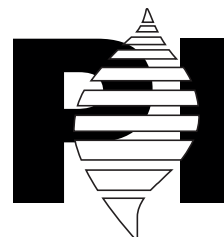


Feedwater Center

JC-FWC-XX



Pump Sequencing and
Modulating Control System
Installation and Operation

1-4 Feedwater Pumps, 0-3
Transfer Pumps, Lead/Lag
Controller used in Steam ap-
plications:

5/06/2009

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"Smart" Pump Sequencing

- Pump Speed demand based Start-Stop
- Header Pressure based Start-Stop
- Lead-Lag Sequence
- Field Adjustable Parameters

INTRODUCTION

This manual is intended to describe the installation, operation and troubleshooting of a Feedwater Center.

This manual is intended to be used by operators, plant engineers and service engineers.

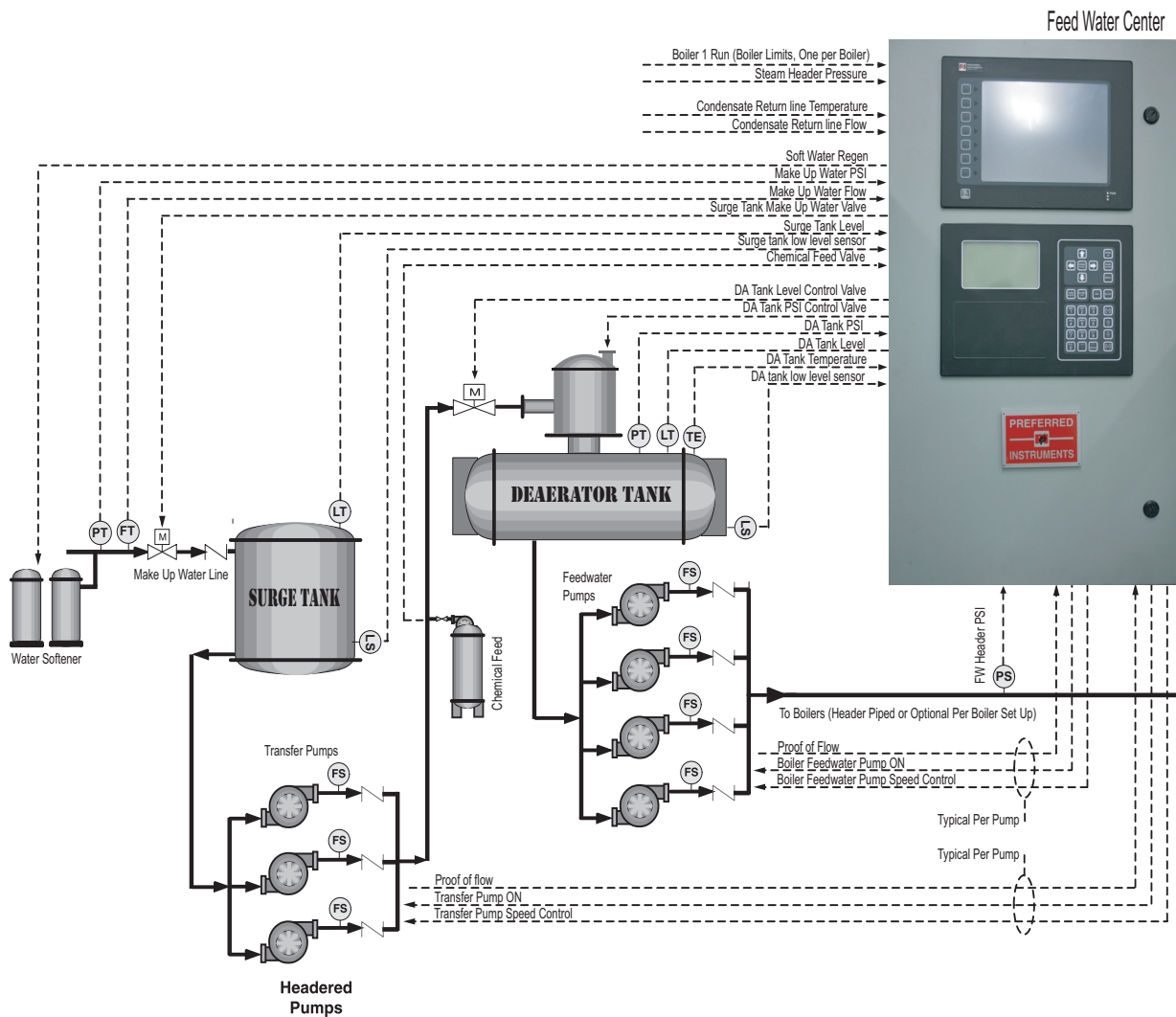
As many features included in the Preferred Instruments Feedwater Center are field selectable, not all features described may be used.

Each model has certain features available. Look at the model specific Quick Start Guide for more details.

SYSTEM OVERVIEW

FEEDWATER CENTER MODEL JC-FWC-FC

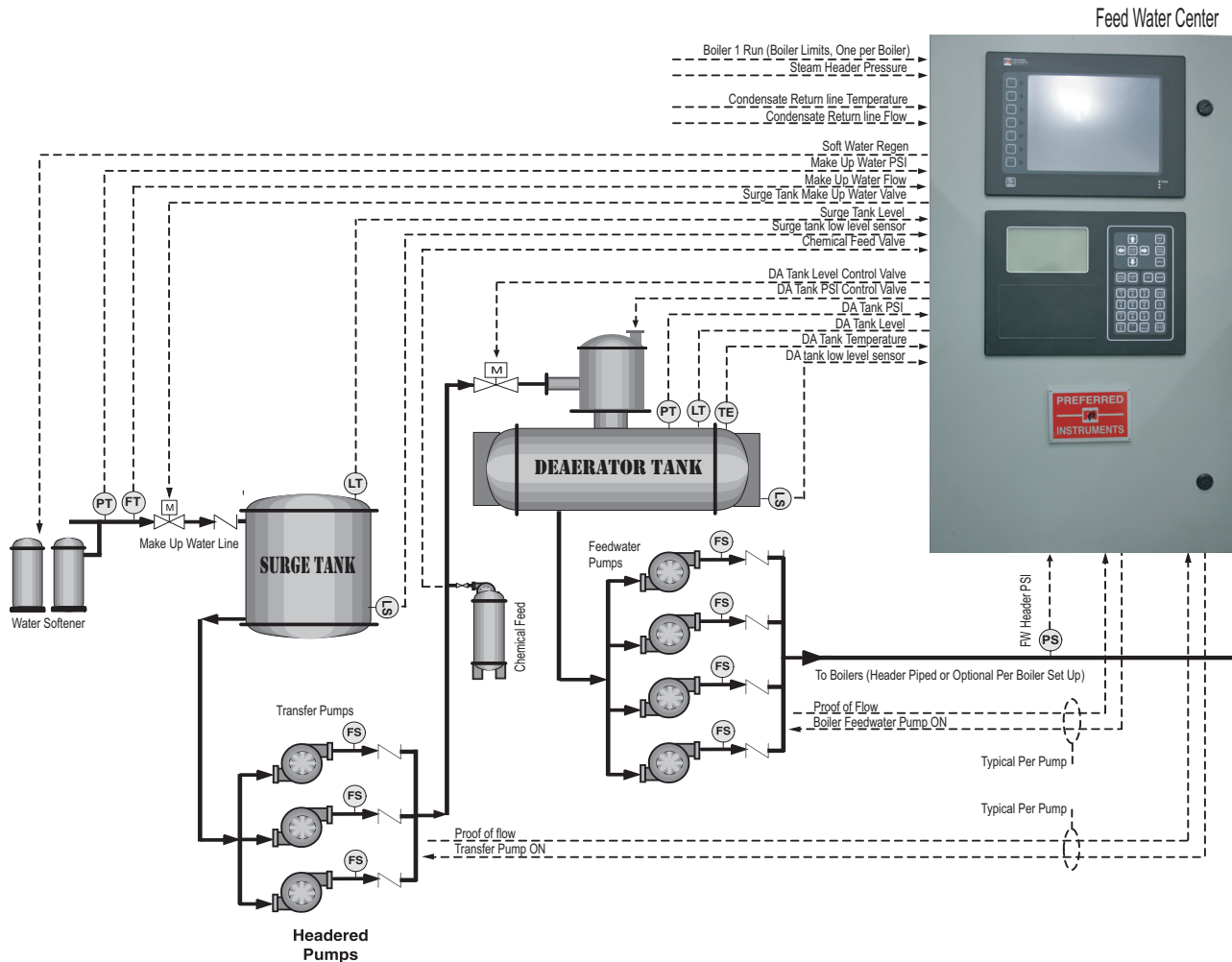
4 STEAM BOILERS, 3 HEADERED TRANSFER PUMPS AND 4 HEADERED FEEDWATER PUMPS



SYSTEM OVERVIEW

FEEDWATER CENTER MODEL JC-FWC-NV

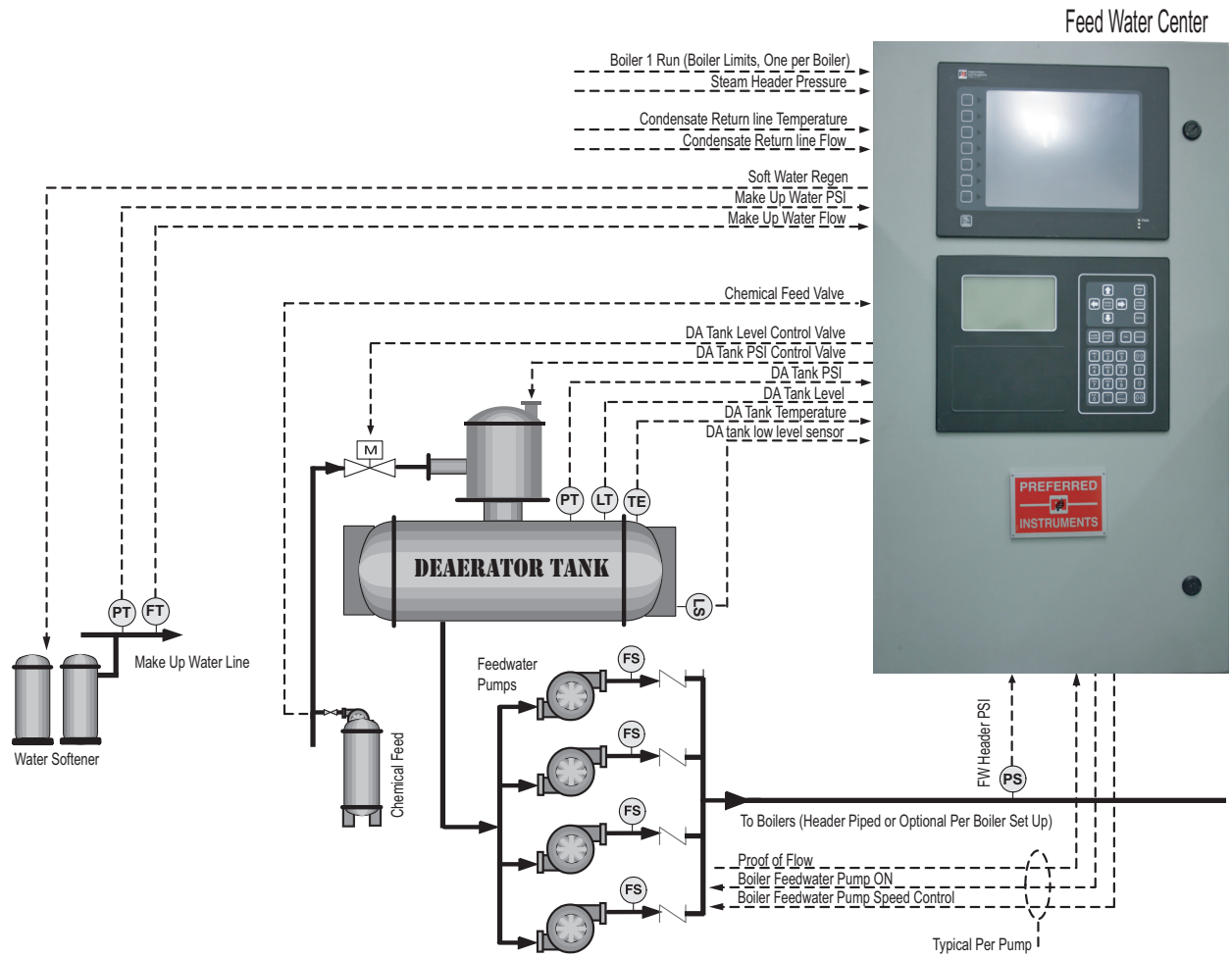
4 STEAM BOILERS, 3 HEADERED TRANSFER PUMPS AND 4 HEADERED FEEDWATER PUMPS



The NV version has all of the features of the FC version, except the Auto/Manual 0-100% outputs for the Feedwater and Transfer Pump sets, This is to be used when there are no VSD systems for the Pumps.

SYSTEM OVERVIEW

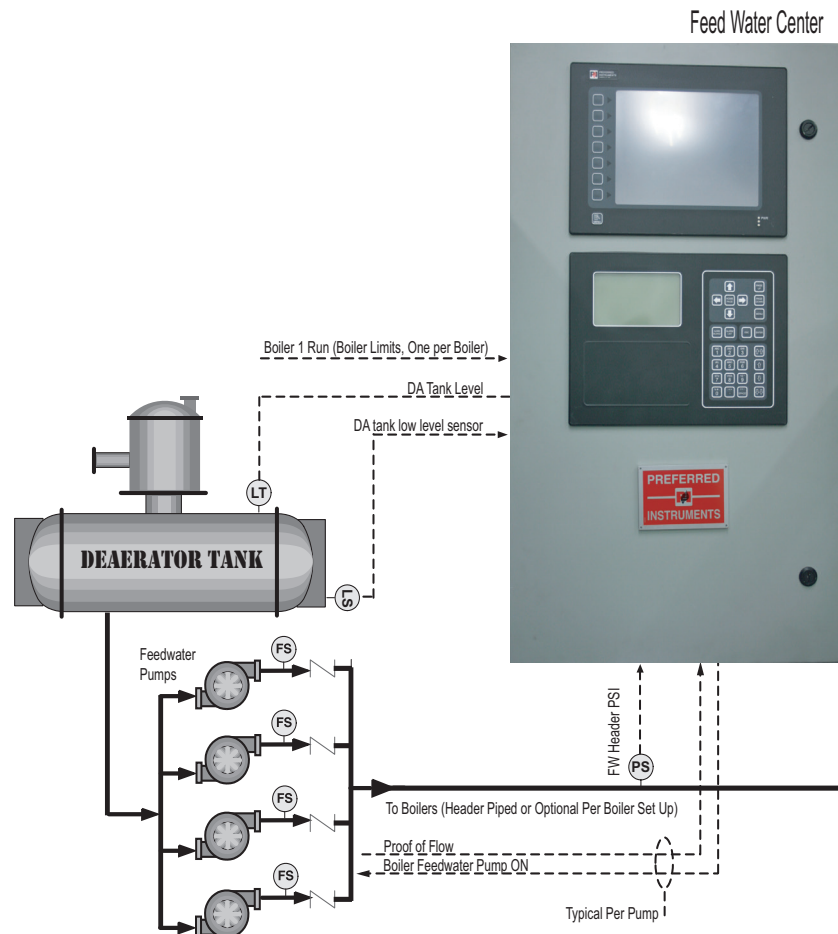
FEEDWATER CENTER MODEL JC-FWC-NS 4 STEAM BOILERS, 4 HEADERED FEEDWATER PUMPS



The NS version does not have any Surge Tank or Transfer Pump control, this is for a system that uses a Deaerator tank only.

SYSTEM OVERVIEW

FEEDWATER CENTER MODEL JC-FWC-NVS 4 STEAM BOILERS, 4 HEADERED FEEDWATER PUMPS



The NVS version has only Deaerator tank control for up to 4 boiler feed water pumps.

SYSTEM OVERVIEW

The Feedwater Center is a complete pump control system designed to increase efficiency and help extend pump life.

FEATURES

“SMART” PUMP SEQUENCING

In Headered mode, pumps are automatically sequenced on/off to ensure that the number of pumps in service meets the demand. If any pump fails to start when called, the Feedwater Center immediately starts another pump to replace the faulted pump. The operator may manually select the lead pump or allow the lead pump to rotate automatically. Additionally, the total number of pumps in service may be set automatically or manually as selected by the operator or all pumps may be shutdown by a building automation system (BAS) 'Enable/Disable' contact input.

EASY INSTALLATION / EASY SETUP

The Feedwater Center integrates Modbus communications, relays, 24Vdc power supplies, and multifunction display into a single wall mountable controller. Simple menu style fill in the blanks setup displays minimize commissioning and training time.

LCD GRAPHIC DISPLAY

LCD graphic display brings plant overviews, alarms and event status and setup displays right to the operator's touch.

ALARMS / EVENT SUMMARY

Up to 200 alarms, system events and operator actions are listed in “first in first out” order with a time/date stamp. Alarms include system fault, pump failure and both over and under pressure conditions.

HARD MANUAL BACKUP

Hard-wired control switches and dials provide simple manual control for easy troubleshooting and service. Each pump has an individual speed demand bar graph, a manual speed demand output knob, and an Auto/Manual switch.

