND MENU

1. Touching the “TREND MENU” button from “Main Menu” will call up the Trend Menu screen
2. Touching any button from this screen will call up its corresponding trend chart display
3. Touching the “HISTORY” button will call up “Trend History Menu” screen
4. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.1 TREND - TEMPERATURE

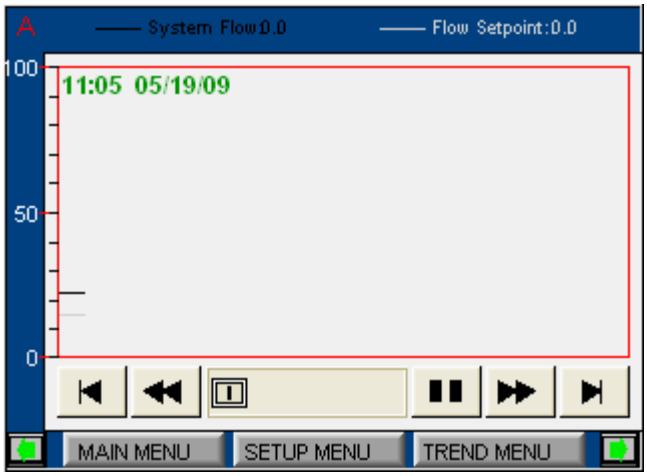


1. Touching the “TEMPERATURE” button from “TREND MENU” will call up the Temperature Chart screen. This will display 5 graphs consisting of

    - Outside Air Temperature
    - System Hot Water Return Temperature
    - System Hot Water Return Temp Setpoint
    - System Hot Water Supply Temperature
    - System Hot Water Supply Temp Setpoint

2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 5 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.2 TREND – SYSTEM FLOW

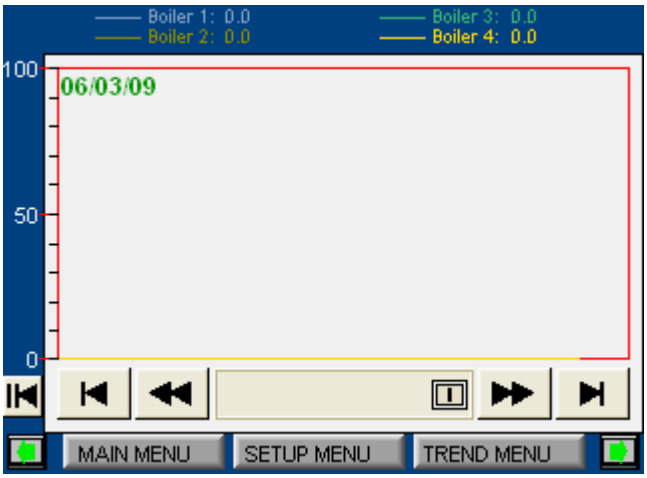


1. Touching the “SYSTEM FLOW” button from “TREND MENU” will call up the System Flow Chart screen. This will display 2 graphs consisting of

    - System Flow
    - System Flow Setpoint

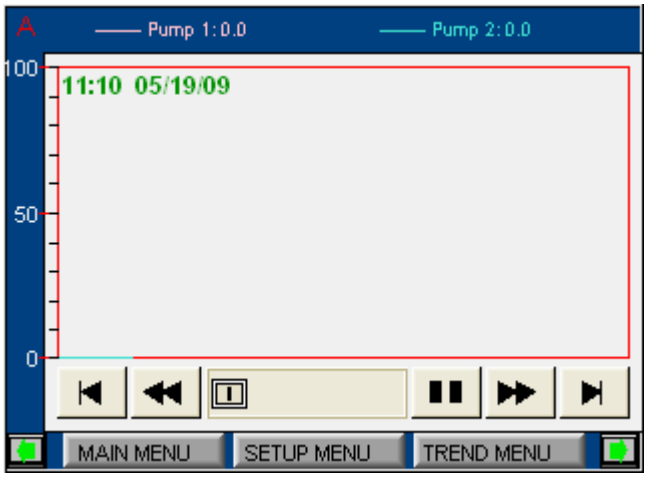
2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 2 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.3 TREND – BOILER FLAME



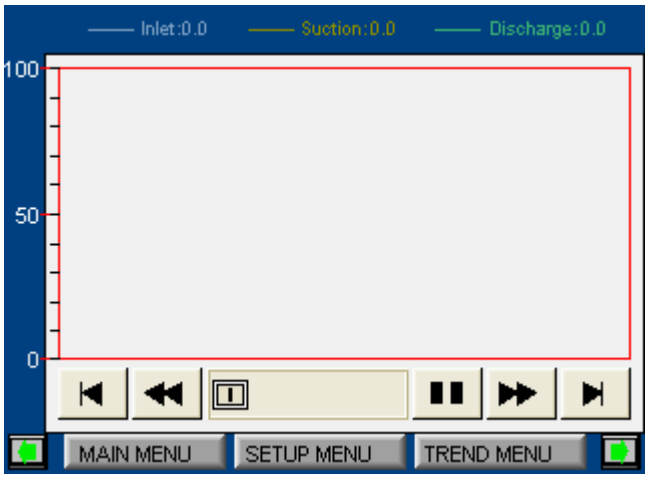
1. Touching the “BOILERS FLAME” button from “TREND MENU” will call up the Boiler Flame Chart screen. This will display maximum 4 graphs consisting of
    - Boiler 1 Flame
    - Boiler 2 Flame
    - Boiler 3 Flame
    - Boiler 4 Flame
2. The number of charts are depend on the number of boilers (Set up by ECO*PAK MBS™ Model)
3. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of charts are displayed on top of this screen
4. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
5. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
6. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.4 TREND – PUMP SPEED



1. Touching the “PUMPS SPEED” button from “TREND MENU” will call up the Pump Speed Chart screen. This will display 2 graphs consisting of
    - Pump 1 Speed
    - Pump 2 Speed
2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 2 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.5 TREND - PRESSURE

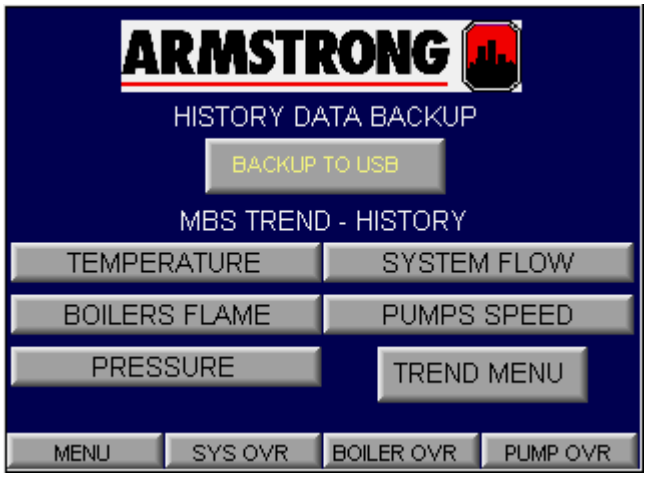


1. Touching the “PRESSURE” button from “TREND MENU” will call up the System Pressure Chart screen. This will display 3 graphs consisting of

    - The strainer Inlet Pressure
    - The Suction Pressure
    - The Discharge Pressure

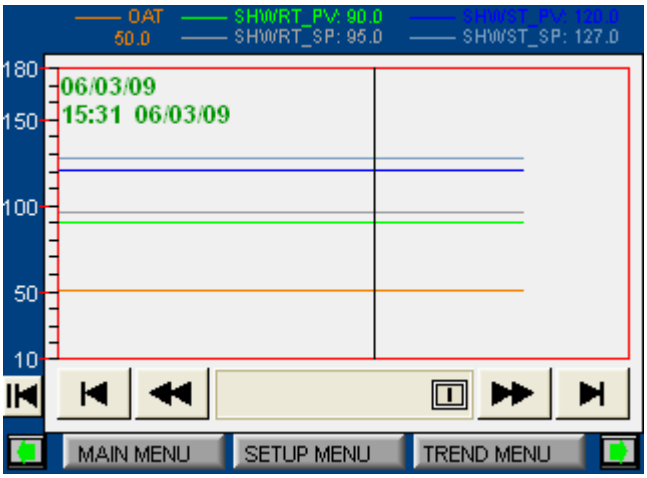
2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 3 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touch the buttons on the menu at the bottom to bring up the desired screen

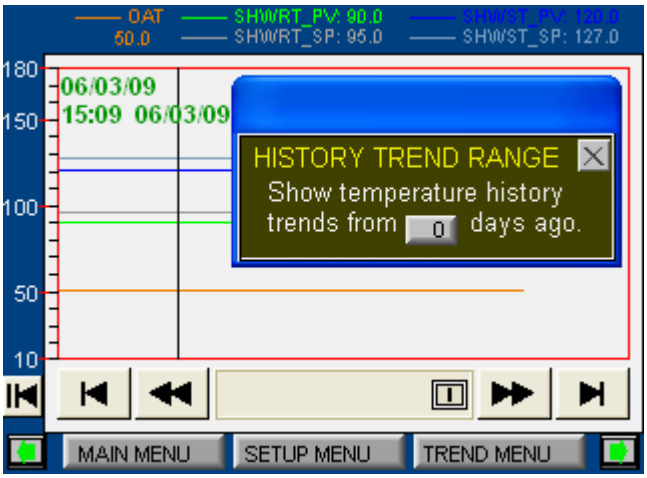
1.3.6 TREND HISTORY - MENU



1. Touching the “HISTORY” button from “TREND MENU” will call up the Trend History Menu screen
2. Touching any button from this screen will call up its corresponding trend history chart display
3. Touching the “TREND MENU” button will go back to Trend Menu screen
4. Touching the “BACKUP TO USB” button will save history event log, alarm log and history trend data to USB within 31 days from today
5. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.6.1 TREND - TEMPERATURE