MODBUS COMMUNICATION INTERFACE

A factory-configured RS485 MODBUS interface is available for building automation or SCADA system monitoring and control.

OPTIONS

HISTORICAL TRENDS (OPTION P/N 190604)

Easy to use four pen charts allow quick steam system assessment and maintenance monitoring, such as header temperature and pump operating hour trends.

TELEPHONE MODEM (OPTION P/N 190603)

The modem allows the Feedwater Center to dial out to an

alphanumeric pager and allows a technician to dial in to the Feedwater Center to view all Feedwater Center displays and make tuning adjustments.

OPTIONAL FEATURES

The Feedwater Center has many features that can be added or removed according to your needs. Each model offers a different feature set, consult the quick start guide for your models specifications. This Controller was designed to accommodate the needs of any 1-4 pump system. It is able to run with a surge and a deaerator tank (or one of each, or none). It accommodates 0-3 transfer pumps and 0-4 feed water pumps. The Feed Water Center can be used in Headered boiler applications as well as individual feed water pumps to each boiler. The Feed Water Center can have all of these following sensors;

Temperature:

Condensate Return line

DA tank

Pressure:

DA tank

Feedwater Header

Steam Header

Make Up Water

Level:

1 DA Tank

1 Surge Tank

Flow:

Make Up Water Flow

Condensate Return Flow

As well as controlling the speeds of up to 3 transfer pumps and 4 boiler feed pumps. The Feedwater center controls a number of valves in order to maintain levels/pressures/flow rates within the system. The following valves can be maintained.

DA level valve

DA PSI Control Valve

Surge Tank Make Up Water Valve

Chemical Feed Pump Valve

All of these options are added/removed from the program simply by going through the initial setup page and telling the Feedwater Center what is installed and what is not.

The Controller version number can be found in the Parameter setup up - 2 page (Menu -> 7. initial setup parameters -> 2. parameters setup - page 2) this indicates the current version that is being used.

SYSTEM OVERVIEW

Feedwater Center

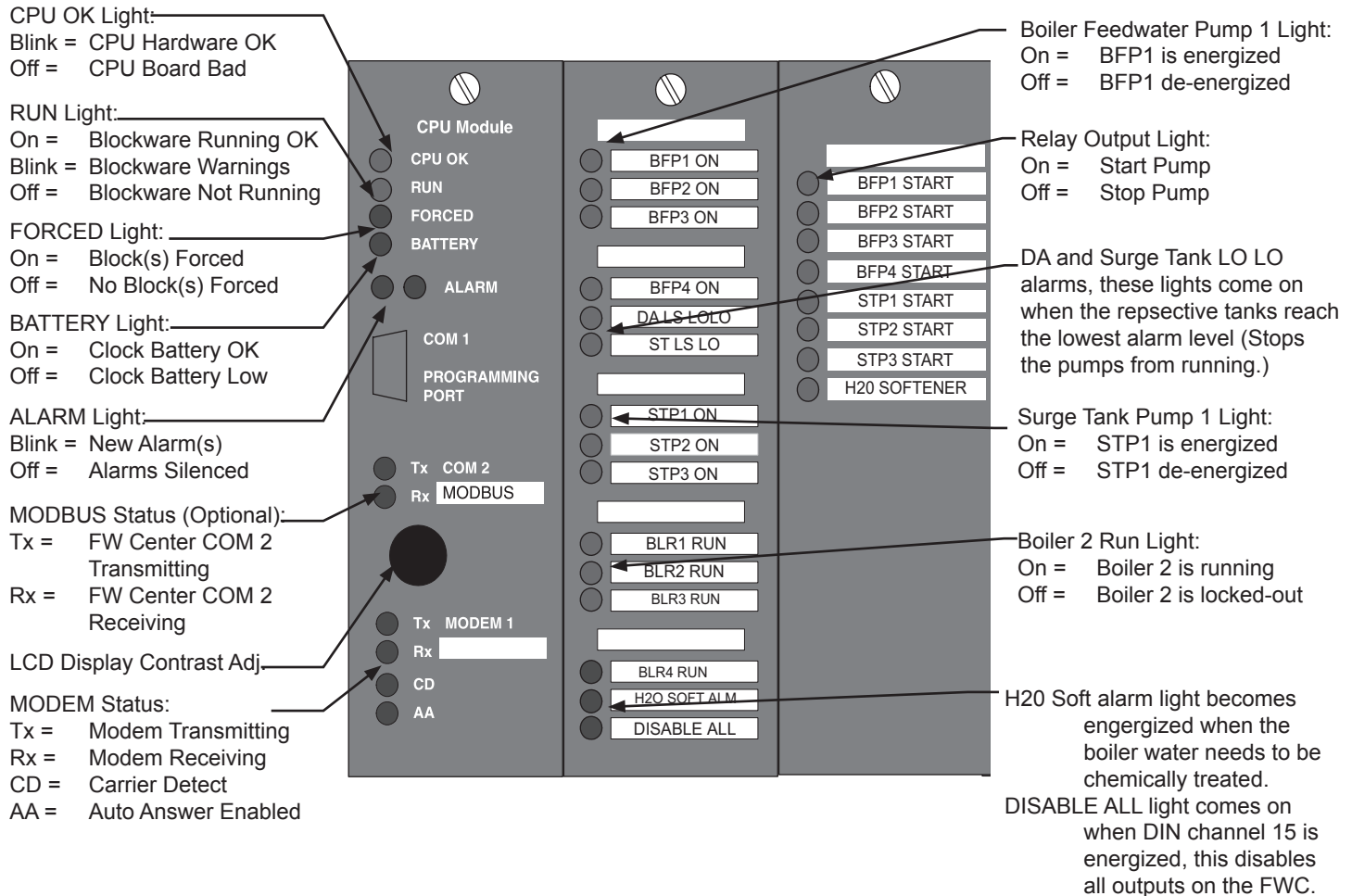


(Shown with Optional 10" Touch Screen Installed)



Feedwater Center front view with door open

FRONT PANEL LAYOUT



CPU OK LIGHT

The CPU OK light blinks when power is on and there are no hardware faults.

RUN LIGHT

The RUN light indicates the health of the blockware control logic. The RUN light should be active continuously. This means that there is blockware loaded into the Feedwater Center memory, and there were no errors found.

If the RUN light is either blinking or off, a technician should be called to determine the cause of the blockware problem. The technician will need a laptop or desktop computer with PWC_Edit software in order to diagnose the problem and re-load the blockware into the Feedwater Center.

FORCED LIGHT

The block(s) FORCED feature has not been implemented.

BATTERY LIGHT

The BATTERY light is on when the time/date clock backup

battery voltage is ok. This battery is only used to power the time of day and date clock chip when the 120 Vac power is removed from the Feedwater Center. The clock battery has a life of approximately 8 years (with 120 Vac applied).

The battery is located under the plastic guard on the lower door.

Blockware is stored in non-volatile flash memory. This battery is not used to retain the blockware memory.

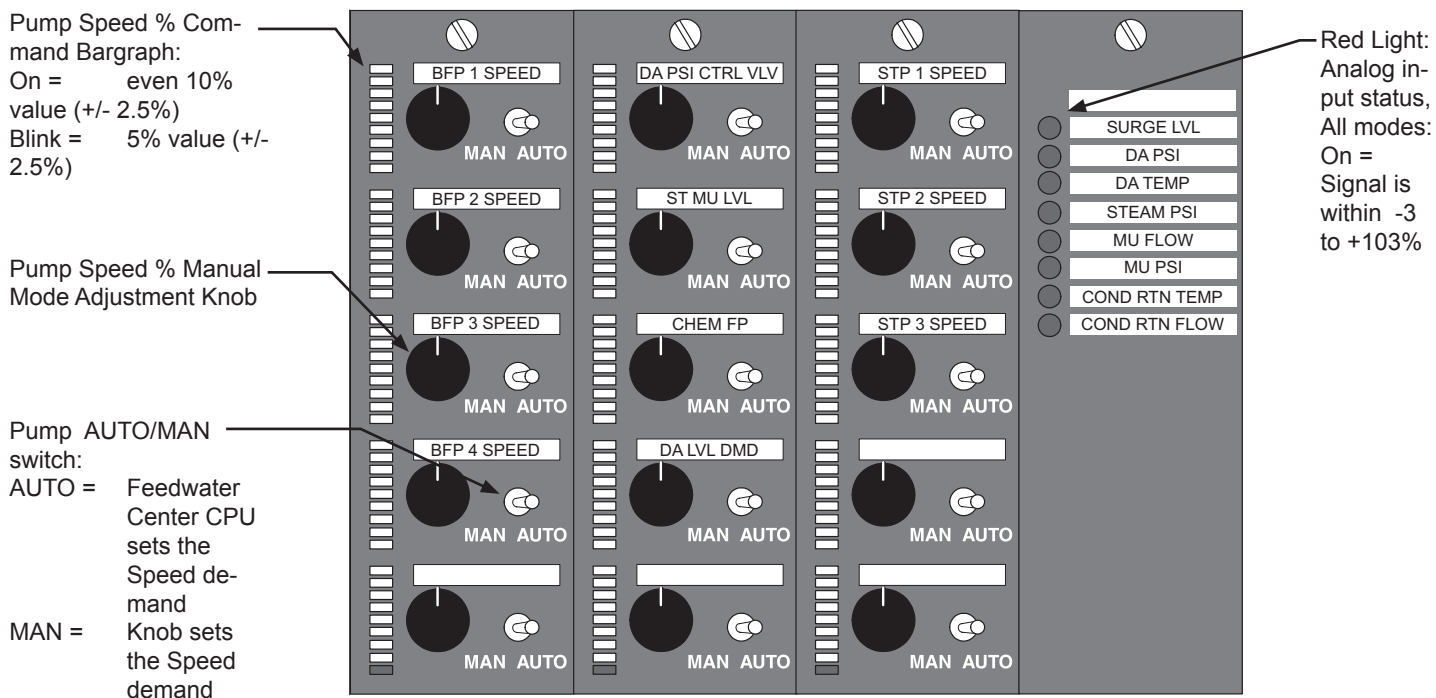
ALARM LIGHT

The ALARM lights blink after a new alarm occurs, and will continue to blink until the ALARM SILENCE button on the keypad is pressed.

The home page display screen lists the three most recent alarms. Press the ALARM LIST button to view a complete alarm, event, and operator action history. Press the HOME PAGE button to exit the alarm history screens.

FRONT PANEL

FRONT PANEL LAYOUT



Note:

The operator is responsible for the proper operation of the pumps in the ON, OFF, MAN or LOCAL positions.

Normal operating settings are:

- AUTO All pump MAN-AUTO modulation output switches. The MAN-AUTO switch bypasses the Feedwater Center control logic in the MAN position.
- AUTO 'PMP QTY' 'soft button' on the home page and transfer pump page.
- AUTO 'SPEED%' 'soft button' on the home page.

DISPLAY NAVIGATION

Pressing HOME PAGE, MENU or ALARM LIST buttons will immediately change the screen to the respective screen, no matter what is currently being displayed.

HOME PAGE

Pressing the HOME PAGE button changes the LCD display to the primary operating screen. It also puts the display into the PAGE UP/PAGE DOWN loop mode.

SCREEN LOOP

Pressing PAGE UP or PAGE DOWN causes the display to cycle through all of the screens in the home page group, as shown in the figure. There can be up to 15 screens in the home page group (however, typically there are less than 5).

Note:
Screens in this section are typical.
Actual screens may vary according
to model.



Press the HOME PAGE button to display the feed-water system overview from any other page.

FEEDWATER	HEADER: 127 PSI	BOILER FEED PUMPS
SETPOINT: 121	LEAD PMP: 1 ROTATE	
STM PSI: 106	PMP QTY: 1 MANUAL	
	SPEED: 8 MANUAL	
FW PUMP: 1	2	3
COMMAND: START	STOP	STOP
FAULT: 8	0	0
SPEED: 8	0	0
FAULT <RESET>		
11:51 05/07 DA LEVEL LOW		ALARM



These buttons cause the display to cycle through all of the screens in the HOME PAGE group



FEEDWATER	HEADER: 127 PSI	BOILER FEED PUMPS
SETPOINT: 121	LEAD PMP: 1 ROTATE	
STM PSI: 106	PMP QTY: 1 MANUAL	
	SPEED: 8 MANUAL	
FW PUMP: 1	2	3
COMMAND: START	STOP	STOP
FAULT: 8	0	0
SPEED: 8	0	0
FAULT <RESET>		
11:51 05/07 DA LEVEL LOW		ALARM

SURGE TANK	LEVEL: 47.5 "WC	
MAKEUP VALVE%: 100	AUTO	
COND RETURN TEMP: 162.8	F	
COND RETURN FLOW: 31.0	GPM	
MAKEUP FLOW: 11		
MAKEUP PRESSURE: 4.2		
09:04 05/08 DA LEVEL LOW		ALARM

DEAERATOR	LEVEL: 52.5 "WC	TRANSFER PUMPS
SETPOINT: 54.1	LEAD PMP: 1 ROTATE	
	PMP QTY: 2 AUTO	
	PMP DEMAND: 30 AUTO	
TRANSFER PUMP: 1	2	3
COMMAND: START	START	STOP
FAULT: 30	30	0
SPEED HZ: 30	30	0
09:04 05/08 DA LEVEL LOW		ALARM

Etc...

DISPLAY NAVIGATION

Press the ALARM LIST Button to view the most recent 16 alarms and events.



10:20	05/08	TRANSFER PUMP 1	OFF
10:20	05/08	BLR FEED PUMP 4	OFF
10:20	05/08	BLR FEED PUMP 3	OFF
10:20	05/08	BLR FEED PUMP 2	OFF
10:20	05/08	BLR FEED PUMP 1	OFF
10:18	05/08	DA LEVEL LOW	ALARM
10:13	05/08	FW HDR PRESS LOW	ALARM
09:04	05/08	TRANSFER PUMP2	ON
09:04	05/08	TRANSFER PUMP1	ON
09:04	05/08	BLR FEED PUMP4	ON
09:04	05/08	BLR FEED PUMP3	ON
09:04	05/08	BLR FEED PUMP2	ON
09:04	05/08	BLR FEED PUMP1	ON
09:04	05/08	BLR FEED PUMP QTY	MANUAL
09:04	05/08	DA LEVEL HIGH	ALARM
09:04	05/08	FW PRESSURE CONTROL	MANUAL

Press the PAGE UP Button to view the more recent alarms and events.



Press the PAGE DOWN Button to view the next 16 older alarms and events.



Press the ALARM SILENCE after an alarm occurs to silence any optional external alarm bell and turn off blinking alarm lights on the CPU board.



FEEDWATER	127	PSI	BOILER FEED PUMPS
HEADER:	121		LEAD PMP: 1 ROTATE
SETPOINT:	121		PMP QTY: 1 MANUAL
STM PSI:	106		SPEED : 8 MANUAL
FW PUMP:	1	2	3
COMMAND:	START	STOP	STOP
FAULT:			
SPEED:	8	0	0
FAULT <RESET>			
11:51	05/07	DA LEVEL LOW	ALARM

Home Screen includes an ALARM WINDOW

ALARM LIST

The Feedwater Center stores the last 200 alarms or events that have occurred in a time and date stamped memory. When the memory is full, the oldest alarm or event is erased when a new alarm or event occurs.

Press either HOME PAGE or MENU to exit the ALARM LIST screens.

ALARMS VS. EVENTS

Alarms appear on the ALARM LIST screens, blink the alarm lights, sound optional external bells, and appear in the alarm windows of the home page group screens. The alarm status is either ALARM or CLEAR, and is indented one space for easy recognition.

Events appear on the ALARM LIST screens. Events do not blink the ALARM lights, sound optional external bells, or appear in the alarm windows of the home page group screens. The events track system operation and help speed troubleshooting and system tuning.

ALARM SILENCE

Each new alarm causes the alarm lights to blink. Press the ALARM SILENCE button to turn off the alarm lights.

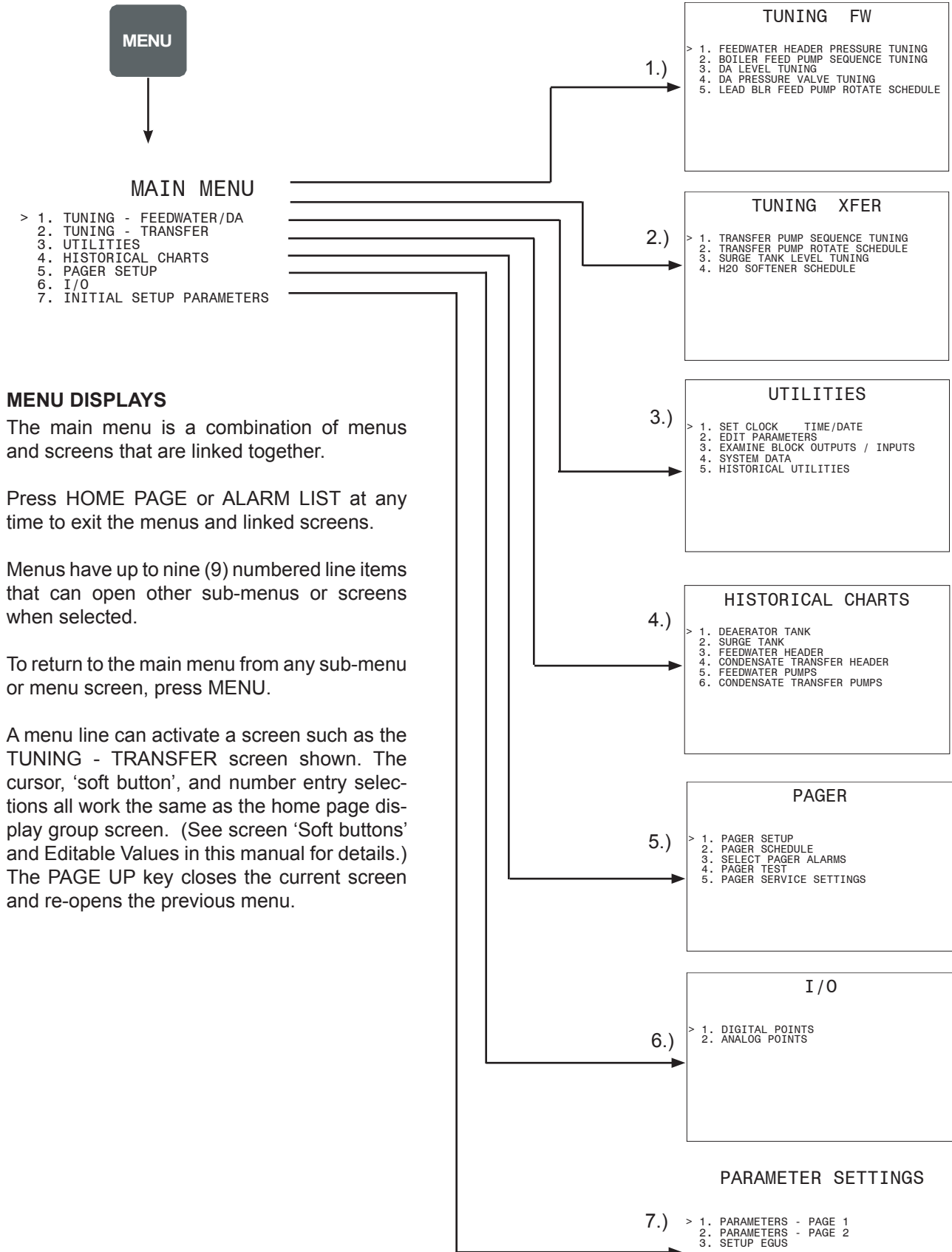
ALARM WINDOW

The home page includes a three-line alarm window at the bottom of the screen that shows the three most recent alarms. Events are not shown here.

Alarms are listed with the most recent on the top, and the oldest on the bottom. If more than 3 alarms are active, the older alarms are removed from the bottom of the alarm window.

Alarms that return to normal are automatically deleted from the alarm window, and the next oldest active alarm is added back to the alarm window.

DISPLAY NAVIGATION



MENU DISPLAYS

The main menu is a combination of menus and screens that are linked together.

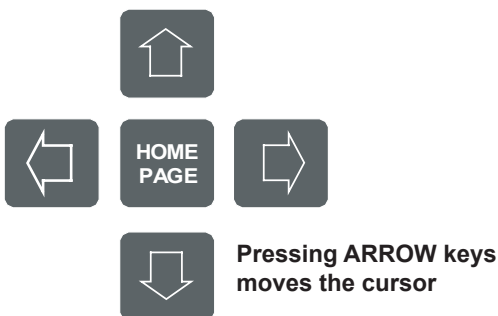
Press HOME PAGE or ALARM LIST at any time to exit the menus and linked screens.

Menus have up to nine (9) numbered line items that can open other sub-menus or screens when selected.

To return to the main menu from any sub-menu or menu screen, press MENU.

A menu line can activate a screen such as the TUNING - TRANSFER screen shown. The cursor, 'soft button', and number entry selections all work the same as the home page display group screen. (See screen 'Soft buttons' and Editable Values in this manual for details.) The PAGE UP key closes the current screen and re-opens the previous menu.

'SOFT BUTTONS' AND 'EDITABLE NUMBERS'



EDITABLE ITEMS

Many screens have values and/or 'soft buttons' that the operator can change. These are called editable items.

The cursor is not visible initially. The operator must press any one of the cursor arrow keys (up, right, down, left) to make the cursor visible. If no key is pressed on the keyboard for ten seconds, the cursor disappears again.

The right and down arrows both move the cursor from the upper left corner down towards the lower right corner. For these keys, the cursor moves left to right across each line, then moves down to the next line, and then left to right again.

The left and up arrows both move the cursor from the lower right corner towards the upper left corner. For these keys, the cursor moves right to left across each line, then moves up to the next line, and then right to left again.

When the cursor disappears, it remains in the same position. The first press of an arrow key makes it visible at its last location; the second press moves the cursor.

MAIN MENU

- > 1. TUNING - FEEDWATER/DA
- 2. TUNING - TRANSFER
- 3. UTILITIES
- 4. HISTORICAL CHARTS
- 5. PAGER SETUP
- 6. I/O
- 7. INITIAL SETUP PARAMETERS

Shaded items are 'editable numbers' or 'soft buttons.' To change a 'soft button', move the cursor to the 'soft button' to highlight it, then press the ENTER key. The display text changes to confirm the key press.

'SOFT BUTTONS'

A 'soft button' is text on the screen that functions as an 'on/off' push-button. The figure to the right highlights all editable screen items (on real screens, only one item is highlighted at a time). ROTATE, AUTO and AUTO are all 'soft buttons.'

To change a 'soft button', move the cursor to the 'soft button' (to highlight it), then press the ENTER key. The displayed text changes to confirm the key press.

'SOFT BUTTONS' AND 'EDITABLE NUMBERS'

EDITABLE NUMBERS

Numbers that the cursor highlights are changed via the number keypad or the arrows to the right of the number keys.

To change a number, move the cursor to the number (to highlight it), type in the value with the numeric keys, and then press ENTER. The displayed number changes to a rotating bar character while it is being saved to confirm the entry.

Alternatively, the up and down arrows by the number keys can be used to change the displayed value, and then press ENTER. The single up and single down keys change the right hand digit, and the double up and double down keys change the next digit to the left. (i.e. If the value displayed is 215, the single up arrow changes value to 216, the double up arrow changes the value to 225.)

If the rotating bar character does not appear after pressing ENTER, then the Feedwater Center blockware logic is temporarily preventing the operator from changing the value, or the ENTER key was not pressed hard enough (try again).

The following editable values can only be changed when the 'soft button' is in MANUAL:

The LEAD PMP number can only be changed when the ROTATE / MANUAL 'soft button' is in MANUAL.

The SET POINT value can only be changed when the RESET / MANUAL 'soft button' is in MANUAL.

The PMP QTY value can only be changed when the AUTO / MANUAL 'soft button' is in MANUAL.

The SPEED DEMAND % value can only be changed when the AUTO / MANUAL 'soft button' is in MANUAL.

To change a number, move the cursor to the number to highlight it, type in the value, with the numeric keys, and press ENTER.



Use this key for a decimal place.



Use this key for a minus sign



If you notice a mistake and do not want to proceed with the change, press the ESC key (instead of the ENTER key).



Use either of these keys to **increase** the display value and then press ENTER.



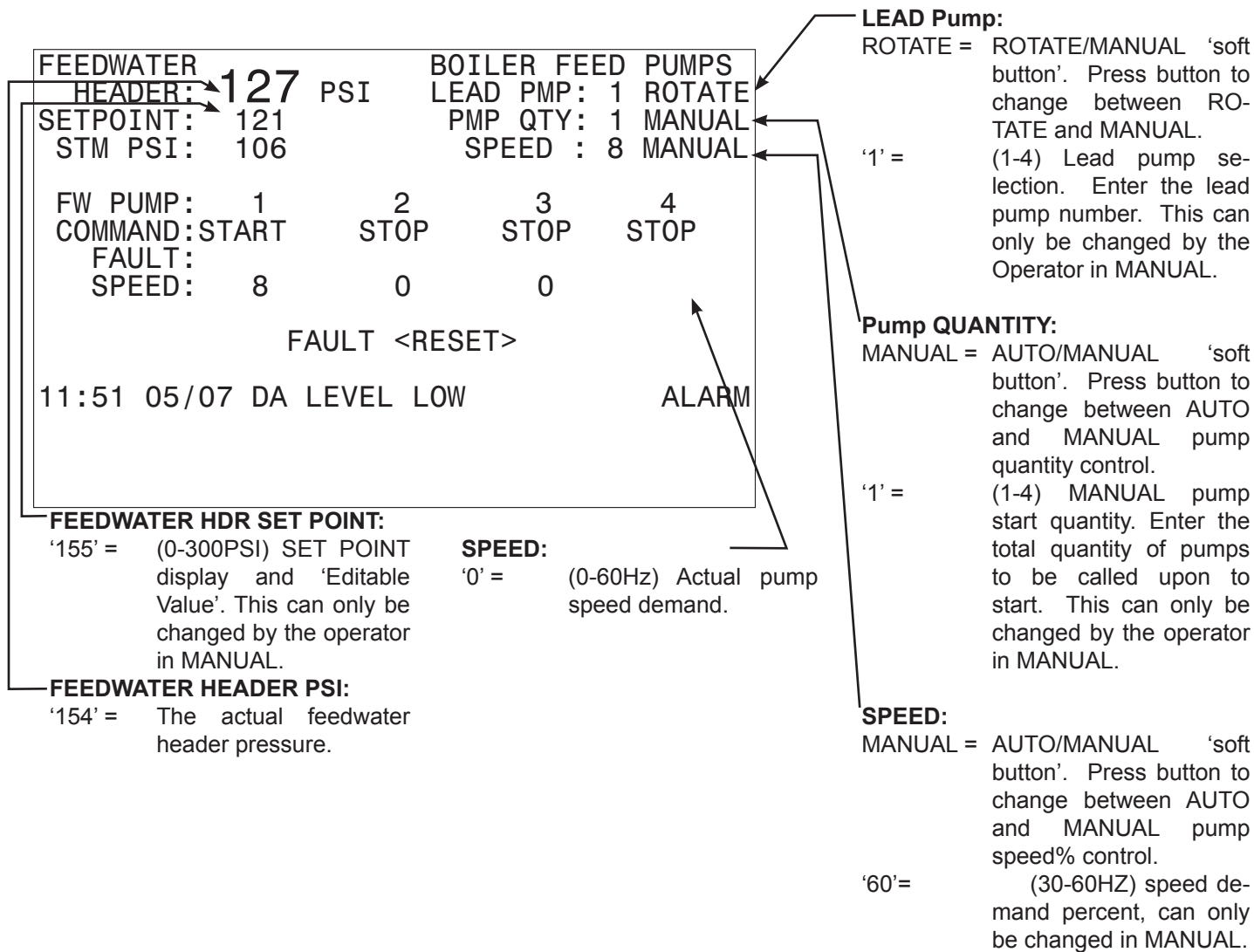
Use either of these keys to **decrease** the display value and then press ENTER.



OPERATION

HOME PAGE

* ALL MODELS



SET POINT

The supply header temperature set point is adjustable.

PUMP SPEED DEMAND %

This is the speed rate demand for all pumps in auto modulation and in operation. When in AUTO the Feedwater Center determines the speed %. When in MANUAL the operator adjusts the speed % manually and the Feedwater Center will not change the speed.

LEAD PUMP

The lead pump is the first to be started and the last to be stopped. When ROTATE is selected the Feedwater Center automatically changes the lead pump using the Lead Runtime in a circular pattern: 1,2,3,4,1,2,3,4.... When in MANUAL the operator selects the lead pump and the Feedwater Center will not change the lead pump.

PUMP QUANTITY

The pump start quantity may either be selected by the operator or selected automatically by the Feedwater Center. When in AUTO the Feedwater Center determines the quantity of pumps required to be started. In MANUAL, the pump start quantity will not change in response to header temperature or demand. Manual pump quantity mode can be used to force all pumps off-line (for summer), or to synchronize the Feedwater Center to the actual number of pumps running. Manual quantity mode overrides the BAS DISABLE contact.

Pump:

Static Text, Pump Reference Number.

COMMAND INDICATION:

START = Feedwater Center is calling for this pump to START.

STOP = Feedwater Center is not running that current pump.

FAULT INDICATION:

FAULT = FAULT means any one of the following:

- 1) The pump is tripped,
- 2) The Feedwater Center toggle switch is not in AUTO, or
- 3) The pump running input was not made after the Feedwater Center commanded a START.

FEEDWATER				BOILER FEED PUMPS			
HEADER: 127 PSI				LEAD PMP: 1 ROTATE			
SETPOINT: 121				PMP QTY: 1 MANUAL			
STM PSI: 106				SPEED : 8 MANUAL			
FW PUMP: 1		2		3		4	
COMMAND: START		STOP		STOP		STOP	
FAULT:							
SPEED: 8		0		0			
FAULT <RESET>							
11:51 05/07 DA LEVEL LOW				ALARM			

ALARM WINDOW

The HOME screen includes a 3 line Alarm Window (one current alarm shown) at the bottom of the screen that shows the three most recent alarms. Events are not shown here.

FAULT <RESET>

The RESET is a 'soft button' this must be pressed in order to reset a pump fault. If a pump is faulted and RESET has not been pushed the feedwater center will not run the faulted pump until RESET is pushed.

DEAERATOR LEVEL PAGE

LEVEL SET POINT

The deaerator level set point is adjustable.

PRESSURE SET POINT

The deaerator pressure set point is adjustable.

DEAERATOR			
LEVEL:		27.5"	
→ SETPOINT:	30.0	DEMAND%:	100 AUTO
DEAERATOR			
PRESSURE:		16.4PSI	
→ SETPOINT:	15	CRTL VALVE%:	0 AUTO
DA TEMP:		171 F	
11:51 05/07 DA LEVEL LOW			ALARM

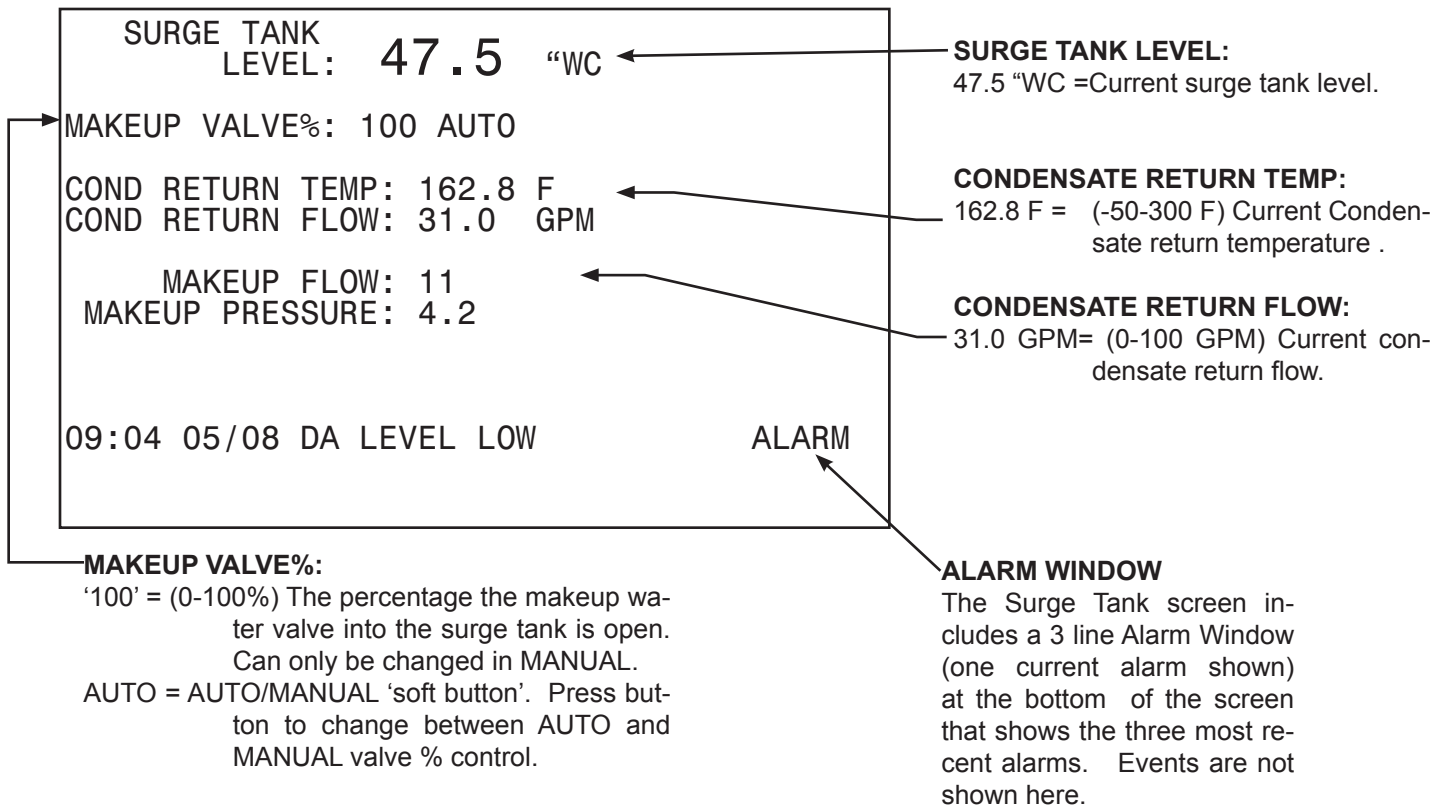
ALARM WINDOW

The HOME screen includes a 3 line Alarm Window (one current alarm shown) at the bottom of the screen that shows the three most recent alarms. Events are not shown here.