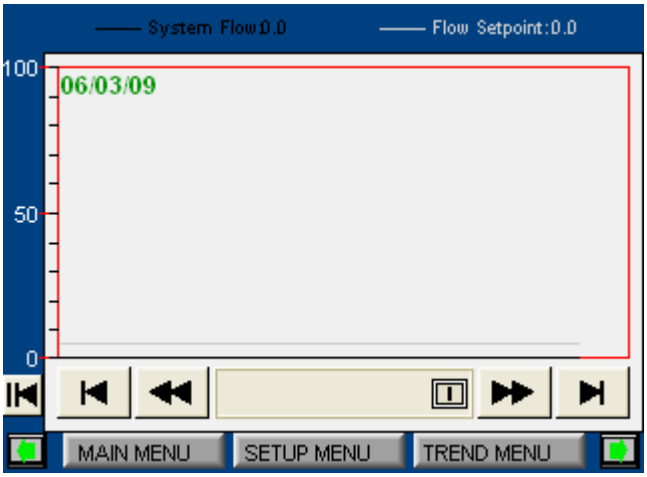


1. Touching the “TEMPERATURE” button from “TREND HISTORY MENU” will call up the History Temperature Chart screen. This will display 5 graphs consisting of

    - Outside Air Temperature
    - System Hot Water Return Temperature
    - System Hot Water Return Temp Setpoint
    - System Hot Water Supply Temperature
    - System Hot Water Supply Temp Setpoint

2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 5 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touching the button to the left of navigation buttons will bring up the “History Trend Range” pop-up box to select the date to view history trend chart
6. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.6.2 TREND – SYSTEM FLOW



1. Touching the “SYSTEM FLOW” button from “TREND HISTORY MENU” will call up the History System Flow Chart screen. This will display 2 graphs consisting of

    - System Flow
    - System Flow Setpoint

2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 2 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touching the button to the left of navigation buttons will bring up the “History Trend Range” pop-up box to select the date to view history trend chart

6. Touch the buttons on the menu at the bottom to bring up the desired screen

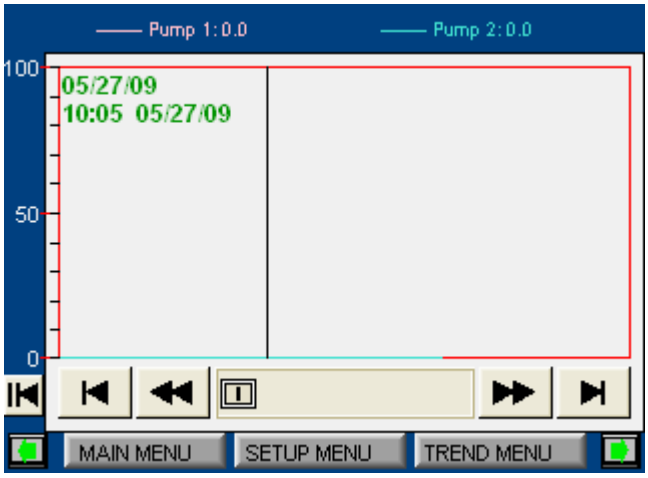
1.3.6.3 TREND – BOILER FLAME

1. Touching the “BOILERS FLAME” button from “TREND HISTORY MENU” will call up the History Boiler Flame Chart screen. This will display maximum 4 graphs consisting of

    - Boiler 1 Flame
    - Boiler 2 Flame
    - Boiler 3 Flame
    - Boiler 4 Flame

2. The number of charts are depend on the number of boilers (Set up by ECO*PAK MBS™ Model)
3. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of charts are displayed on top of this screen
4. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
5. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
6. Touching the button to the left of navigation buttons will bring up the “History Trend Range” pop-up box to select the date to view history trend chart
7. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.6.4 TREND – PUMP SPEED

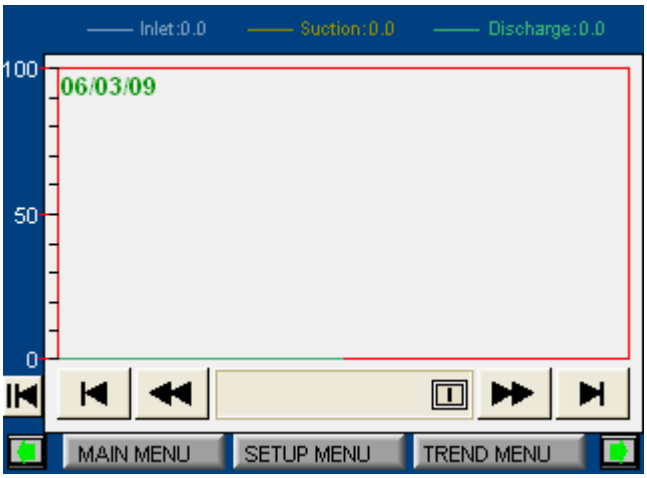


1. Touching the “PUMPS SPEED” button from “TREND HISTORY MENU” will call up the History Pump Speed Chart screen. This will display 2 graphs consisting of

    - Pump 1 Speed
    - Pump 2 Speed

2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 2 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touching the button to the left of navigation buttons will bring up the “History Trend Range” pop-up box to select the date to view history trend chart
6. Touch the buttons on the menu at the bottom to bring up the desired screen

1.3.6.5 TREND - PRESSURE

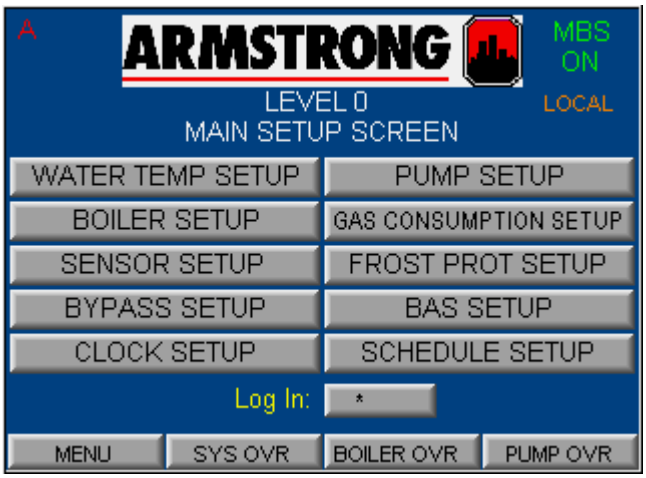


1. Touching the “PRESSURE” button from “TREND HISTORY MENU” will call up the History System Pressure Chart screen. This will display 3 graphs consisting of
    - The strainer Inlet Pressure
    - The Suction Pressure
    - The Discharge Pressure
2. Touching chart display area will display a vertical line. Corresponding the time axis of the line, the values of 3 charts are displayed on top of this screen
3. The current time and the time point of the vertical line will be displayed on the left-top of the chart area
4. Touching the navigation buttons below the chart area will let you navigate the charts in different time periods
5. Touching the button to the left of navigation buttons will bring up the “History Trend Range” pop-up box to select the date to view history trend chart
6. Touch the buttons on the menu at the bottom to bring up the desired screen

1.4 Level 0 Setup Displays

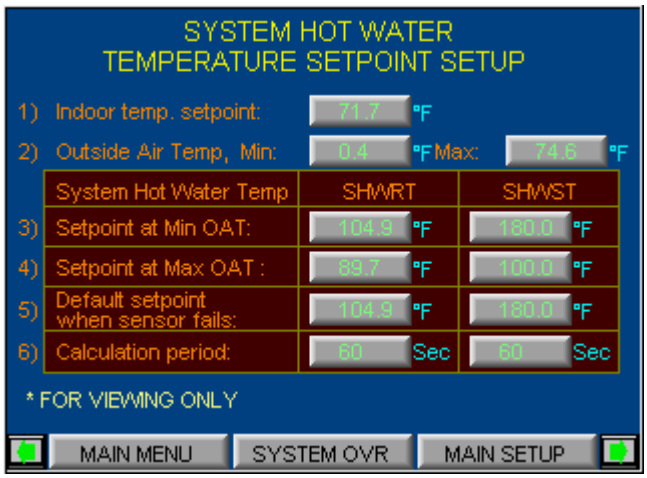
See the following table

1.4.0 LEVEL 0 SETUP MENU

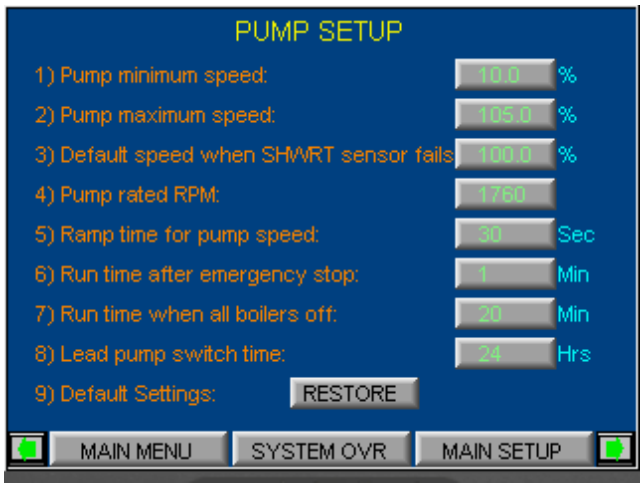


1. Touching the “SETUP SCREEN” button from “Main Menu” will call up the Level 0 Setup screen
2. Pressing the password area to the right of “Log In:” will pop-up a keypad to log on to installer display or factory display
3. The top left corner of the screen will flash “A” when there is a new alarm. The “A” will be solid when the alarm is acknowledged or muted. Pressing the “A” will call up the alarm screen
4. Pressing any of the “SETUP” button will call up its corresponding Setup display
5. These displays are for viewing only. No values can be modified on these displays
6. Below are the screens that the user sees when pressing on each of those buttons
7. Touch the buttons on the menu at the bottom to bring up the desired screen
8. Touching the “Right” and “Left” arrow will navigate between the viewing only Setup Screens

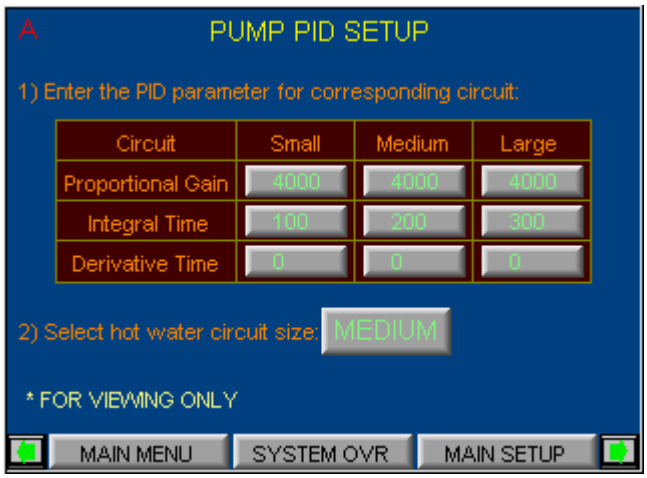
1.4.1 SYSTEM HOT WATER TEMP SETUP



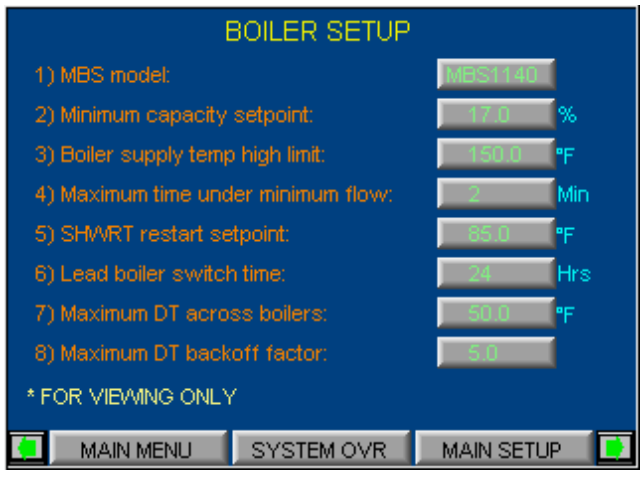
1.4.2 PUMP SETUP



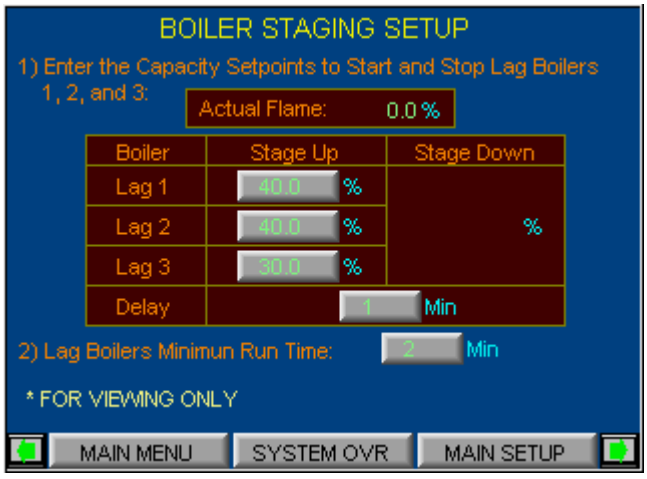
1.4.3 PUMP PID SETUP



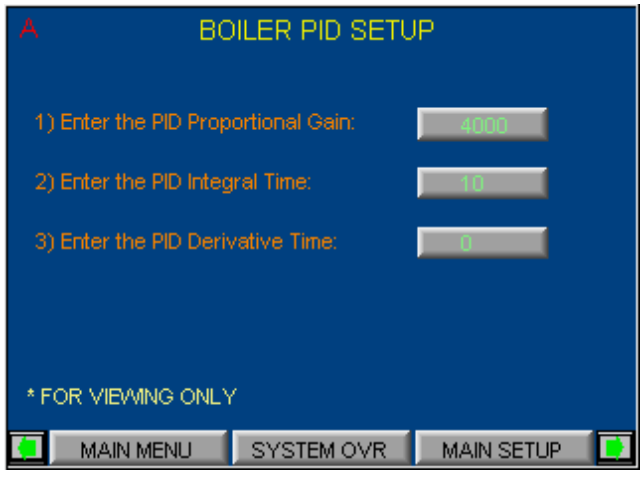
1.4.4 BOILER SETUP



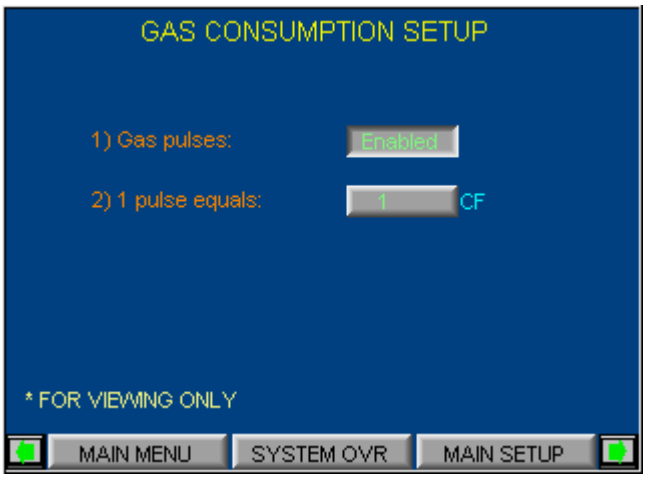
1.4.5 BOILER STAGING SETUP



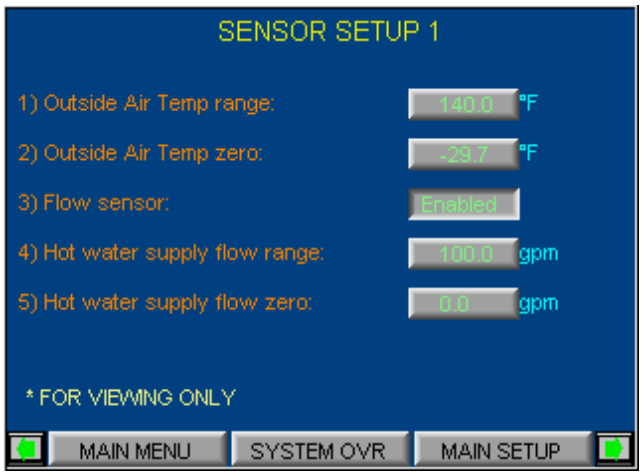
1.4.6 BOILER PID SETUP



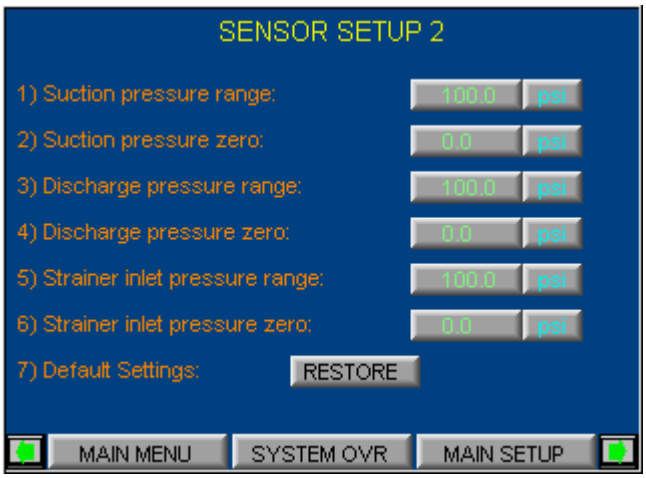
1.4.7 GAS CONSUMPTION SETUP



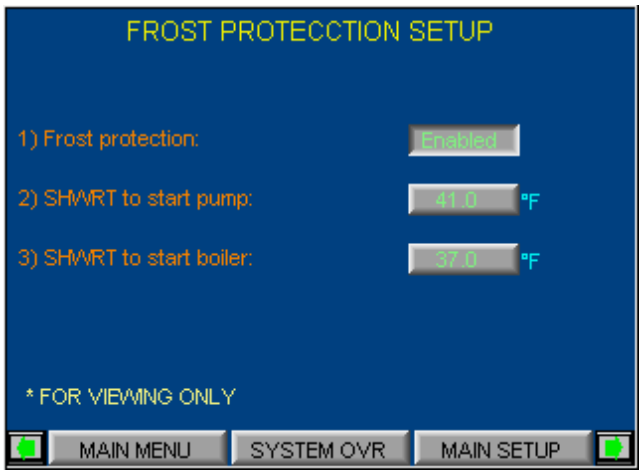
1.4.8 SENSOR SETUP 1



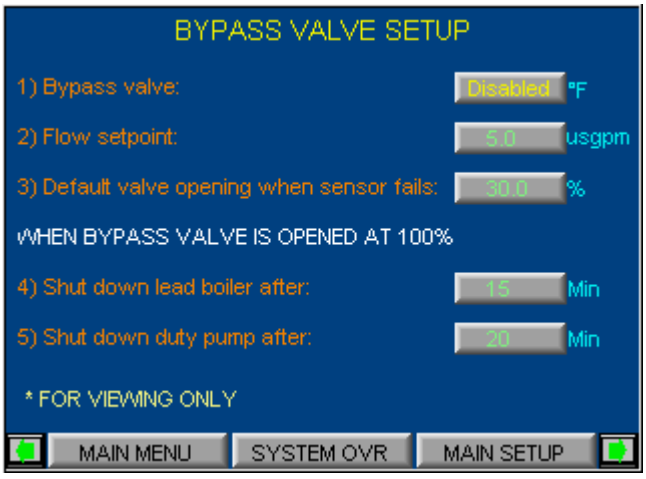
1.4.9 SENSOR SETUP 2



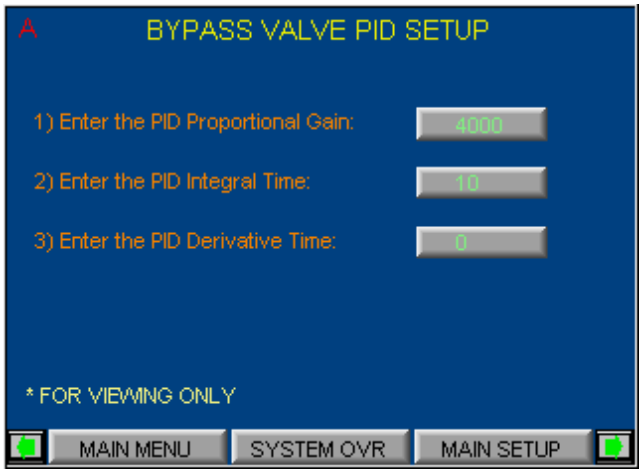
1.4.10 FROST PROTECTION SETUP



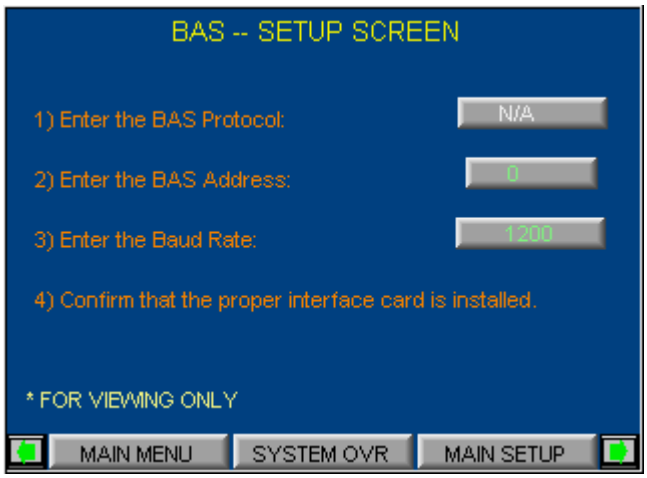
1.4.11 BYPASS SETUP



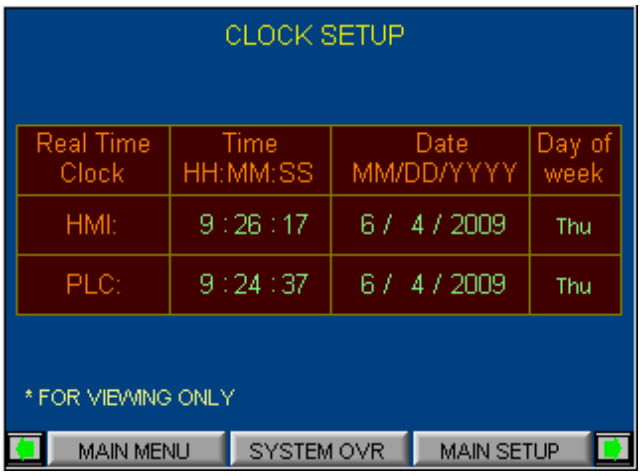
1.4.12 BYPASS PID SETUP



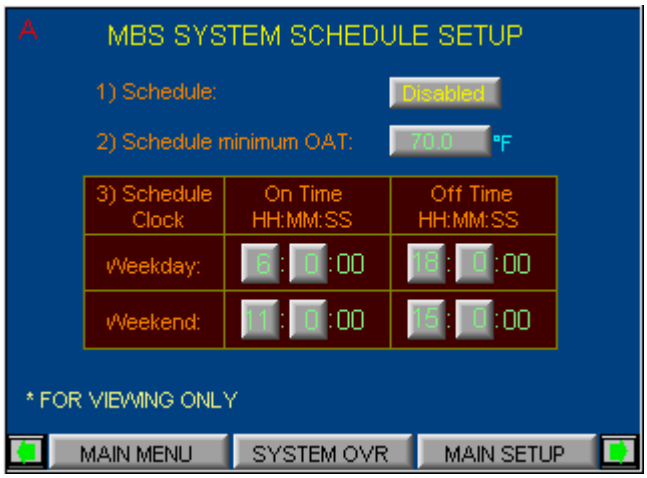
1.4.13 BAS SETUP



1.4.14 CLOCK SETUP



1.4.15 SCHEDULE SETUP



INSTALLER DISPLAYS

Installer Displays include system displays, alarm management displays, trend displays and level 1 setup displays. To access level 1 setup displays the user is required a level 1 password.

2.1 System Displays

See previously in the Operator Displays

2.2 Alarm Management Displays

See previously in the Operator Displays

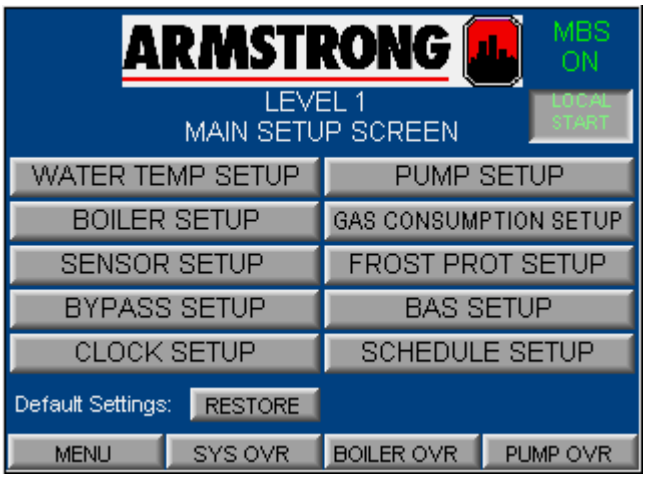
2.3 Trend Displays

See previously in the Operator Displays

2.4 Level 1 Setup Displays

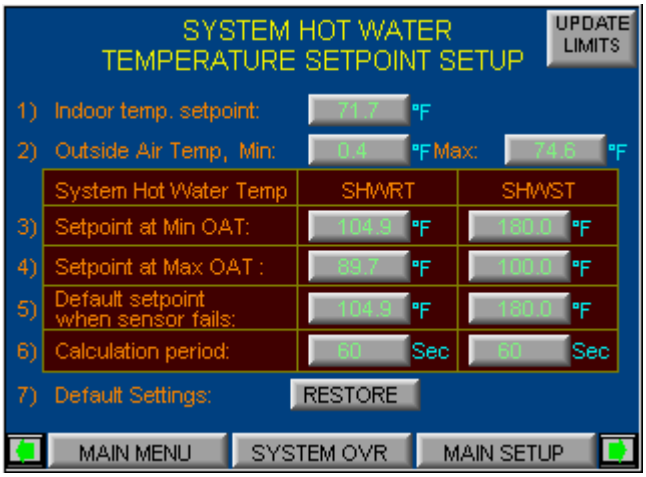
Most of the level 1 setup displays are almost the same as the level 1 setup displays, except that the user can press “Save” button to save changed values to the system factory defaults on each setup display screen. However, some different displays are listed in the following table

2.4.0 LEVEL 1 SETUP MENU



1. Pressing and inputting the proper password in “LEVEL 0 SETUP” screen will call up the Level 1 Setup screen
2. Pressing the “LOCAL/REMOTE START” button will pop-up a box to switch ECO*PAK MBS™ between “LOCAL” and “REMOTE” status (next picture). Under local status ECO*PAK MBS™ will be started immediately. Under remote status ECO*PAK MBS™ will be stopped, or started by BAS or the customer’s hardwire contact
3. The top left corner of the screen will flash “A” when there is a new alarm. The “A” will be solid when the alarm is acknowledged or muted. Pressing the “A” will call up the alarm screen
4. Pressing any of the “SETUP” button will call up its corresponding Setup display. These displays are for changing the system setup and restoring the system factory defaults
5. PID setup displays are for viewing only