OPERATION

SURGE TANK PAGE

* JC-FWC-FC / JC-FWC--NV MODELS ONLY



MAKEUP VALVE%

If the surge tank has a make up water line, the feedwater center will automatically open the make up water valve enough to fill the surge tank if the level drops too low. During normal operation water that is lost can be replaced in the surge tank via a supply line of water. The supply line will have a valve that the feedwater center will control in order to keep the proper amount of water in the system.

* ALL MODELS

DEAERATOR TANK PAGE

DEAERATOR TANK LEVEL:

52.5 "WC =Current surge tank level.

PMP QTY:

MANUAL = AUTO/MANUAL 'soft button'. Press button to change between AUTO and MANUAL pump quantity control.
'2' = (1-3) MANUAL pump start quantity. Enter the total quantity of pumps to be called upon to start. This can only be changed by the operator in MANUAL.

Pump Number

Pump Command

START = Start pump
STOP = Stop Pump

SPEED = 30 = 30HZ VSD Signal (-FC/-NS models only)

DEAERATOR
LEVEL: 52.5 "WC
SETPOINT: 54.1
TRANSFER PUMPS
LEAD PMP: 1 ROTATE
PMP QTY: 2 AUTO
PMP DEMAND: 30 AUTO

TRANSFER
PUMP: 1 2 3
COMMAND: START START STOP
FAULT:
SPEED HZ: 30 30 0

09:04 05/08 DA LEVEL LOW

ALARM

PMP QTY:

AUTO = AUTO/MANUAL 'soft button'. Press button to change between AUTO and MANUAL pump quantity control.
'2' = (1-3) MANUAL pump start quantity. Enter the total quantity of pumps to be called upon to start. This can only be changed by the operator in MANUAL.

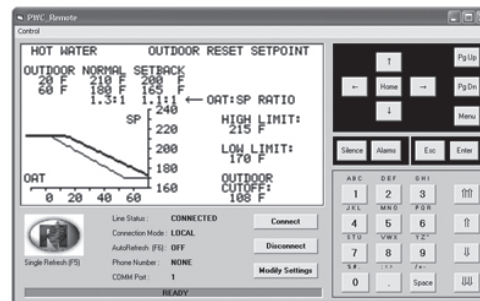
Pump Demand:

30 = 30% of pump speed (0-100%)

PWC REMOTE SOFTWARE

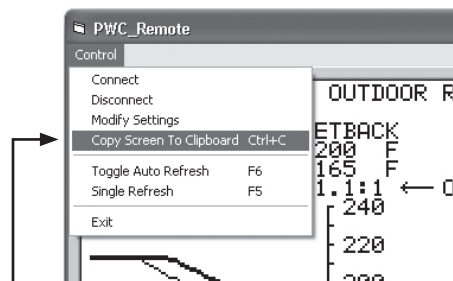
The PWC_Remote software allows a technician to dial into the Feedwater Center from a remote location using a standard analog phone line. Once connected, the Feedwater Center front panel buttons are completely accessible from the PWC_Remote software. This may be used to view current status, adjust tuning parameters, view historical data (with optional historical card) and acknowledge alarms by pressing alarm silence button.

The PWC_Remote software can be used to document historical and tuning data. While the desired screen is visible, press 'Copy Screen to Clipboard'. The page is place in the Windows clipboard. It can be pasted into a MS Word® or other document. Hard copies can be printed for records.



Telephone Connection Status

Remote Feedwater Center Keypad Functions same as actual Feedwater Center Keypad



Use 'Copy Screen to Clipboard' to document tuning parameters and Historical charts.

TELEPHONE MODEM

The Telephone Modem option allows the Feedwater Center to dial out to an alphanumeric pager and allows a technician to dial into the Feedwater Center to view all Feedwater Center displays & make tuning adjustments.

PAGING

Pages are triggered by alarms or events that have been defined through the Select Paging Alarms Screen. An example page looks like:

"02/14 02:30 NEW YORK NY Pump 1 FAULT".

The location and up to eight different pager numbers can be defined through the PAGER SETUP screen.

PAGER SETUP

Use the left cursor and right arrows to highlight the character location or telephone # and IDPIN # you want to edit. Use the number pad to enter the desired letter. Use the number pad to input letters and numbers. Pressing 1 will show the character "1" at the cursor position. Pressing 1 again will show the character "A", then "B", then "C" and then back to "1". Use a comma (4th push of the '0' button) to indicate a delay. Example: 9,18005555555.

Once you are satisfied with the entry, press the down arrow twice to highlight the SAVE RECORDS field. Press the ENTER button to save your changes. If you leave this screen without saving, your changes will be lost. Press PAGE UP or PAGE DOWN to change the current pager number and make any other changes.

PAGER TEST

Use this display to test a pager. Messages that appear under the title are also displayed in the alarm list.

Exiting this screen before the page completes will abort the page. If a page fails, check the alarm list for the specific reason.

PAGER SETUP

Location:
MAIN PLANT NEW YORK, NY

Pager# 1:	Telephone# 18005555555	ID/PIN# 1234567
--------------	---------------------------	--------------------

Test Pager
Save Records

Use Num Pad to Edit Location and Numbers
 Use Comma for Delay, Use Space to Erase
 PGUP/PGDN - Switch Pager #
 Press ESC, Menu, or HOME to Exit

Select Character

↑

←

HOME
PAGE

→

↓

Move Fields

PAGE
UP

PAGE
DOWN

Select Next Telephone

Enter Characters

ABC 1	DEF 2	GHI 3
JKL 4	MNO 5	PQR 6
STU 7	VWX 8	YZ 9
% #, 0	: < > .	/ + - SPACE

TESTING PAGER #1

PAGING PRIMARY
*

Step 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Waiting To Connect

Location:
 Main Plant New York, NY
 Tel.# : 18005555555
 ID/PIN# : 1234567
 Message : Pager Test
 Backup Pager Disabled for Test

TimeOut
47

Press ESC to Abort or Return to Setup

TELEPHONE MODEM

SCHEDULING

You may select primary and backup pagers based on the time and day of the week through the pager schedule screen. You may define 2 or 3 different “shifts” during the day and choose the active primary and backup pagers for each shift. The pager numbers entered correspond to those defined in the PAGER SETUP screen.

Enter the start times for each of the shifts on the top of the screen and enter the primary and backup pagers for each day and particular shift.

Entering a zero in the primary pager column will disable paging during that shift on the corresponding day.

SELECT PAGER ALARMS

The select pager alarms screen shows all alarms setup in the Feedwater Center. Use PAGE UP and PAGE DOWN to scroll through the alarms. The modem will only page on alarms marked ‘YES’.

PAGER SETTINGS

The pager settings screen allows the user to enable or disable the pager system. If the enable pager setting is OFF, then the system will not attempt to send any pages. Since the telephone modem is optional, this setting is defaulted to OFF.

The send test page option functions just like a regular alarm in the system. If it is not acknowledged by the time-out period, then the pager will page the backup pager.

PAGER SERVICE SETTINGS

The pager service settings screen allows the user to adjust the settings that the PWC’s Modem, will use to connect to the TAP pager service provider. Most pager services auto-detect these settings, however if they require a specific data size, parity or number of stop bits, the user can adjust them here.

Service Response Time-out is the time the PWC will wait for the “ID=” string from the pager service before sending another <CR>.

NOTE:

These values have no affect on the modem settings used to connect with PWC Remote. PWC Remote requires 8 data bits, no parity and 1 stop bit. Please ensure your PC’s modem settings are set to these values. Some PC programs (eg. Hyperterminal) override your modems settings even when they are not running.

Pager Schedule						
Start:	Shift 1 2:30		Shift 2 10:45		Shift 3 18:00	
	Pri	Back	Pri	Back	Pri	Back
MON:	1	2	8	3	5	7
TUE:	2	1	4	5	3	7
WED:	0	0	0	0	0	0
THU:	1	8	7	2	6	4
FRI:	4	7	5	3	0	0
SAT:	5	1	0	0	8	3
SUN:	2	0	0	0	1	2
Enter 0 in Pri. Column to Disable Paging Enter 24:00 to Eliminate Shift 3						

Select Pager Alarms			
Page	Description	Blk	Output
YES	HIGH HEADER TEMP	021	MAIN
YES	LOW HEADER TEMP	022	MAIN
NO	BLR 1 FAULT	241	MAIN
NO	BLR 2 FAULT	242	MAIN
NO	BLR 3 FAULT	243	MAIN
NO	BLR 4 FAULT	244	MAIN
NO	BLR 5 FAULT	245	MAIN

PAGER SETTING

OFF ENABLE PAGER

TEST SEND TEST PAGE (MUST ACKNOWLEDGE)

Pager Service Settings

Data Bits: 8 (7 or 8)

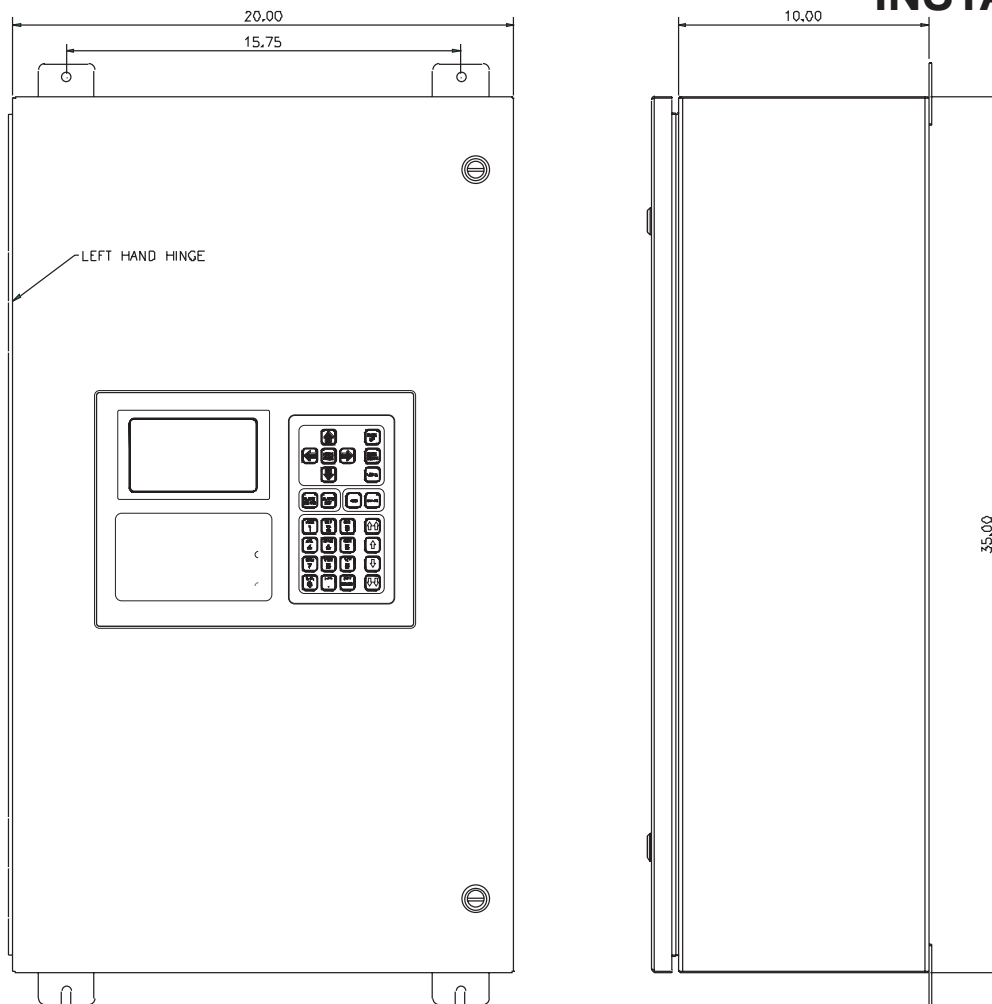
Parity: 0 (0=NONE 1=ODD 2=EVEN)

Stop Bits: 1 (1 or 2)

Service Response Timeout: 6 (5-30 SEC)

NOTE: TAP Suggested Atandard For Pagers:
7 Data Bits, EVEN Parity, 1 Stop Bit.
Contact our Service Provider For
The Correct Settings

INSTALLATION



MOUNTING OVERVIEW

The Feedwater Center is designed for wall mounting in a NEMA 4 indoor environment. Continuous operation is guaranteed over a 32-125°F ambient temperature range. The controller should not be subjected to excessive vibration. The Feedwater Center is UL508 recognized and suitable for NEMA 4 dry indoor applications.

WARNING

The Feedwater Center is commonly used to control potentially dangerous boiler and chemical processes. **VERIFY THAT THE PROCESS BEING CONTROLLED HAS BEEN SAFELY SECURED, ISOLATED, OR BYPASSED (AS REQUIRED BY THE SITE CONDITIONS) BEFORE REMOVING POWER FROM THE FEEDWATER CENTER CONTROLLER. FAILURE TO DO SO CAN RESULT IN EQUIPMENT DAMAGE, OPERATOR INJURY, OR DEATH.**

It is very common to have multiple sources of power among the wires connected to a Feedwater Center. **VERIFY THAT ALL SOURCES OF POWER HAVE BEEN DISCONNECTED BEFORE WORKING ON WIRING. FAILURE TO DO SO CAN RESULT IN INJURY OR DEATH.**

WARNING

All panel and field wiring should conform to national and local electrical codes.

INSTALLATION

120 VAC POWER AND GROUND

Connect the incoming AC power ground (i.e. “Green Wire”) to the screw and lug marked “GROUND” in the lower left corner. Connect the 120 Vac power supply to the terminals marked “POWER INPUT” in the lower left corner.

The Feedwater Center internal 120 Vac load is 0.5 A. However, up to an additional 12 amps of 120 Vac load can be connected to external field loads via the Feedwater Center auxiliary power output terminals.

TERMINAL BLOCKS

All field wiring terminals are separable, and plug-in to the Feedwater Center I/O boards. This allows rapid board level replacement without disconnecting individual field wires. Verify that terminals are inserted properly before applying power.



All terminals accept 24 to 12 ga. wire and should be tightened to 4.5 in-lb. Each terminal can accept up to (2) 14 ga. wires.

WIRE TYPE

All wiring (AC, DC, and shielded cable) should be copper, stranded, 150 V min., and 60°C minimum.

SHIELDED CABLE

All temperature sensor and 4-20 mA input and output wiring should be 22 gauge minimum, shielded, and have twisted pairs (Belden 8737 or equal). 100% foil shielding is preferred, instead of braided shielding.

The shields of all cables should be connected at one end only, as shown on the drawings that follow. Generally, the shield is connected to the DC common of the power supply that is powering the signal.

All shield foils and shield wires should be insulated (tape or heat shrink) to prevent accidental connection to earth or power ground. Shields connected at both ends or unintentionally grounded can actually add extra noise to a signal instead of reducing noise.

To prevent noise pick-up, shielded cable field wiring should never be run in conduits or trays with AC wiring (any voltage). Ignition transformer and variable frequency drive AC wiring is particularly noisy and must be run in separate conduit from all DC signal wiring.

Within the Feedwater Center, minimize the distance that DC and AC wires are run together. Wherever possible cross AC and DC wires at a 90 degree angle to each other.

DC SIGNAL COMMON ISOLATION

A thorough understanding of the signal common will prevent ground loops problems. Ground loops can cause lower than expected 4-20 mA values at a Feedwater Center input due to a portion of the current bypassing the intended circuit path and traveling through some unintended parallel path.

GREEN WIRE GROUND

The incoming AC power ground (the green wire) is only connected to case ground (i.e., the Feedwater Center metal enclosure). Case ground is isolated from all neutrals and all DC commons inside the Feedwater Center. Case ground should always be connected to an appropriate NEC code power supply ground for safety.

DC SIGNAL COMMON

The DC signal commons (“-”) are all isolated from case ground and AC neutral. The DC signal commons of the 24 Vdc field power, CPU and AIN analog inputs are interconnected with each other.

4-20MA ANALOG OUTPUTS

All terminals of each analog output channel on the A/M-AOUT boards are isolated from DC common and AC power ground, and each channel is isolated from each other analog output channel.

ISOLATED RS485

Terminal 11 (“S”) is the isolated common of the isolated RS485 communications link. The RS485 data “+” and “-” (terminals 1 & 2) are also isolated from the CPU Board.

250 OHM RESISTORS FOR 4-20 MA INPUTS

Each Feedwater Center 4-20 mA analog input channel has an internal 250.0 ohm precision resistor across the input when the input type switch is set to ‘4-20’. The 250 ohm resistor converts a 4-20 mA signal into a 1-5 Vdc signal.

24, 15 & 5 VDC FIELD POWER SUPPLIES

The internal DC power supplies are large enough to supply any combination of I/O boards and connected field loads at any temperature up to 125°F ambient with a 120 Vac +/- 15% supply.