6. After changing values in any setup screens, should you want to regain the previous saved values, press “Restore” button to retrieve all the setup values from the system factory defaults
7. Below are the screens that the user sees when pressing on each of those buttons
8. Touch the buttons on the menu at the bottom to bring up the desired screen
9. Touching the “Right” and “Left” arrow will navigate between the Level 1 Setup Screens

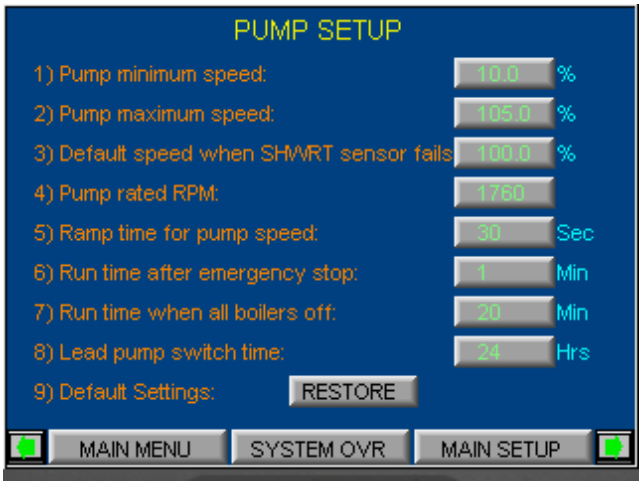
2.4.1 SYSTEM HOT WATER TEMP SETUP



1. Touching the “WATER TEMP SETUP” button from “LEVEL 1 MAIN SETUP” screen will call up the System Hot Water Temperature Setpoint Setup screen
2. Indoor Temperature setpoint, Minimum OAT, Maximum OAT, Minimum OAT SHWRT, Minimum OAT SHWRT, Maximum OAT SHWST, Maximum OAT SHWST. Contact S.A.Armstrong for information on these parameters
3. Enter the default SHWST and SHWRT set-point. When the OAT sensor returns an error value, SHWST and SHWRT set-point will be set at the value entered
4. After input the ‘Setpoint at Min OAT’, ‘Setpoint at Max OAT’, ‘Default setpoint when sensor fails’, and ‘Schedule minimum OAT’ in “SCHEDULE SETUP”

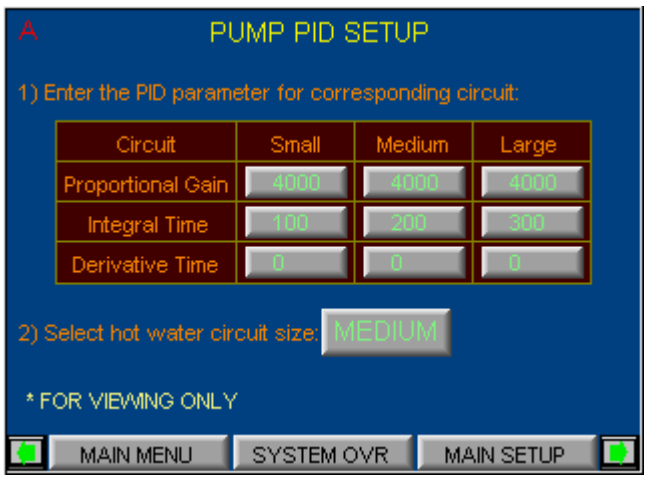
screen, press “UPDATE LIMITS” button to make sure the values are within the limits
5. Enter calculation period for the SHWST and SHWRT set-point
6. Press “Restore” button to retrieve SHWT set-point setup values from the system factory defaults
7. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.2 PUMP SETUP



1. From “LEVEL 1 MAIN SETUP” press on “PUMP SETUP” to call up this screen
2. Enter the pump minimum speed. The minimum speed the pump will be allowed to run in Auto or Hand mode
3. Enter the pump maximum speed. The maximum speed the pump will be allowed to run in Auto or Hand mode
4. Enter the pump default speed. If SHWRT sensor fails, the running pump in Auto mode will have its speed set to the default speed
5. Enter the pump rated RPM as indicated on the motor
6. Enter the speed ramp time. The minimum amount of time it will take the pumps to increase the speed from 0% to 100% or to decrease the speed from 100% to 0%
7. Enter the pump run time. After an emergent stop, the pump will continue to run for this period of time
8. Enter the pump run time. When all boilers are off the pump will continue to run for this period of time
9. Enter the lead pump switch time. After the duty pump runs for the entered amount of hours, the standby pump will switch to lead
10. Press “Restore” button to retrieve pump setup values from the system factory defaults
11. Touch the buttons on the menu at the bottom to bring up the desired screen

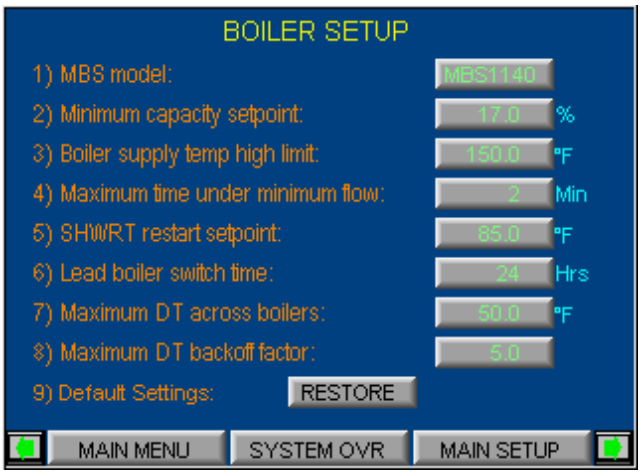
2.4.3 PUMP PID SETUP



This screen is for viewing only

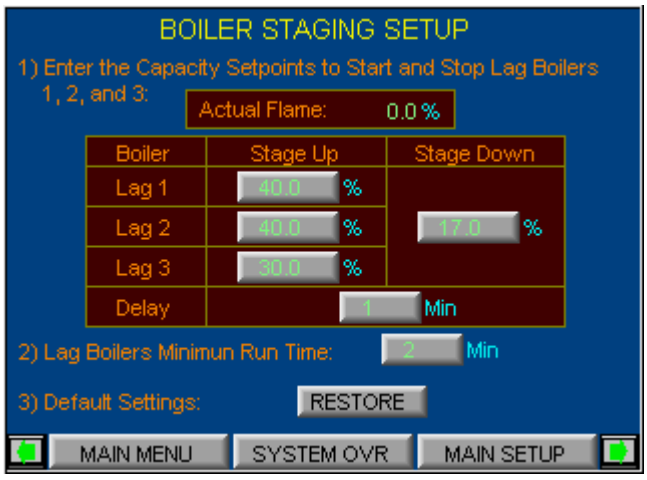
1. Press bottom right navigation button from “PUMP SETUP” to bring up this screen
2. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.4 BOILER SETUP



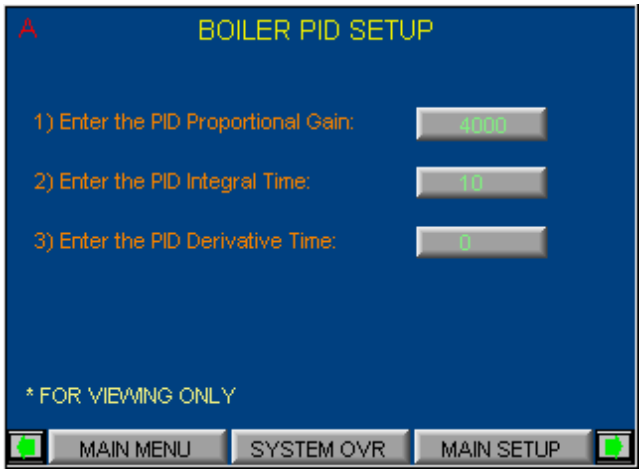
1. Press “BOILER SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Touching the MBS model beside the description will toggle between “MBS 420”, “MBS 570”, “MBS 630”, “MBS 855” and “MBS 1140”. MBS 420 represents 2 boilers with capacity of 210 BTU/hr ea. MBS 570 represents 2 boilers with capacity of 285 BTU/hr ea. MBS 630 represents 3 boilers with capacity of 210 BTU/hr ea. MBS 855 represents 3 boilers with capacity of 285 BTU/hr ea. MBS1140 represents 4 boilers with capacity of 285 BTU/hr ea.
3. Enter the minimum running capacity for boiler. Boilers should not operate at less than the minimum capacity.
4. Enter the high limit of Boiler Supply Temperature (BST). If BST is approaching its high limit, the lag boiler shall be added on to maintain BST below its high limit.
5. Enter the period of time to operate boilers under minimum flow. After this period of time, lead boiler shall be shut down.
6. Enter SHWRT restart set-point. When the actual SHWRT is lower than this set-point, system will start the lead boiler
7. Enter the lead boiler switch time. After the lead boiler runs for the entered amount of hours the lead boiler will transfer lead to the lag boiler (Lag 1)
8. Enter the differential temperature set-point between SHWST and SHWRT. When the actual DT is approaching this set-point, all the boilers are going to reduce their capacity by an amount determined by the back-off factor. If DT remains high, the boiler will shutdown
9. Enter the back-off factor. Determines how fast the boiler capacity is reduced
10. Press “Restore” button to retrieve boiler setup values from the system factory defaults
11. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.5 BOILER STAGING SETUP



1. Press bottom right navigation button from “BOILER SETUP” to bring up this screen
2. Enter the stage up capacity for “Lag1”, “Lag2” and “Lag3” boilers in the boxes beside the descriptions. When the capacity of lead boiler reaches the corresponding capacity entered above for a specific time, the corresponding lag boiler shall be staged up
3. Enter the stage down capacity for all the lag boilers. When the capacity of lead boiler goes below this value for a specific time, the last lag boiler shall be staged down
4. Enter the delay time for staging up or staging down
5. Enter minimum run time for boilers. The minimum run time the boilers are going to run after they are started
6. Press “Restore” button to retrieve boiler sequencing setup values from the system factory defaults
7. Touch the buttons on the menu at the bottom to bring up the desired screen

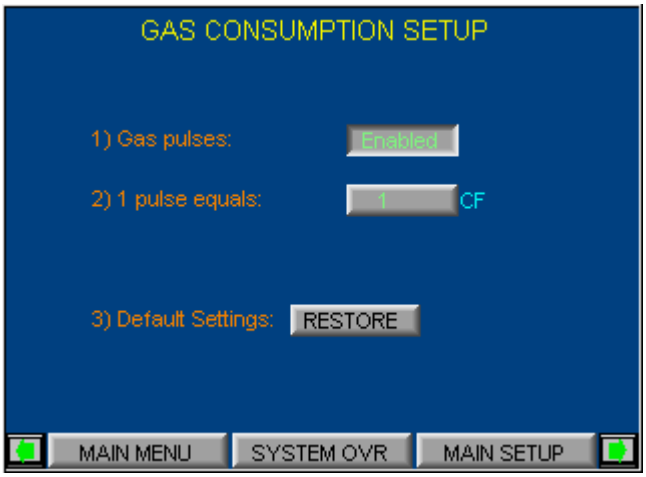
2.4.6 BOILER PID SETUP



This screen is for viewing only

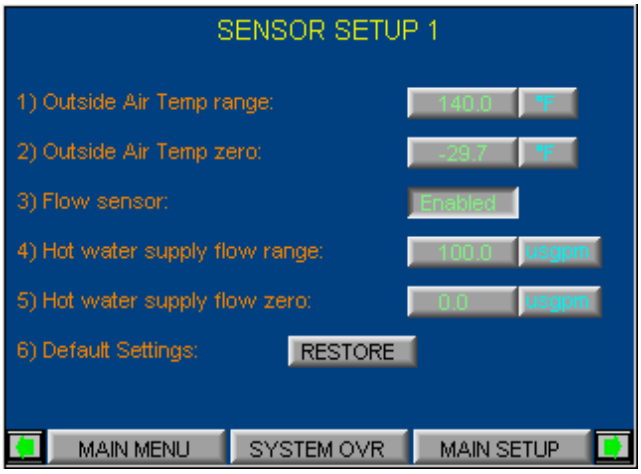
1. Press bottom right navigation button from “BOILER SETUP” to bring up this screen
2. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.7 GAS CONSUMPTION SETUP



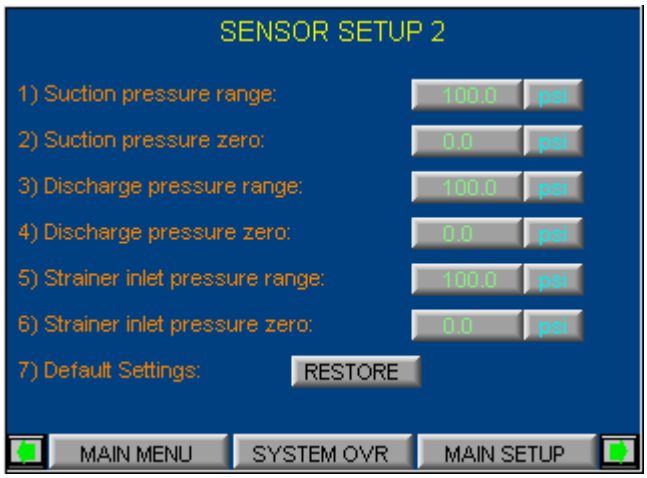
1. Press “GAS CONSUMPTION SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Gas Pulses can be enabled to measure the gas consumption when the gas meter is installed in the system
3. Enter the magnitude of each pulse in Cubic Feet
4. Press “Restore” button to retrieve gas consumption setup values from the system factory defaults
5. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.8 SENSOR SETUP 1



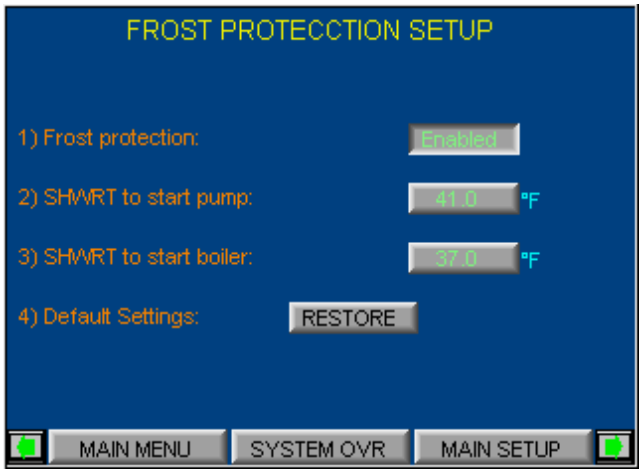
1. Press “SENSOR SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Press the first two boxes to enter the range for outside air temperature sensor and toggle the temperature unit between “°F” and “°C”
3. Press the second two boxes to enter the zero (the lowest measure value)for outside air temperature sensor and toggle the temperature unit between “°F” and “°C”
4. Flow sensor can be enabled when the flow sensor is installed in the system
5. Press the boxes beside the “flow range” to enter flow sensor’s range and toggle the flow unit among “usgpm”, “lps”, and “m^3/hr”
6. Press the boxes beside the “flow zero” to enter flow sensor’s zero (the lowest measure value) and toggle the flow unit among “usgpm”, “lps”, and “m^3/hr”
7. Press “Restore” button to retrieve sensor setup 1 values from the system factory defaults
8. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.9 SENSOR SETUP 2