Each field wiring DC power output terminal is individually protected by a solid state self-resetting ‘fuse’ (PTC thermistor):

Board	Voltage	Max. mA:
CPU terminal 7	+24 Vdc	300 mA
CPU 4-20 mA Analog Input	+24 Vdc	35 mA
CPU Thermistor Analog Input	+5 Vdc	15 mA

FUSES

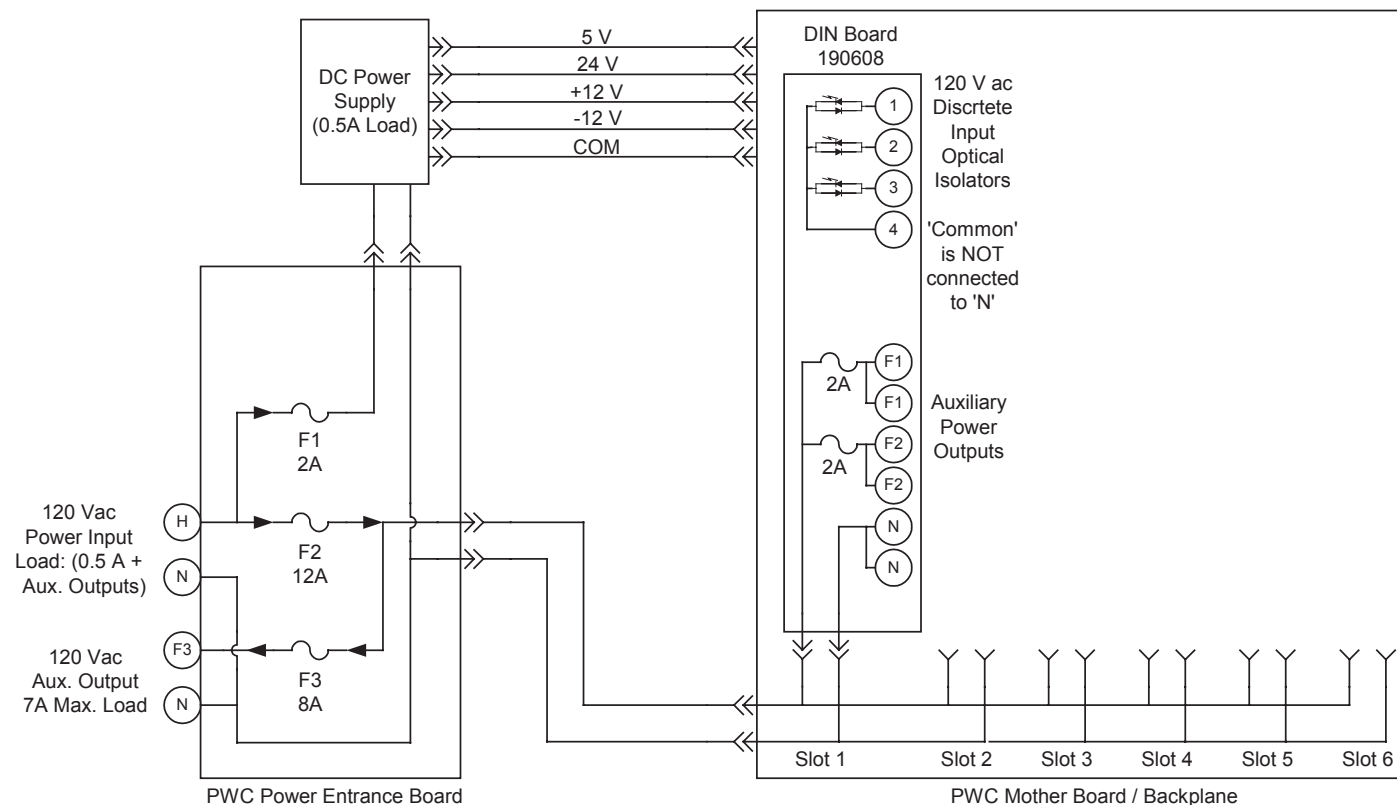
All fuses are located behind the field wiring area. Fuses used in the Feedwater Center include:

Board	Service	Amps	Type	Little fuse Part Number
Power Entrance	F1, DC Power Supplies	2	Slo-Blo 250 V, ¼ x 1¼	313002
Power Entrance	F2, Auxiliary 120 V (Motherboard bus + F3)	12	Slo-Blo 250 V, ¼ x 1¼	313012
Power Entrance	F3 Auxiliary 120 V Output	8	Slo-Blo 250 V, ¼ x 1¼	313008
DIN, HOA-ROUT	F1 & F2 Auxiliary 120 V Output	2	Slo-Blo 250 V, ¼ x 1¼	313002

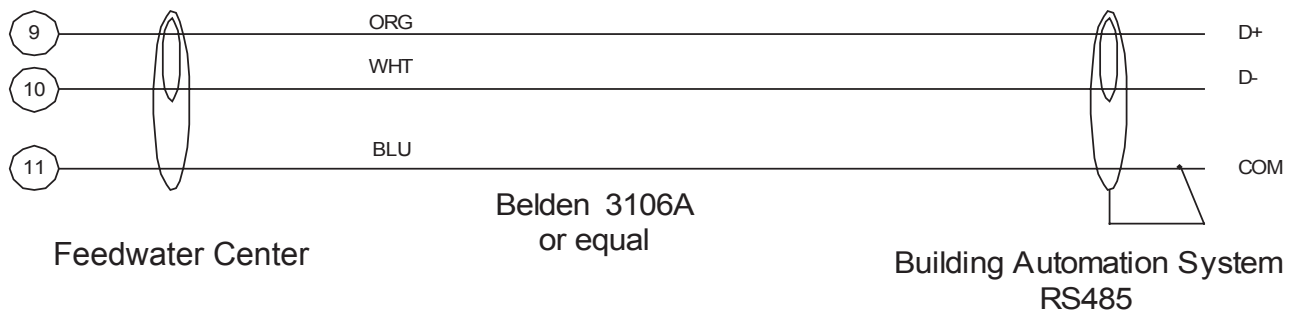
AC POWER DISTRIBUTION

The Feedwater Center 120 Vac power input is fused and then distributed via the motherboard to all I/O boards that

can use 120 Vac. Each board that can use 120 Vac has fuses and auxiliary power output terminals.



INSTALLATION



RS485 COMMUNICATIONS WIRING

RS-485 communications wiring (terminals 9-11) is optically isolated and is not electrically connected to any other circuits within the Feedwater Center. This means that an accidental short of the RS485 cable will not affect the operation of the Feedwater Center controllers.

RS-485 cabling may be up to 4000 feet in length. Longer distances can be accommodated by using RS-485 repeaters. RS-485 Network cabling should always be arranged in a "bus". Do not wire cabling in a "star" or with "stub" connections.

Belden P/N 3106A is the recommended shielded cable for all Feedwater Center RS-485 communications data highways. Belden 3106A has a characteristic impedance of 120 ohms, has 22 ga. conductors, and is rated for 300V @ 60C.

SHIELDING AND RS-485 COMMONS

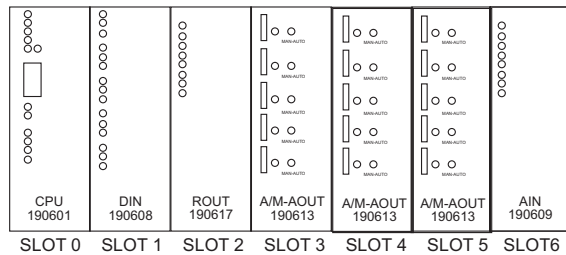
The shield should be connected to the RS-485 common terminal at the master station. At each Feedwater Center, on the network, the shields should NOT be connected to each controller's RS-485 common. The shields of the network cables should be wired together so as to continue the shield to the next controller. The blue wire in the cable should be connected to all the Communications DC Commons on the RS-485 network. Insulate the bare shield wire and any exposed shield and connect as shown above.

NOTE:

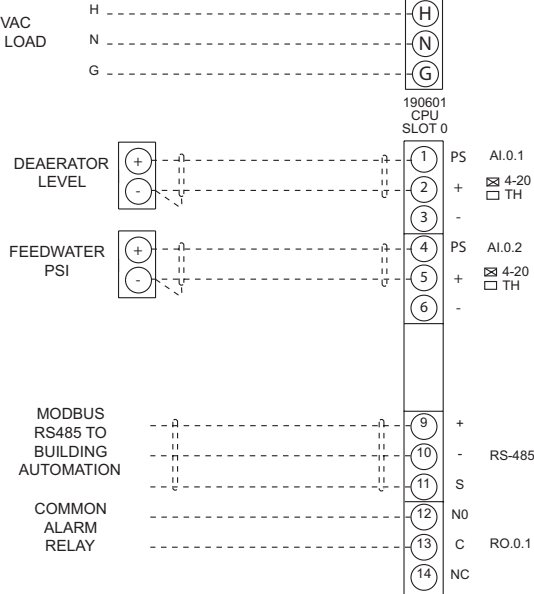
4000 ft. cable length max.
(Use repeaters if greater than 4000 ft.)

WIRING DIAGRAM JC-FWC-FC

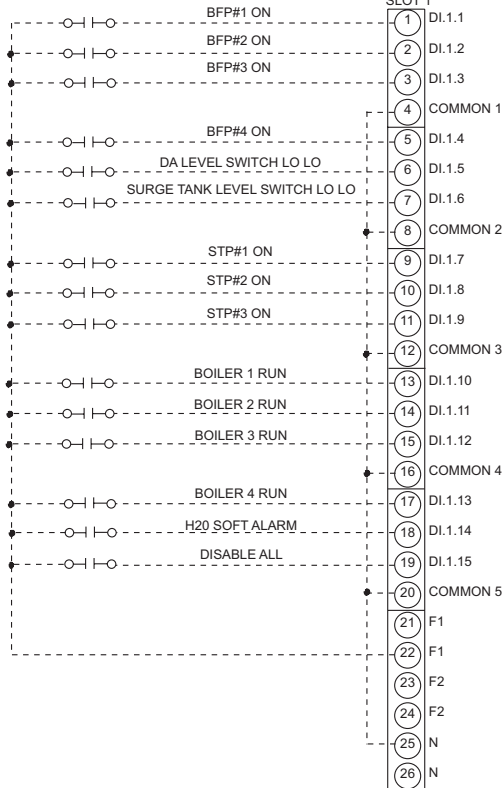
WIRING DIAGRAM



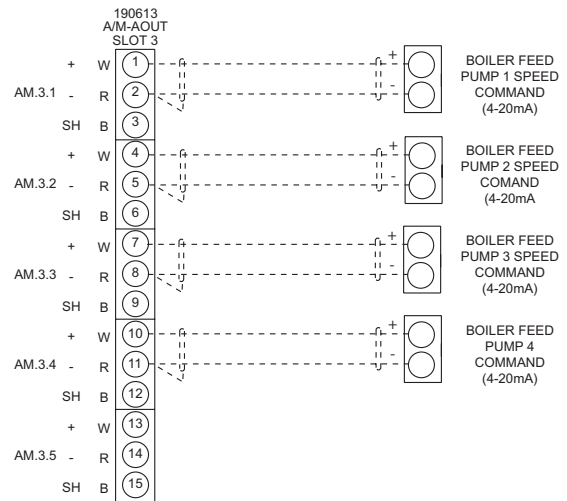
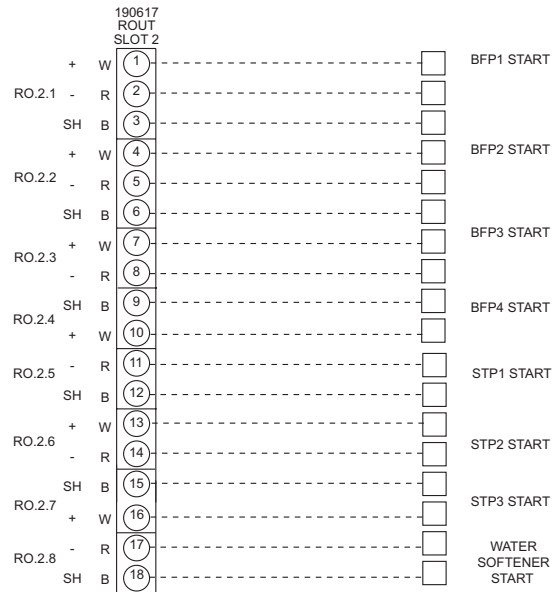
120 VAC
1 AMP LOAD



120 VAC DISCRETE INPUTS



BUILDING AUTOMATION
CONTACT OUTPUT
(OPTIONAL)

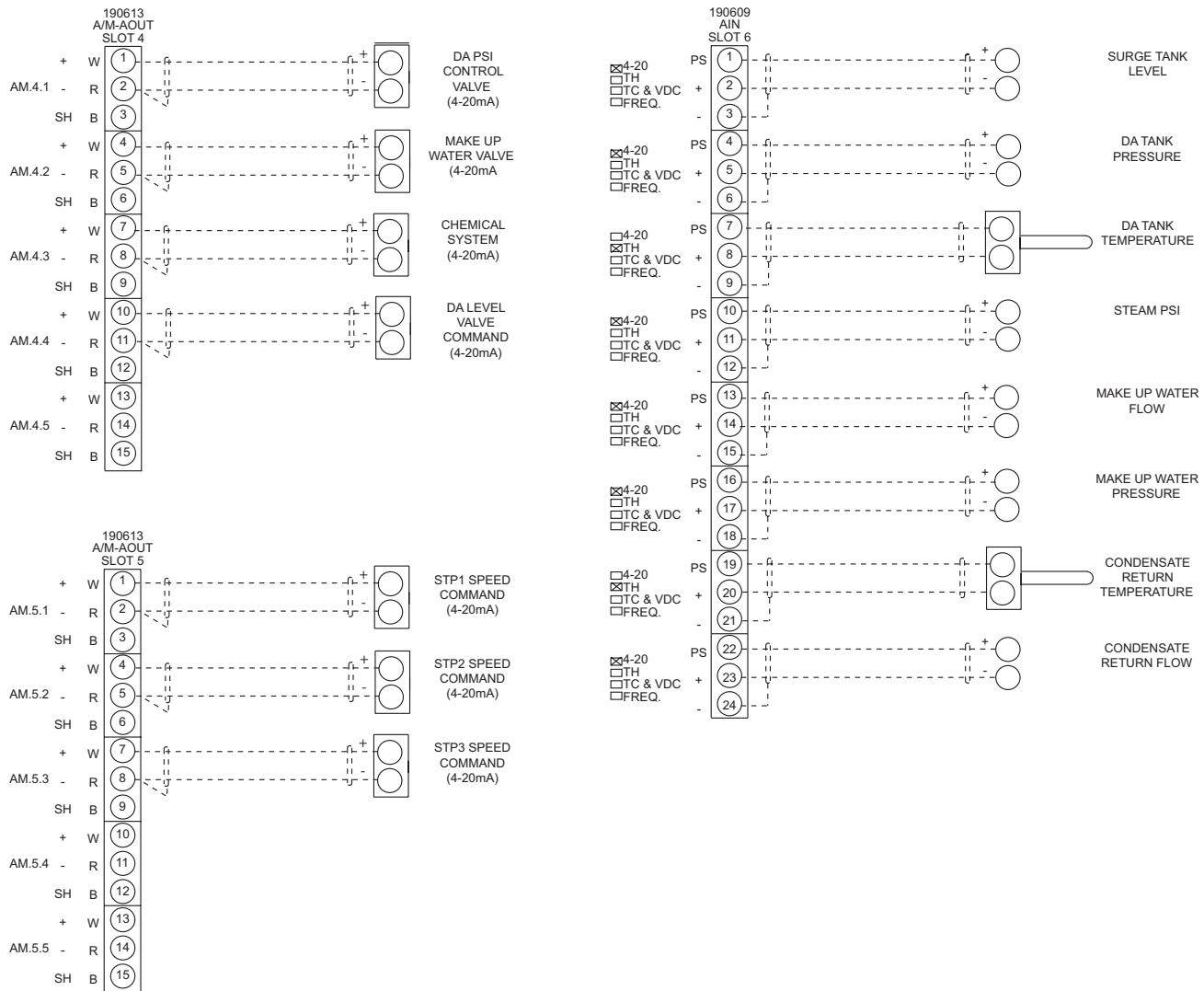


NOTE:

1. SHIELDED, TWISTED CABLE CONNECT SHIELD WHERE SHOWN. INSULATE ALL SHIELDS THAT ARE NOT CONNECTED WITH TAPE.
2. DO NOT RUN SHIELDED CABLE AND AC WIRES IN THE SAME CONDUIT.