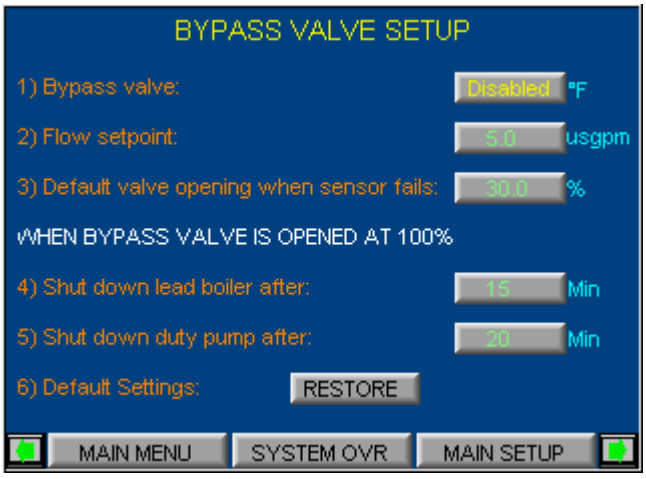
1. Press bottom right navigation button from “SENSOR SETUP 1” to bring up this screen
2. Press the first two boxes in column 1 to enter the range and zero for system suction pressure sensor
3. Press the second two boxes in column 1 to enter the range and zero for system discharge pressure sensor
4. Press the third two boxes in column 1 to enter the range and zero for system strainer inlet pressure sensor
5. Press any box in column 2 to toggle the pressure unit among “psi”, “ft”, “KPa”, “m” and “bar”
6. Press “Restore” button to retrieve sensor setup 2 values from the system factory defaults
7. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.10 FROST PROTECTION SETUP



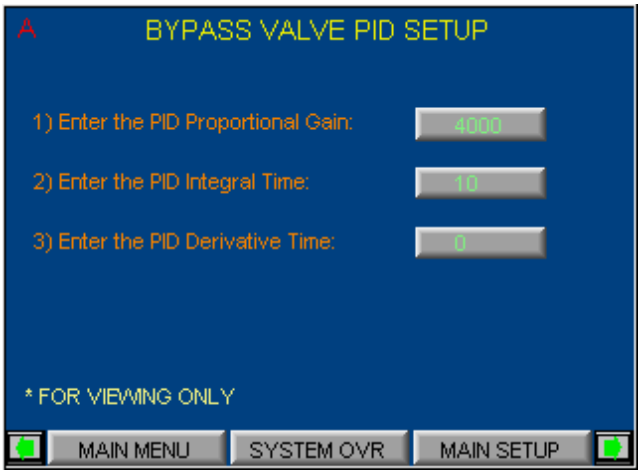
1. Press “FROST PROT SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Frost protection can be enabled or disabled
3. Enter SHWRT set-point 1. When SHWRT drops below this value, duty pump will be started at the minimum speed
4. Enter SHWRT set-point 2. When SHWRT drops below this value, lead boiler will be started at the minimum capacity
5. Press “Restore” button to retrieve frost protection setup values from the system factory defaults
6. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.11 BYPASS SETUP



1. Press “BYPASS SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Bypass valve can be enabled if it is installed in the system
3. Enter the flow set-point (per boiler). When the flow is lower than this value, bypass valve opens and tries to maintain the flow above the set-point
4. Enter the default value of bypass valve. When the flow sensor fails, the bypass valve will open at this value
5. Enter the time to keep lead boiler running when the bypass valve is (100%) open
6. Enter the time to keep duty pump running when the bypass valve is (100%) open
7. Press “Restore” button to retrieve bypass valve setup values from the system factory defaults
8. Touch the buttons on the menu at the bottom to bring up the desired screen

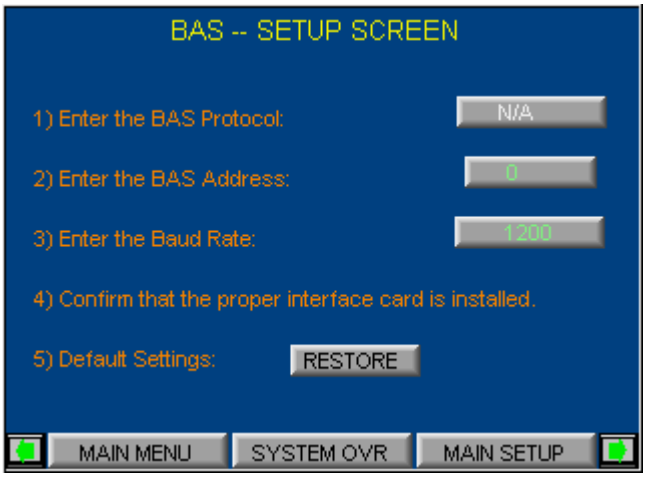
2.4.12 BYPASS PID SETUP



This screen is for viewing only

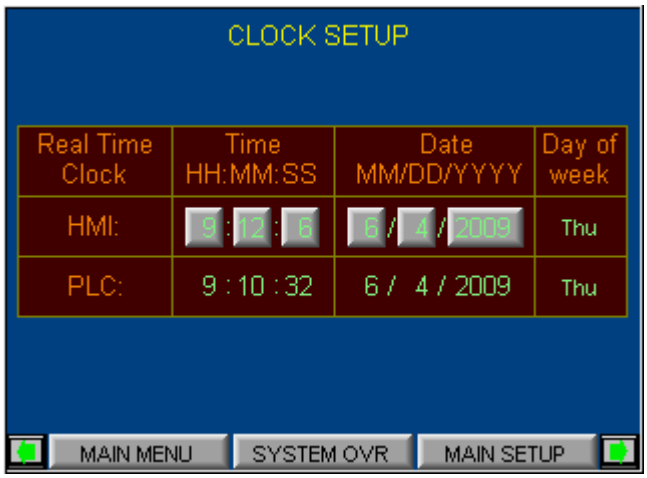
1. Press bottom right navigation button from “BYPASS VALVE SETUP” to bring up this screen
2. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.13 BAS SETUP



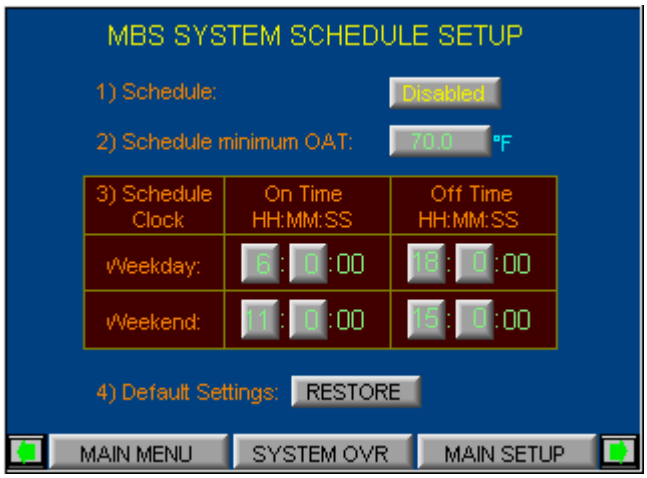
1. From “LEVEL 1 MAIN SETUP” press on “BAS Setup” to set the protocol used to communicate between the ECO*PAK MBS™ Controller and the BAS
2. Check that the proper hardware is installed in the ECO*PAK MBS™ controller panel
3. Select the BAS communication protocol by pressing the protocol box to toggle between “Modbus”, “LonWorks”, and “BacNet”
4. Enter the network address as specified by the Building Management Administrator
5. Select the BAS communication baud rate as specified by the Building Management Administrator
6. Press “Restore” button to retrieve bas setup values from the system factory defaults
7. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.14 CLOCK SETUP



1. From the “LEVEL 1 MAIN SETUP” press “Clock Setup” button to call up this screen to adjust the time in the HMI and display the time in the PLC
2. The HMI time and date can be adjusted by pressing the individual hour, minute, month, day, year and day of the week box and entering the corresponding value
3. Touch the buttons on the menu at the bottom to bring up the desired screen

2.4.15 SCHEDULE SETUP



1. Press “SCHEDULE SETUP” button from “LEVEL 1 MAIN SETUP” to bring up this screen
2. Schedule can be enabled or disabled by pressing the box beside the “schedule” text
3. Press the next box to enter minimum Outside Air Temperature. When the OAT is lower than the value, system schedule is enabled
4. Enter the on and off time respectively for weekday and weekend. When the time is inside the range, the MBS is enabled
5. Press “Restore” button to retrieve schedule setup values from the system factory defaults
6. Touch the buttons on the menu at the bottom to bring up the desired screen

FACTORY DISPLAYS

Factory Displays include system displays, alarm management displays, trend displays and level 2 setup displays. To access level 2 setup displays the user is required a level 2 password.