WIRING DIAGRAM

WIRING DIAGRAM JC-FWC-FC

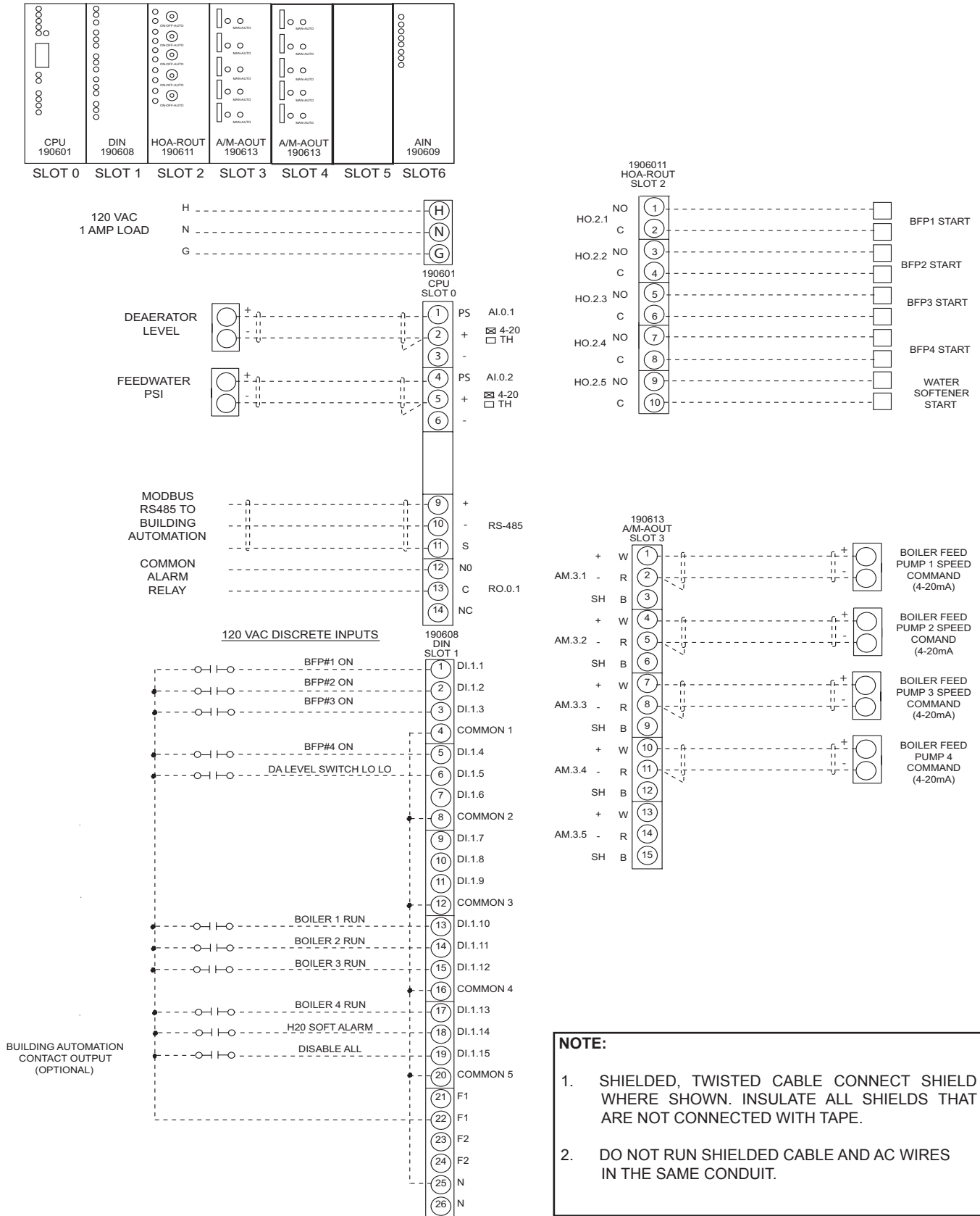


NOTE:

1. SHIELDED, TWISTED CABLE CONNECT SHIELD WHERE SHOWN. INSULATE ALL SHIELDS THAT ARE NOT CONNECTED WITH TAPE.
2. DO NOT RUN SHIELDED CABLE AND AC WIRES IN THE SAME CONDUIT.

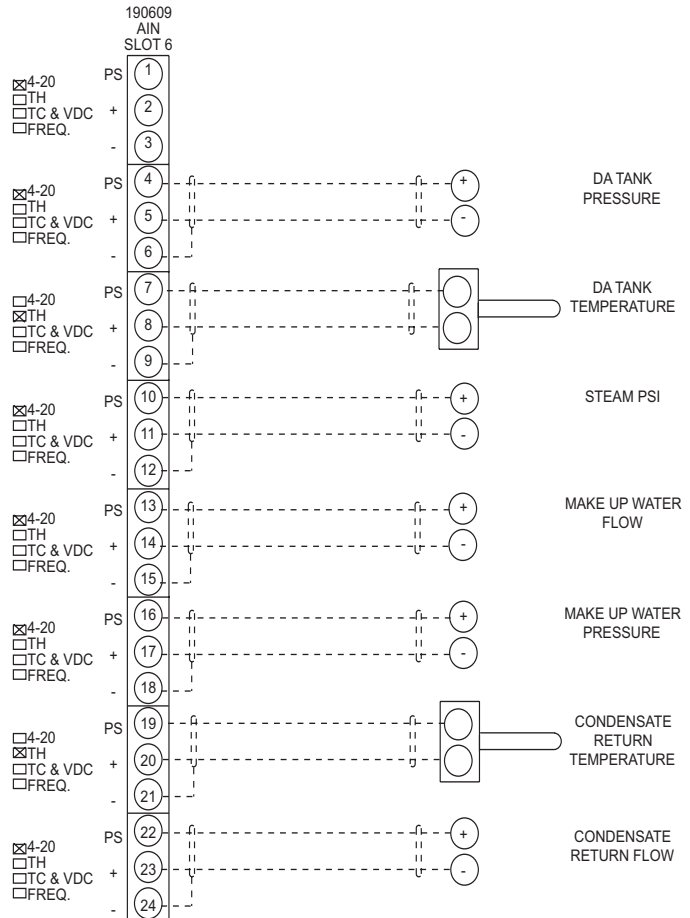
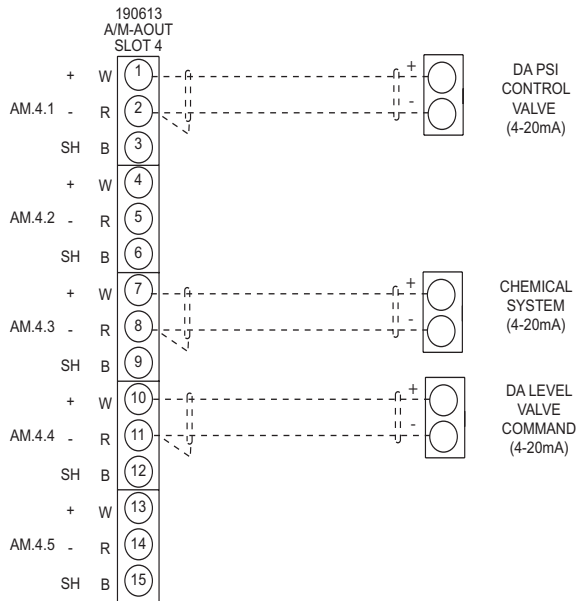
WIRING DIAGRAM

WIRING DIAGRAM JC-FWC-NS



WIRING DIAGRAM

WIRING DIAGRAM JC-FWC-NS

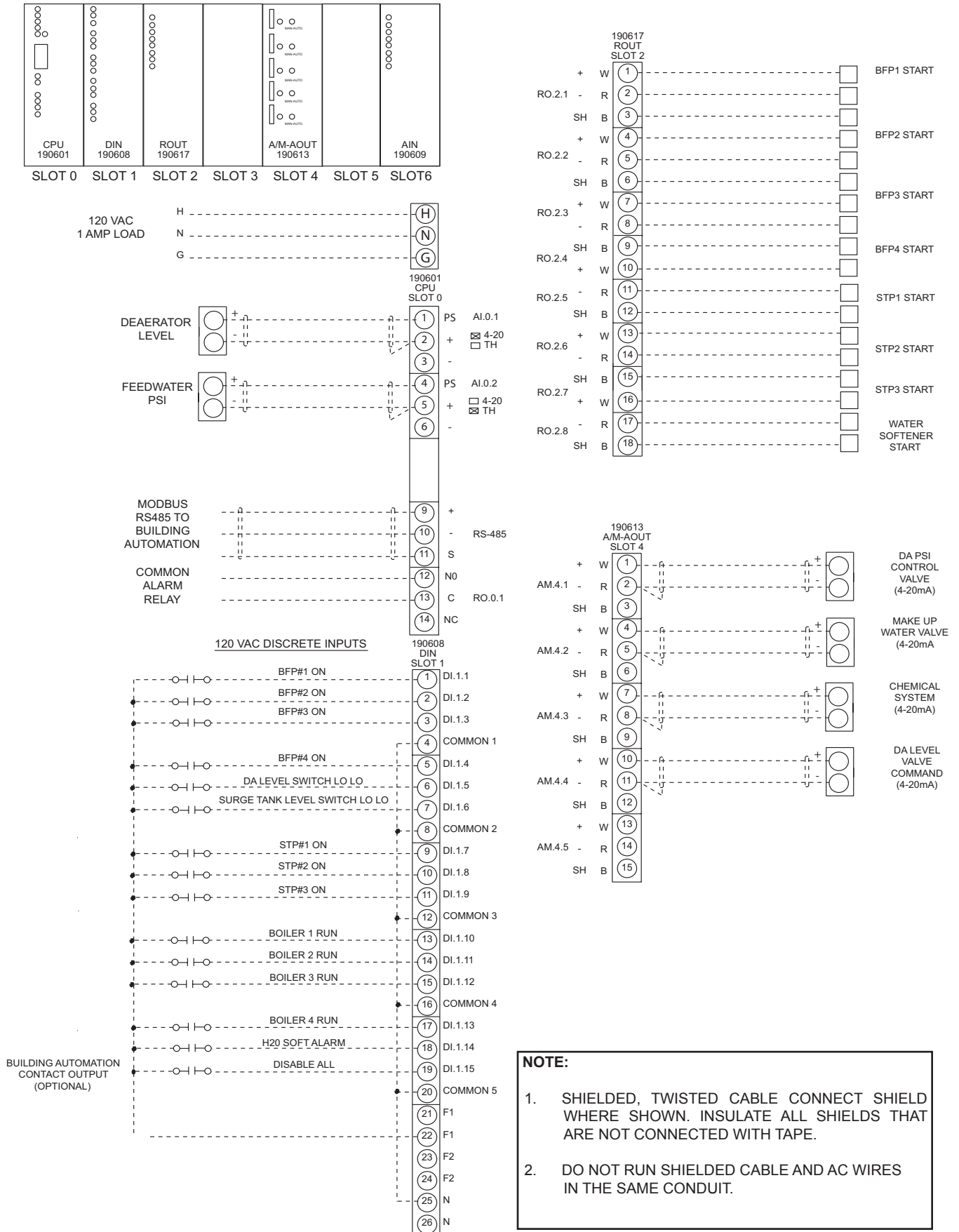


NOTE:

1. SHIELDED, TWISTED CABLE CONNECT SHIELD WHERE SHOWN. INSULATE ALL SHIELDS THAT ARE NOT CONNECTED WITH TAPE.
2. DO NOT RUN SHIELDED CABLE AND AC WIRES IN THE SAME CONDUIT.

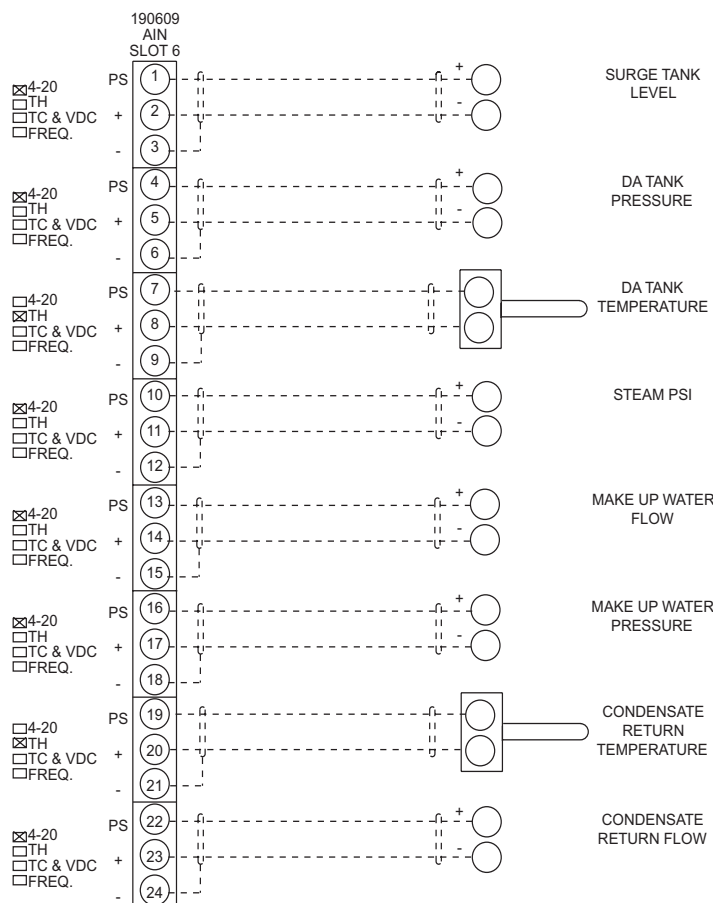
WIRING DIAGRAM JC-FWC-NV

WIRING DIAGRAM



WIRING DIAGRAM

WIRING DIAGRAM JC-FWC-NV

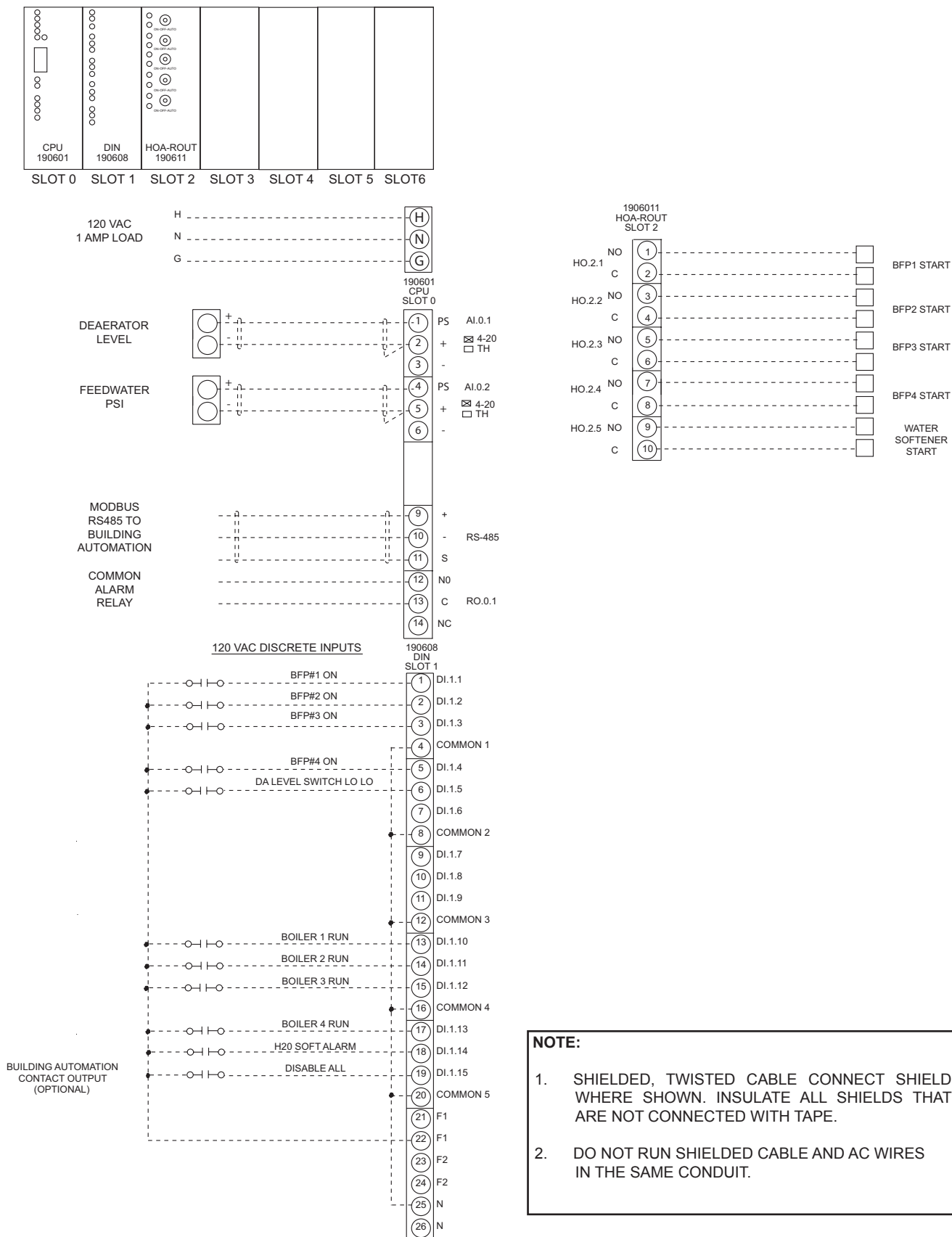


NOTE:

1. SHIELDED, TWISTED CABLE CONNECT SHIELD WHERE SHOWN. INSULATE ALL SHIELDS THAT ARE NOT CONNECTED WITH TAPE.
2. DO NOT RUN SHIELDED CABLE AND AC WIRES IN THE SAME CONDUIT.

WIRING DIAGRAM

WIRING DIAGRAM JC-FWC-NVS



TUNING ADJUSTMENTS

INITIAL PARAMETER SETUP

The Preferred Instruments Feedwater Center is designed to be field adjustable for multiple applications. In order to customize to your installation some preliminary settings must be entered.