3.1 System Displays
See previously in the Operator Displays

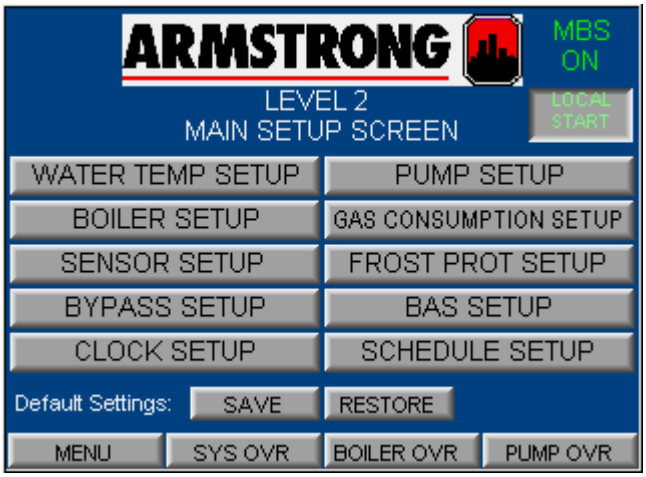
3.2 Alarm Management Displays
See previously in the Operator Displays

3.3 Trend Displays
See previously in the Operator Displays

3.4 Level 1 Setup Displays

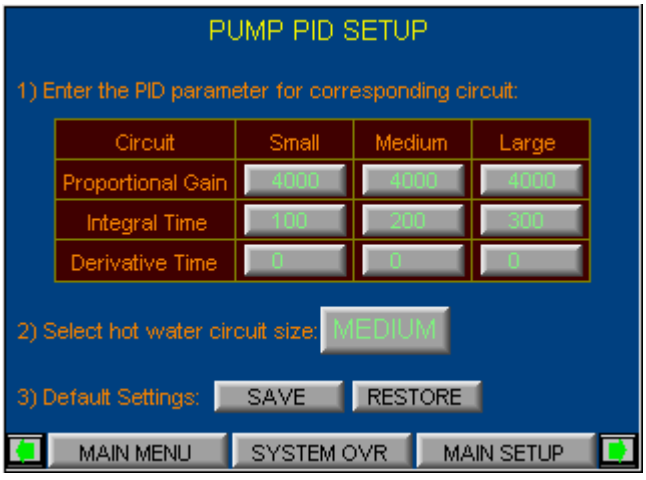
Most of the level 2 setup displays are almost the same as the level 1 setup displays, except that the user can press “Save” button to save changed values to the system factory defaults on each setup display screen. However, some different displays are listed in the following table

3.4.0 LEVEL 2 SETUP MENU



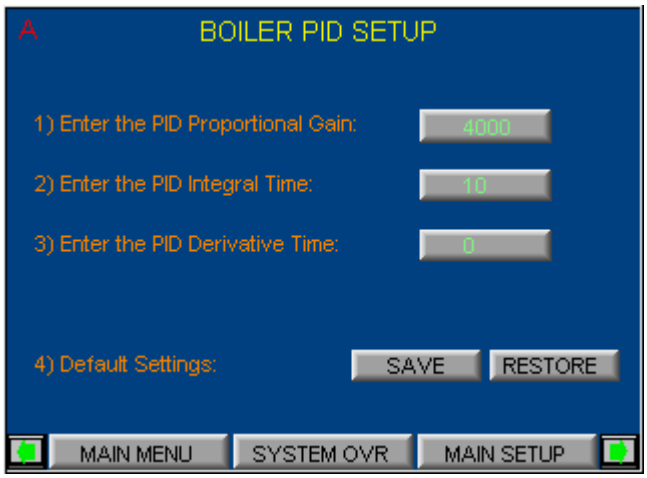
1. Pressing and inputting the proper password in "LEVEL 0 SETUP" screen will call up the Level 2 Setup screen
2. Pressing the "LOCAL/REMOTE START" button will pop-up a box to switch MBS between "LOCAL" and "REMOTE" status (next picture). Under local status MBS will be started immediately. Under remote status MBS will be closed, or started by BAS or the customer's hardwire contact
3. The top left corner of the screen will flash "A" when there is a new alarm. The "A" will be solid when the alarm is acknowledged or muted. Pressing the "A" will call up the alarm screen
4. Pressing any of the "SETUP" button will call up its corresponding Setup display. These displays are for changing the system setup, saving and restoring the system factory defaults
5. After changing values in any setup screens, press "Save" button to save all the changes as system factory defaults
6. After changing values in any setup screens, should you want to regain the previous saved values, press "Restore" button to retrieve all the setup values from the system factory defaults
7. Below are the screens that the user sees when pressing on each of those buttons
8. Touch the buttons on the menu at the bottom to bring up the desired screen
9. Touching the "Right" and "Left" arrow will navigate between the Level 2 Setup Screens

3.4.1 PUMP PID SETUP



1. Press bottom right navigation button from "PUMP SETUP" to bring up this screen
2. There are three groups of proportional gain, integral gain and derivative gain for small, medium and large size circuit. The PID modulation is based on the parameters in the group selected beside the description of "Select hot water circuit size:"
3. Enter the P, I and D parameters for selected circuit
4. Press "Save" button to save changed values to the system factory defaults, press "Restore" button to retrieve pump PID setup value from the system factory defaults
5. Touch the buttons on the menu at the bottom to bring up the desired screen

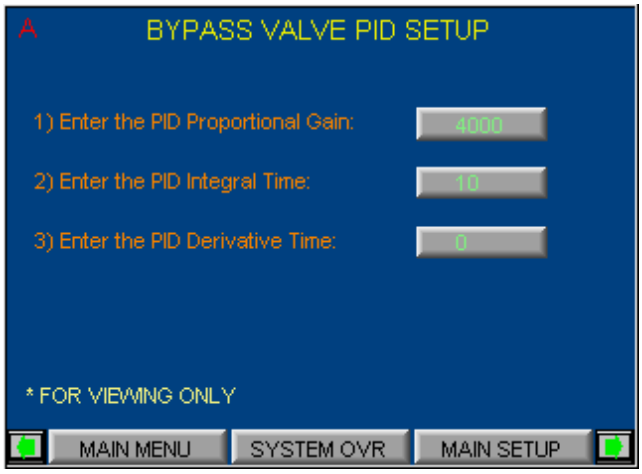
3.4.2 BOILER PID SETUP



1. Press bottom right navigation button from "BOILER SETUP" to bring up this screen, in order to set the Proportional, Integral and Derivative gains to be used for controlling boiler
2. Enter a proportional gain. Increasing the value will slow down the speed reaction to a system step change. Decreasing the value will increase the speed reaction to a system step change
3. Enter the Integral time gain. Increasing the value will slow down the speed reaction to a system step change. Decreasing the value will increase the speed reaction to a system step change
4. Enter the D derivative time. Increasing the value will increase the speed reaction to a system step change. Decreasing the value will decrease the speed reaction to a system step change
5. Press "Save" button to save changed values to the system factory defaults, press "Restore" button to retrieve pump PID setup value from the system factory defaults
6. Touch the buttons on the menu at the bottom to bring up the desired screen

NOTE: The D gain is rarely used in HVAC applications; this parameter is used only when the changes in the controlled variable are rapid

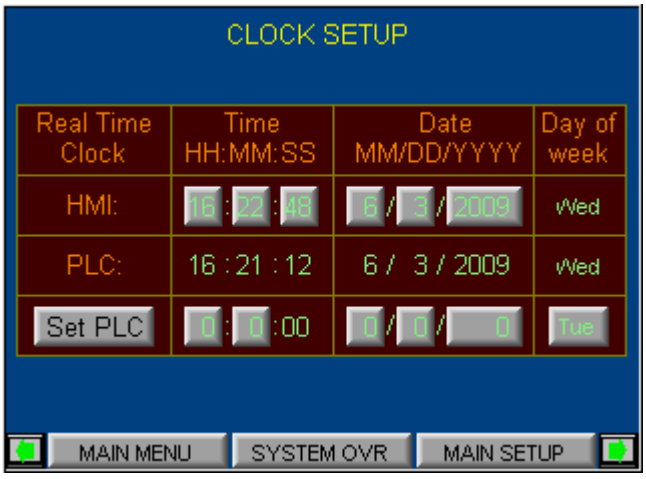
3.4.3 BYPASS PID SETUP



1. Press bottom right navigation button from "BOILER SETUP" to bring up this screen, in order to set the Proportional, Integral and Derivative gains to be used for controlling bypass valve
2. Enter a proportional gain. Increasing the value will slow down the speed reaction to a system step change. Decreasing the value will increase the speed reaction to a system step change
3. Enter the Integral time gain. Increasing the value will slow down the speed reaction to a system step change. Decreasing the value will increase the speed reaction to a system step change
4. Enter the D derivative time. Increasing the value will increase the speed reaction to a system step change. Decreasing the value will decrease the speed reaction to a system step change

NOTE: The D gain is rarely used in HVAC applications; this parameter is used only when the changes in the controlled variable are rapid

3.4.4 CLOCK SETUP



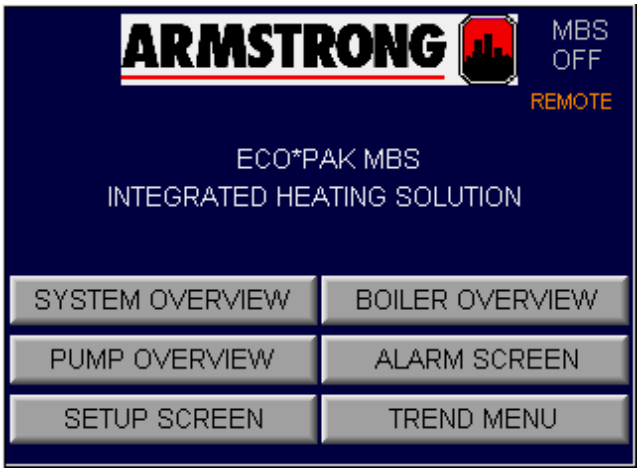
1. From the “LEVEL 2 MAIN SETUP” press “Clock Setup” button to call up this screen to adjust the time in the HMI and the time in the PLC
2. The HMI time and date can be adjusted by pressing the individual hour, minute, second, month, day, year box and entering the corresponding value. The day of the week will be changed automatically
3. The system (PLC) time and date can be adjusted by pressing the individual hour, minute, month, day, year and day of the week box and entering the corresponding value
4. Press “Set PLC” button to write the displayed time and date to system
5. Touch the buttons on the menu at the bottom to bring up the desired screen

SYSTEM START-UP PROCEDURE

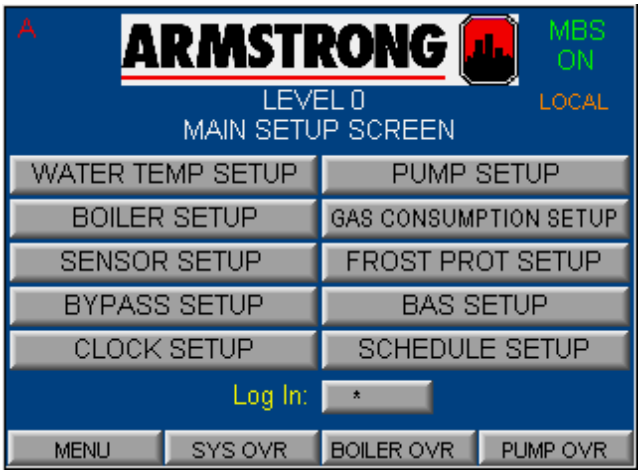
1. Ensure that the proper power supply is connected to the ECO*PAK MBS™ as per specification

2. Turn on the main power disconnect on the door of ECO*PAK MBS™ controller

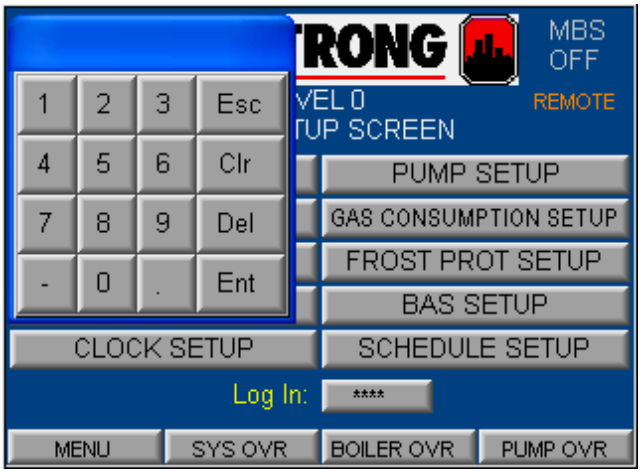
3. Touch the ‘SETUP SCREEN’ button in the main menu screen



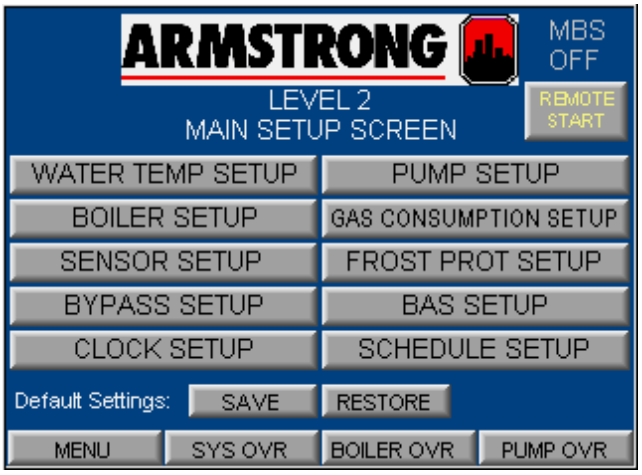
4. The screen changes to ‘LEVEL 0 MAIN SETUP SCREEN’. Press the button beside the text of ‘Log In:’



5. A keypad pops up. Touch the level 1 or level 2 password, then press ‘Ent’

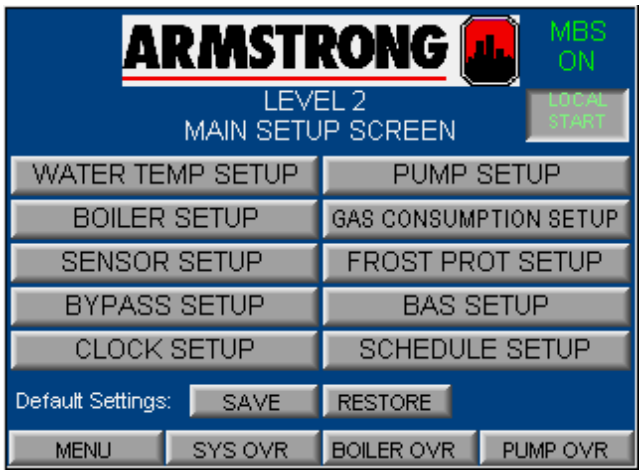


6. The screen changes to ‘LEVEL 1 MAIN SETUP SCREEN’ or ‘LEVEL 2 MAIN SETUP SCREEN’. Press the button on the top-right corner indicated as ‘REMOTE START’

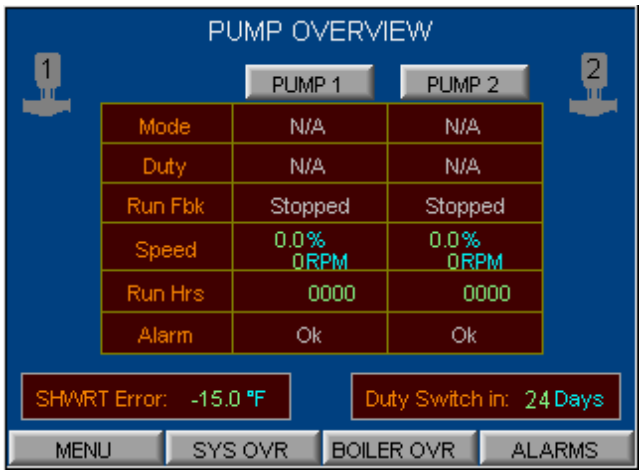


7. A pop-up window displays. Press the button indicated as ‘Remote’ and the button will show as ‘Local’. Close the window by touching the crossing mark button

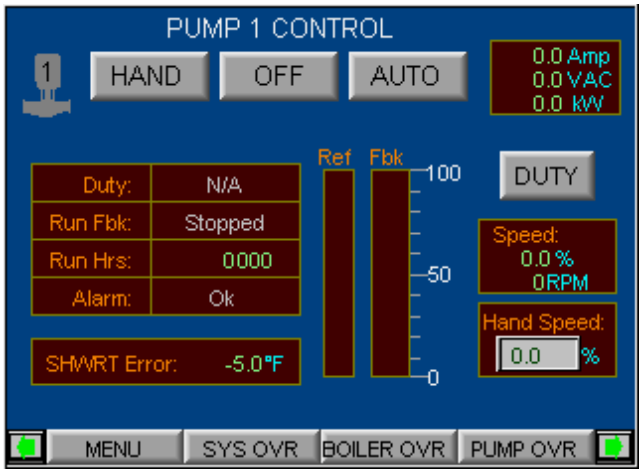
8. The screen changes back to ‘LEVEL 2 SETUP SCREEN’. The top-right corner displays ‘MBS ON’. Press the ‘PUMP OVR’ button.



9. The screen changes to ‘PUMP OVERVIEW’. Press ‘PUMP 1’ button

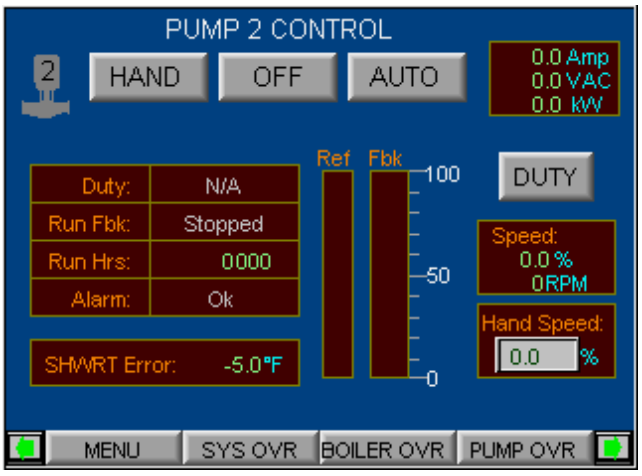


10. The screen changes to ‘PUMP 1 CONTROL’. Press ‘AUTO’ button. Press the green right arrow button on the bottom-right corner, The screen changes to ‘PUMP OVERVIEW’ again

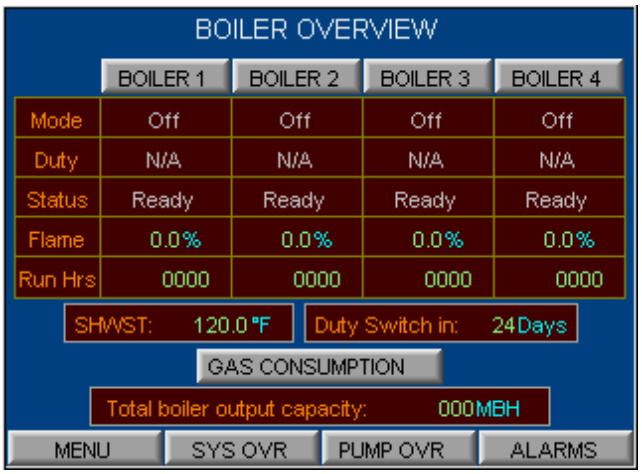


ARMSTRONG

11. The screen changes to ‘PUMP 2 CONTROL’. Press ‘AUTO’ button. Press ‘BOILER OVR’ button



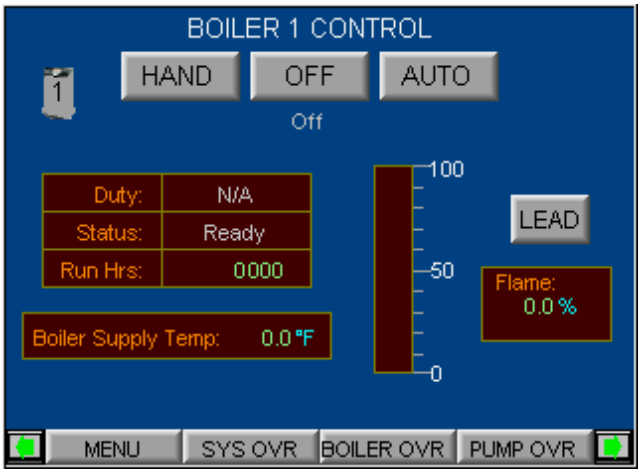
12. The screen changes to ‘BOILER OVERVIEW. Press ‘BOILER 1’ button



13. The screen changes to ‘BOILER 1 CONTROL’. Press ‘AUTO’ button. Press the green right arrow button on the bottom-right corner. The screen changes to ‘BOILER 2 CONTROL’ again

14. Repeat the step 13. Set all the boilers in ‘AUTO’

15. The ECO*PAK MBS™ will start up automatically



S. A. Armstrong Limited
23 Bertrand Avenue
Toronto, Ontario
Canada, M1L 2P3
T: (416) 755-2291
F: (416) 759-9101

Armstrong Pumps Inc.
93 East Avenue
North Tonawanda, New York
U.S.A. 14120-6594
T: (716) 693-8813
F: (716) 693-8970

Armstrong Holden Brooke Pullen Ltd.
Wenlock Way
Manchester
United Kingdom, M12 5JL
T: +44 (0) 161 223 2223
F: +44 (0) 161 220 9660