After initial powerup, the homepage should be displayed. To set initial parameters, Press the MAIN MENU button, and then “7” for Initial Parameter Menu

MAIN MENU

- > 1. TUNING - FEEDWATER/DA
- 2. TUNING - TRANSFER
- 3. UTILITIES
- 4. HISTORICAL CHARTS
- 5. PAGER SETUP
- 6. I/O
- 7. INITIAL SETUP PARAMETERS

PARAMETER SETTINGS

- > 1. PARAMETERS - PAGE 1
- 2. PARAMETERS - PAGE 2
- 3. SETUP EGUS

PARAMETER SETUP - 1

```
FEEDWATER PRESSURE(AI 0.2):  INSTAL'D
SURGE TANK LEVEL(AI 6.1):  NOT USED
DA PRESSURE (AI 6.2):  INSTAL'D
DA TEMPERATURE (AI 6.3):  INSTAL'D
2. PARAMETERS - PAGE 2
3. SETUP EGUS
> 1. PARAMETERS - PAGE 1
2. PARAMETERS - PAGE 2
3. SETUP EGUS
> 1. PARAMETERS - PAGE 1
2. PARAMETERS - PAGE 2
3. SETUP EGUS
```

PARAMETERS - INSTALLED DEVICES

NOTE: Some parameters are NOT available in ALL MODELS, See quick start guide for model specific parameters.

PARAMETERS - PAGE 1 deals with the installed devices. Set each sensor to INSTAL'D if it is included in this application.

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	NOT USED	FW PRESSURE	If the system being set up has a Pressure sensor on the Feedwater Header, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	SURGE TANK LEVEL	If the system being set up has a Level sensor in the Surge tank, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	DA PRESSURE	If the system being set up has a Pressure sensor in the Deaerator tank, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	DA TEMPERATURE	If the system being set up has a temperature sensor in the Deaerator tank, turn the 'NOT USED' to 'INSTAL'D' by using the UP and DOWN arrow keys and highlighting the 'NOT USED' and pressing enter.
	NOT USED	STEAM HEADER	If the system being set up has a Pressure sensor in the Steam Header, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	MAKE UP FLOW	If the system being set up has a Flow sensor on the Make Up water line going into the Surge tank, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	MAKE UP PRES-SURE	If the system being set up has a Pressure sensor on the Make Up water line going into the Surge tank, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	COND RTN TEMP	If the system being set up has a Temperature sensor on the Condensate return line, turn the 'NOT USED' to 'INSTAL'D'
	NOT USED	COND RTN FLOW	If the system being set up has a Flow sensor on the Condensate return line, turn the 'NOT USED' to 'INSTAL'D'
	0	FEEDWATER PUMPS	Enter the number of Feedwater Pumps installed in the system (up to four), the Feed Water Center will only run that number of pumps in the program.

TUNING ADJUSTMENTS

PARAMETERS - PAGE 1 (continued) deals with the installed devices. Set each sensor to INSTAL'D if it is included in this application.

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	0	TRANSFER PUMPS	Enter the number of Transfer Pumps installed in the system (up to three),
	NO	TRANSFER LEAD ALWAYS ON	Enabling this, changing 'NO' to 'YES', will ensure that the Lead Transfer pump runs continuously.

PARAMETERS - SCOPE

PARAMETERS - PAGE 2 deals with the scope and type of control being used. A description of the effect of each parameter are provided.

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	NOT USED	SURGE TANK IN USE	If the system being set up has a Surge tank installed, turn the 'NOT USED' to 'INSTAL'D' by using the UP and DOWN arrow keys and highlighting the 'NOT USED' and pressing enter.
	PER BLR	FEEDWATER PIPING	Piping must be set to 'PER BLR' or 'HEADERED'
	PER BLR	FEEDWATER CONTROL	If Piping is set to 'PER BLR' then control MUST be 'PER BLR'. In that setup, each boiler has its own specific pump that runs any time the BLR RUN input is turned on. If Piping is Headered, then the control setting can be 'PER BLR' or 'PSI'. In Headered/per blr, the number of boilers running determines the number of boilers. In Headered/PSI, the number of pumps running is determined by the Lead/Lag control.
	NOT USED	DA PSI CONTROL VALVE	If the system being set up has a pressure control valve on the DA Tank, change 'NOT USED' to "INSTAL'D" This enables the Pressure control Valve output.
	NO	SEND MU FLOW TO CFP	If Makeup Flow is being monitored, that signal can be re-sent to a cemical feed system. If desired, set to 'YES'.
	NOT USED	DA LEVEL CONTROL VALVE	If the system being set up has a level control valve on the DA Tank, change 'NOT USED' to "INSTAL'D" This enables the Pressure control Valve output.

TUNING ADJUSTMENTS

PARAMETERS - ENGINEERING UNITS

The ability to field adjust engineering units has been added to the Feedwater Controller in order to allow each installation to accommodate the installed field sensors. Each Engineering unit listed is editable from the "Set EGU's" page. For details on how to use the Global Engineering Unit Editor, please see Setup EGU's in the Tuning Adjustments Section.

ID	NAME	VALUE 0%	VALUE 100%	DECPT	HELP/COMMENTS
A1	DA LVL	0.0	100.0	1	DA Tank Level in "WC
A2	ST LVL	0.0	100.0	1	Surge Tank Level in "WC
A3	DA PSI	0.0	25.0	1	DA Pressure in PSI
A4	DA F	-50	300	0	DA Temperature in °F
A5	FW PSI	0	200	0	Feedwater Pressure in PSI (Must be same as Steam Header if using Steam PSI to generate feedwater setpoint)
A6	MU PSI	0.0	25.0	1	Makeup Pressure in PSI
A7	MU FLO	0	100	0	Makeup Flow in GPM
A8	FW FLO	0	100	0	Feedwater Flow in GPM
A9	CR F	-50	300	0	Condensate Return Temperature in °F
A10	CR FLO	0	100	0	Condensate Return Flow in GPM
A11	FW VSD	0	60	0	Feedwater Pump VSD in Hz
A12	TP VSD	0	60	0	Transfer Pump VSD in Hz
A13	DEMAND	0	100	0	Demand (it is not recommended to change this value)

TUNING ADJUSTMENTS

NOTE:

Each Feedwater Center must be tuned (adjusted) to suit characteristics of each individual installation. The values shown are factory defaults that are pre-loaded into the Feedwater Center. Adjust the values as required and record the final values in the spaces provided.

All TUNING screen items should only be changed by an experienced technician. Incorrect settings can cause excessive speed demand swings which can shorten the life of the pumps.

FEEDWATER HEADER PRESSURE TUNING PAGE
(MENU --> TUNING --> FEEDWATER HEADER PRESSURE TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	3.00	PID GAIN	This setting determines the immediate response to a pressure change. Higher values cause a larger speed demand change for each degree of temperature change. If set too high, the speed demand will cycle up and down excessively. Lower values cause a smaller speed demand change for each degree of temperature change. If set too low, the speed demand response will be sluggish and the pressure will wander away from set point.
	1.50	PID REPEATS PER MINUTE (INTEGRAL)	During a demand change, the PID gain changes the speed demand immediately. After this initial change the PID integral slowly ramps the speed demand until the temperature returns to the exact set point. Higher repeats per minute cause a faster return to the exact set point. Excessively high values will cause speed demand cycling over several minutes. Lower values cause a slower return to the exact set point. Excessively low values can prevent the temperature from ever getting back to the set point.
	180	HIGH PRESS ALARM	These settings are used to establish high and low header pressure alarms (if desired). The time delay may be used to prevent nuisance alarms.
	0	HIGH PRESS ALARM DELAY	
	20	LOW PRESS ALARM	
	0	LOW PRESS ALARM DELAY	
	0	MINIMUM VSD PUMP SPEED	Enter the minimum speed for the feedwater pumps.
	200	PSI, STEAM HEADER XMTR SPAN	Enter the steam pressure that relates to 100% of transmitter output.
	0	SP DEVIATION FROM STM HEADER PSI	If it is desired to have the feedwater pressure setpoint adjust relative to the measured steam header pressure automatically, enter the differential in psi.

TUNING ADJUSTMENTS

TUNING OF PID GAIN & REPEATS/MIN:

Put the pump speed demand into MANUAL (on home page), reduce the SPEED demand by 20%, and wait for the pressure to drop. Put SPEED back into AUTO, then observe the header pressure and SPEED for 3-4 minutes. Be PATIENT! Do not jump to make adjustments too soon. The pressure should come back to the set point without any significant overshoot above the set point, and no cycling (unless the real demand happens to be changing at that time).

If the response is too slow, increase the gain by 5, repeat the pressure drop and observe 3-4 min. Repeat gain increases until the pressure overshoots the set point and then cycles below the set point. Then change the gain back to the last setting that did not cause cycling.

Without changing the gain, increase the repeats per minute by 0.3, drop the pressure, and observe for 3-4 minutes. Do this again until the pressure starts to overshoot and cycle after recovering. Then decrease the repeats per minute to the previous stable setting.

When done, watch the pressure for 10 minutes (with SPEED in AUTO) to make sure that the speed demand isn't slowly cycling up and down by more than +/-5% over several minutes. If it is cycling, decrease the repeats per minute by 0.2 and observe for another 10 minutes. If the SPEED long term cycling decreases, the PID was tuned too aggressively. Continue to reduce the repeats per minute and observe.

BOILER FEED PUMP SEQUENCE TUNING (MENU --> TUNING --> BOILER FEED PUMP SEQUENCE TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
SYSTEM SUPPLY:			
	-10	PSI, SP DEVIATION START LAG	Pressure difference from set point before the lag pump will be started.
	80	DEMAND %, ADD A LAG PUMP	When the pump speed demand remains above this setting longer than the delay, the feedwater center will automatically add a lag pump.
	10	SECONDS, ADD A LAG DELAY	
	0	PSI, SP DEVIATION STOP LAG	Pressure difference from set point before the lag pump will be stopped.
	5	DEMAND %, STOP A LAG PUMP	When the pump speed demand remains below this setting longer than the delay, the feedwater center will automatically stop a lag pump.
	10	SECONDS, STOP A LAG DELAY	
	15	SECONDS, ADD'L PUMP START DELAY	An additional delay that will stop a pump from starting after it has been called for, for the set amount of seconds.
	30	SECONDS, ADD'L PUMP STOP DELAY	An additional delay that will not allow a pump to stop after it has been called to stop for the set amount of time.

TUNING ADJUSTMENTS

SURGE TRANSFER PUMP SEQUENCING TUNING PAGE (MENU --> TUNING --> SURGE TRANSFER PUMP SEQUENCING TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
HEADER PRESSURE BASED START-STOP: - Starts –stops pumps in response to sudden, large demand swings. - Lead pump starts if header temperature is very low (Lead pump start-stop pressure below set point). - Lag pump starts if the lead pump is started, the temperature is low, and the speed demand is at high speed. - Lag pump stops if the pressure is high and the speed demand is near low speed. - Lead pump stops if all lag pumps are stopped, the temperature is high, and the speed demand is at low speed. SPEED DEMAND % BASED LAG Pump START-STOP: - Only applies to lag pumps. Starts pumps even if header temperature is exactly at set point. Used for slow demand changes. - The start feature is typically used in plants with cycling process demands to insure that the next pump comes on-line before it is needed to avoid flow dips. Setting the start % lower and the start delay shorter brings a spare pump on-line sooner. Plants with heating demands that can tolerate temperature dips can turn off this feature by setting the Start % to 110%. - The stop feature is typically used in plants with fairly constant heating demands to prevent the inefficient operation of multiple pumps near low speed when less pumps at high speed can carry the demand. Consider the burner turn-down when setting this value. Plants with process demands can turn off this feature by setting the Stop % to -10%.			
	-6.6	"WC, SP DEVIATION START LAG	Level difference from set point before the lag pump will be started.
	80	DEMAND %, ADD A LAG PUMP	When the pump speed demand remains above this setting longer than the delay, the feedwater center will automatically add a lag pump.
	15	SECONDS, ADD A LAG DELAY	
	3.3	"WC, SP DEVIATION STOP LAG	Level difference from set point before the lag pump will be stopped.
	5	DEMAND %, STOP A LAG PUMP	When the pump speed demand remains below this setting longer than the delay, the feedwater center will automatically stop a lag pump.
	10	SECONDS, STOP A LAG DELAY	
	15	SECONDS, ADD'L PUMP START DELAY	An additional delay that will stop a pump from starting after it has been called for, for the set amount of seconds.
	30	SECONDS, ADD'L PUMP STOP DELAY	An additional delay that will not allow a pump to stop after it has been called to stop for the set amount of time.

TUNING ADJUSTMENTS

DA TANK LEVEL TUNING PAGE (MENU --> TUNING --> DA LEVEL TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	5.00	PID GAIN	5 - 25 is typical. This setting determines the immediate response to a temperature change. Higher values cause a larger speed demand change for each degree of temperature change. If set too high, the speed demand will cycle up and down excessively. Lower values cause a smaller speed demand change for each degree of temperature change. If set too low, the speed demand response will be sluggish and temperature will wander away from set point.
	0.30	PID REPEATS PER MINUTE (INTEGRAL)	0.5 - 2.00 is typical. During a demand change, the PID gain changes the speed demand immediately. After this initial change the PID integral slowly ramps the speed demand until the temperature returns to the exact set point. Higher repeats per minute cause a faster return to the exact set point. Excessively high values will cause speed demand cycling over several minutes. Lower values cause a slower return to the exact set point. Excessively low values can prevent the temperature from ever getting back to the set point.
	60	"WC, DA LEVEL, HIGH ALARM	These settings are used to establish high and low level alarms (if desired) in the deaerator tank. The time delay may be used to prevent nuisance alarms.
	15	SEC, HIGH ALARM DELAY	
	10	"WC, DA LEVEL, LOW ALARM	
	15	SEC, LOW ALARM DELAY	

NOTE:

The speed demand PID should be tuned before adjusting these values. PUMP QTY and SPEED DEMAND % should be in AUTO when adjusting these values.

TUNING ADJUSTMENTS

SURGE TANK LEVEL TUNING PAGE (MENU --> TUNING --> SURGE LEVEL TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	3.3	LEVEL MU VALVE 100% OPEN	5 - 25 is typical. This setting determines the immediate response to a temperature change. Higher values cause a larger speed demand change for each degree of temperature change. If set too high, the speed demand will cycle up and down excessively. Lower values cause a smaller speed demand change for each degree of temperature change. If set too low, the speed demand response will be sluggish and temperature will wander away from set point.
	16.7	LEVEL MU VALVE 0% OPEN	0.5 - 2.00 is typical. During a demand change, the PID gain changes the speed demand immediately. After this initial change the PID integral slowly ramps the speed demand until the temperature returns to the exact set point. Higher repeats per minute cause a faster return to the exact set point. Excessively high values will cause speed demand cycling over several minutes. Lower values cause a slower return to the exact set point. Excessively low values can prevent the temperature from ever getting back to the set point.
	56.6	"WC, HIGH LEVEL ALARM SETPOINT	These settings are used to establish high and low level alarms (if desired) in the surge tank. The time delays may be used to prevent nuisance alarms.
	0	HIGH ALARM DELAY	
	10	"WC, LOW LEVEL ALARM SETPOINT	
	15	LOW ALARM DELAY	

TUNING ADJUSTMENTS

DA PRESSURE VALVE TUNING PAGE (MENU --> TUNING --> DA PRESSURE VALVE TUNING)

CUSTOMER VALUE	FACTORY VALUE	DESCRIPTION	HELP/COMMENTS
	3.00	PID GAIN	25 - 50 is typical. This setting determines the immediate response to a pressure change. Higher values cause a larger valve demand change for each degree of pressure change. If set too high, the valve demand will cycle up and down excessively. Lower values cause a smaller valve demand change for each degree of pressure change. If set too low, the valve demand response will be sluggish and pressure will wander away from set point.
	0.50	PID REPEATS PER MINUTE (INTEGRAL)	0.5 - 2.00 is typical. During a demand change, the PID gain changes the valve demand immediately. After this initial change the PID integral slowly ramps the valve demand until the pressure returns to the exact set point. Higher repeats per minute cause a faster return to the exact set point. Excessively high values will cause valve demand cycling over several minutes. Lower values cause a slower return to the exact set point. Excessively low values can prevent the pressure from ever getting back to the set point.
	22.5	PSI, HIGH PRESSURE ALARM SETPOINT	These settings are used to establish high and low header pressure alarms (if desired). The time delays may be used to prevent nuisance alarms.
	0	SEC, HIGH ALARM DELAY	
	2.5	PSI, LOW PRESSURE ALARM SETPOINT	
	30	SEC, LOW PRESS ALARM DELAY	

TUNING ADJUSTMENTS

CLOCK TIME AND DATE PAGE

Set Time and Date

08:46:44 Saturday, Dec 25, 2004

Time (24 hour)

Date

08:46:44
hh mm ss

12/25/04
mm dd yy

*****WARNING!*****

Time and date changes will generate gaps in historical memory or cause data to be erased. Use Historical Utilities to identify any resulting problems.

TIME:

'10:19:35' = Time of day Enter hours minutes and seconds in military time ('Military' format, 1300: 1 PM).

DATE:

'12/25/ 4' = Month / Day / Year. ENTER the date.

TIME AND DATE

The Feedwater Center has a battery backed time and date clock that automatically corrects for leap years. The time and date must be set up in order for the alarm list and historical trending to start to work.

Times are entered in 24 hr 'Military' format (i.e. 13:30 = 1:30 PM).

After setting the date, verify that the day of the week shown in the status line is correct. If the day is incorrect, re-enter the date correctly.

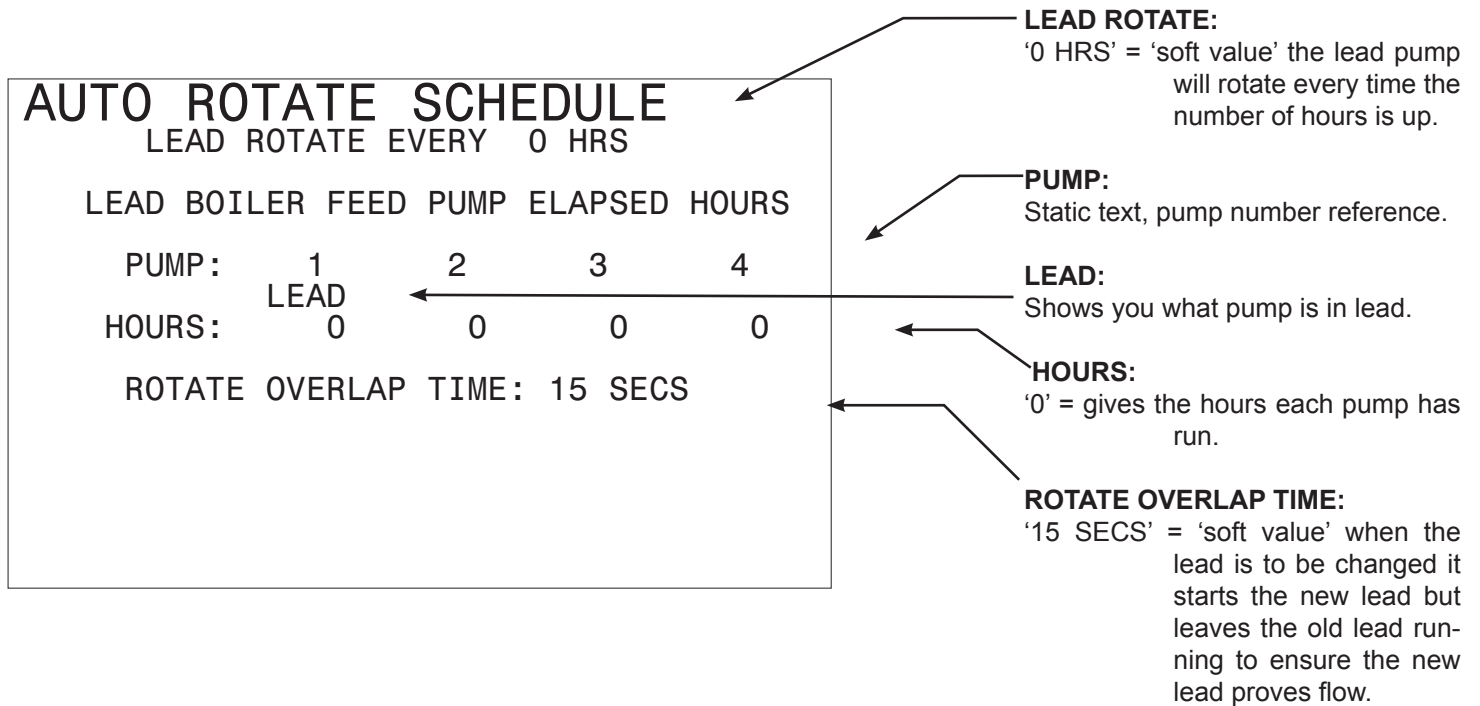
WARNING

The Warning window shows when historical trending is installed. Changing the time back or forward can cause data to be lost. This will not effect the operation of the Feedwater Center, but some historical data may be lost.

See the Historical Trending section for more details.

TUNING ADJUSTMENTS

AUTO ROTATE SCHEDULE, BOILER FEED PUMPS



LEAD ROTATE:

Lead boiler feed pump is automatically rotated to help reduce wear. This is based on lead run time, on this screen there is a "LEAD ROTATE EVERY" and this displays an editable value. This should be set to an amount of hours that the operator thinks the pump should run for before the Lead pump is changed. When the set number of hours is met, the next pump in the line will start and run for 15 seconds before the Lead change happens. This is just in case the next lead pump has a fault, if it does the original lead will continue, the Faulted pump will shut down in fault, and the next pump down the line will be energized and tried for 15 seconds.

TUNING ADJUSTMENTS

AUTO ROTATE SCHEDULE, SURGE TANK TRANSFER PUMPS

versions -FC and -NV ONLY

AUTO ROTATE SCHEDULE
LEAD ROTATE EVERY 0 HRS

LEAD SURGE TRANSFER PUMP ELAPSED HOURS

PUMP:	1	2	3
LEAD			
HOURS:	0	0	0

ROTATE OVERLAP TIME: 15 SECS

LEAD ROTATE:

'0 HRS' = 'soft value' the lead pump will rotate every time the number of hours is up.

PUMP:

Static text, pump number reference.

LEAD:

Shows you what pump is in lead.

HOURS:

'0' = gives the hours each pump has run.

ROTATE OVERLAP TIME:

'15 SECS' = 'soft value' when the lead is to be changed it starts the new lead but leaves the old lead running to ensure the new lead proves flow.

LEAD ROTATE:

Lead transfer pump is automatically rotated to help reduce wear. This is based on lead run time, on this screen there is a "LEAD ROTATE EVERY" and this displays an editable value. This should be set to an amount of hours that the operator thinks the pump should run for before the Lead pump is changed. When the set number of hours is met, the next pump in the line will start and run for 15 seconds before the Lead change happens. This is just in case the next lead pump has a fault, if it does the original lead will continue, the Faulted pump will shut down in fault, and the next pump down the line will be energized and tried for 15 seconds.

TUNING ADJUSTMENTS

DIGITAL POINTS PAGE

MAIN MENU / INITIAL SETUP PARAMETERS / I/O / DIGITAL POINTS

DIGITAL POINTS

DIN 1-1: ON	DIN 1-15: ON
DIN 1-2: ON	RO 2-1: OFF
DIN 1-3: ON	RO 2-2: OFF
DIN 1-4: ON	RO 2-3: OFF
DIN 1-5: OFF	RO 2-3: OFF
DIN 1-6: OFF	RO 2-4: OFF
DIN 1-7: ON	RO 2-5: OFF
DIN 1-8: ON	RO 2-6: OFF
DIN 1-9: ON	RO 2-7: OFF
DIN 1-10: OFF	
DIN 1-11: OFF	
DIN 1-12: OFF	
DIN 1-13: OFF	
DIN 1-14: OFF	

DIGITAL POINTS:

The digital points page allows you to view which terminal points are being energized on the Feedwater centers option boards. If the digital point is being energized, the blockware views this as a '1' when it is not, it is viewed as a '0'. When the blockware sees a '1' it will turn the 'OFF' to an 'ON' next to its respective digital point.

NOTE: This screen may appear different on certain models, see the Quick Start Guide for more model specific information.

ANALOG POINTS PAGE

MAIN MENU / INITIAL SETUP PARAMETERS / I/O / ANALOG POINTS

ANALOG POINTS

AIN 1-1: 27	DA TANK LEVEL
AIN 1-2: 178	FW PRESSURE
AIN 6-1: 3.4	SURGE TANK LEVEL
AIN 6-2: 12	DA TANK PRESSURE
AIN 6-3: 37	DA TANK TEMPERATURE
AIN 6-4: 39	STEAM PRESSURE
AIN 6-5: 11	MAKE UP WATER FLOW
AIN 6-6: 4.2	MAKE UP WATER PSI
AIN 6-7: 5	CONDENSATE RETURN TEMP
AIN 6-8: 21	CONDENSATE RETURN FLOW

ANALOG POINTS:

The analog points page allows you to view the incoming analog signals and their respective input sources that get sent to the feedwater centers option boards. In the Main Menu --> Initial Setup Parameters --> Setup EGUs you can change the span of the transmitters so that the feedwater center is viewing the correct measurement span.

NOTE: This screen may appear different on certain models, see the Quick Start Guide for more model specific information.

TUNING ADJUSTMENTS

MAIN MENU / INITIAL SETUP PARAMETERS / SETUP EGUS

The Global Engineering Unit Editor internal screen mimics PWC Edit's "Engineering Units" screen. It allows the user to edit the value at 0%, value at 100% and the decimal point of the currently selected egu. The user may scroll through the egu's by using the double UP and double DN arrows for fast scrolling (10 egus in the pressed direction) or the single UP and DN arrows for slow scrolling (1 egu at a time). Only the currently selected egu is editable and scrolling is not possible while editing. All changes will take effect immediately and be written to EEPROM shortly thereafter (within a few seconds). Edits made to the 0% and 100% fields assume the current decimal point location and have a minimum and maximum of +-20000 (raw value). The decimal point field has a minimum of 0 and a maximum of 4.

Although there are 50 global egu's available, users will only be able to edit 13 of those egu's encountered before the first empty (no characters) "Name" field. The names are defined through PWC_Edit's engineering units screen "Short Name" column. Spaces are considered characters in this instance.

Global EGU Editor				
ID	Name	Value 0%	Value 100%	DecPt
A1	DA LVL	0.0	66.6	1
A2	ST LVL	0.0	66.6	1
A3	DA PSI	0.0	25.0	1
A4	DA F	-50	300	0
A5	FW PSI	0	200	0
A6	MU PSI	0.0	25.0	1
A7	MU FLO	0	100	0
A8	FW FLO	0	100	0
A9	CR F	-50	300	0
A10	CR FLO	0	100	0
Use Double/Single Arrows to Scroll				

GLOBAL EGU EDITOR

NOTE: You cannot have any of the units highlighted if you want to scroll through the engineering units themselves. Before you press the up or down arrow around the HOME PAGE button, you can use the double and single arrows on the right bottom half of the key pad to change which EGU you want to Edit.

MODBUS ADDRESSING

MODBUS ADDRESSING NUMBERS

MODBUS: The following information applies to all JC-FWC-XX models, not all models will use these modbus addresses, refer to the model specific Quick Start Guide.

NOTE:

MODBUS addresses below are for the NON-OIT version, this does not include points that are used on the touch screen.

	Default:	Options:
Device Address:	1	1-31
Baud:	19200	1200, 2400, 4800, 9600, 19200, 38400
Parity:	ODD	ODD, EVEN
Data Format:	RTU	RTU, ASCII
Wiring Interface:	RS485, 2 wire, isolated	

Notes on the MODBUS list correspond to this chart:

Notes:	
1	Modbus can only change this if the point is in "Manual"
2	Not Available in -NV
3	Not Available in -NS
4	Not Available in -NVS

NOTE:

MODBUS addresses are given for a 4 Boiler Feedwater Pumps, and 3 Transfer pump system. For systems with fewer pumps, disregard addresses of extra pumps.

MODBUS ADDRESSING

MODBUS ADDRESSING NUMBERS

Modbus Register Address	Description	Read/Write Allowed	EGU for register = 0	EGU for register = 10000	Units	Notes:
40001	FeedWater PID gain	Y	0	100		
40002	Feedwater PID Repeats	Y	0	100	rpts/min	
40003	Feedwater PSI Set point	Y	0	200	psi	
40004	Feedwater PSI Low Alarm Set point	Y	0	200	psi	
40005	Feedwater PSI Low Alarm Time Delay	Y	0	10000	secs	
40006	Feedwater PSI High Alarm Set point	Y	0	100	psi	
40007	Feedwater PSI High Alarm Time Delay	Y	0	10000	secs	
40008	Feedwater Pump Demand	Y	0	100	%	1
40009	Feedwater Pump Start Lag SP Deviation	Y	0	200	psi	
40010	Feedwater Pump Demand % Add a lag	Y	0	100	%	
40011	FeedWater Pump Add a lag delay seconds	Y	0	10000	secs	
40012	Feedwater Pump Stop Lag SP Deviation	Y	0	200	psi	
40013	Feedwater Pump Demand % stop a lag	Y	0	100	%	
40014	Feedwater Pump Stop a lag delay seconds	Y	0	10000	secs	
40015	Feedwater Pump Add'l start delay	Y	0	10000	secs	
40016	Feedwater Pump Add'l stop delay	Y	0	10000	secs	
40017	Feedwater Pump Qty called to start	Y	0	10000	pumps	1
40018	Feedwater Pump Rotate Run Time	Y	0	10000	secs	
40019	Number of FW pumps in System	Y	0	10000	pumps	
40020	Surge Tank Low-Low Level Alarm Setpoint	Y	0	100	%	3,4
40021	Surge Tank Low-Low Level Alarm Delay	Y	0	10000	secs	3,4
40022	Feedwater Pump VSD Minimum Speed	Y	0	100	%	
40023	Feedwater Pump Rotate Overlap Time	Y	0	10000	secs	
40024	Feedwater Pump Lead	Y	0	100	pump #	1
40025	Feedwater Pump Fault Delay Seconds	Y	0	10000	sec	
40026	DA Level PID Gain	Y	0	100		
40027	DA Level PID Repeats	Y	0	100	rpts/min	
40028	DA Level Set point	Y	0	66.6	"WC	
40029	DA Level Valve Demand	Y	0	100	%	1
40030	Softener Regeneration Duration	Y	0	10000	sec	
40031	Time Between Regenerations	Y	0	10000	hours	
40032	DA Level Low Alarm Set point	Y	0	66.6	"WC	
40033	DA Level Low Alarm Time Delay	Y	0	10000	Secs	
40034	DA level High Alarm Set point	Y	0	66.6	"WC	
40035	DA level High Alarm Time Delay	Y	0	10000	Secs	
40036	Surge Tank Level for 100% MU Valve	Y	0	100	%	3,4
40037	Surge Tank Level for 0% MU Valve	Y	0	100	%	3,4
40038	Transfer Pump VSD Minimum Speed	Y	0	100	%	3,4
40039	Surge Tank Level Valve Demand	Y	0	100	%	3,4
40040	Surge Tank Level Low Alarm Set point	Y	0	100	%	3,4
40041	Surge Tank Level Low Alarm Time Delay	Y	0	10000	Secs	3,4
40042	Surge Tank Level High Alarm Set point	Y	0	100	%	3,4
40043	Surge Tank Level High Alarm Time Delay	Y	0	10000	Secs	3,4
40044	DA PSI PID Gain	Y	0	100	%	
40045	DA PSI PID Repeats	Y	0	100	%	
40046	DA PSI Set point	Y	0	300	PSI	

MODBUS ADDRESSING

Modbus Register Address	Description	Read/ Write Allowed:	EGU for register = 0	EGU for register = 10000	Units	Notes:
40047	DA PSI Valve Demand	Y	0	25	psi	1
40048	DA PSI Low Alarm Set point		0	25	psi	
40049	DA PSI Low Alarm Time Delay	Y	0	10000	Secs	1
40050	DA PSI High Alarm Set point	Y	0	25	psi	2
40051	DA PSI High Alarm Time Delay	Y	0	10000	secs	2
40052	Surge Tank Pump Start Lag SP Deviation	Y	0	66.6	"WC	2
40053	Surge Tank Pump Demand Add a Lag	Y	0	100	%	2
40054	Surge Tank Pump Add a Lag Delay	Y	0	100	secs	2
40055	Surge Tank Pump Stop Lag SP Deviation	Y	0	66.6	"WC	2
40056	Surge Tank Pump Demand Stop a Lag	Y	0	100	%	2
40057	Surge Tank Pump Stop a Lag Delay	Y	0	100	secs	2
40058	Surge Tank Pump Add'l Start Lag Delay	Y	0	100	secs	2
40059	Surge Tank Pump Add'l Stop Lag Delay	Y	0	10000	secs	2
40060	Surge Tank Pump Quantity	Y	0	10000	Secs	2
40061	Surge Tank Pump Rotate Runtime Hours	Y	0	100	%	1,2
40062	Surge Tank Pump 1 Fault Delay	Y	0	10000	Secs	2
40063	Number of Transfer Pumps in System	Y	0	10000	pumps	2
40064	Surge Tank Pump Rotate Overlap Time	Y	0	10000	secs	2
40065	Surge Tank Pump Lead	Y	0	100	pump #	1,2
40066	Synchronize Time Value		0	10000		
40067	FW/Steam Header Normalizig Scaling		0	100	%	
40068	Steam Header Transmitter Span	Y	0	200	psi	
40069	spare					
40070	spare					
40071	spare					
40072	spare					
40073	spare					
40074	spare					
40075	Deaerator Level		0	66.6	"WC	
40076	Surge Tank Level		0	66.6	"WC	2
40077	Boiler Feed Pump 1 Speed		0	100	%	
40078	Boiler Feed Pump 2 Speed		0	100	%	
40079	Boiler Feed Pump 3 Speed		0	100	%	
40080	Boiler Feed Pump 4 Speed		0	100	%	
40081	Surge Tank Make Up water Valve		0	100	%	
40082	Surge Tank Pump 1 Speed		0	100	%	2
40083	Surge Tank Pump 2 Speed		0	100	%	2
40084	Surge Tank Pump 3 Speed		0	100	%	2
40085	DA MU Valve		0	100	%	1
40086	DA PSI Control Valve		0	100	%	1
40087	Deaerator Tank Temperature		-50	300	°F	
40088	Deaerator Tank Pressure		0	25	PSI	
40089	Feedwater PSI		0	200	PSI	
40090	Steam Header Pressure		0	200	PSI	
40091	Make Up Water Flow		0	100	GPM	
40092	Make Up Water Pressure		0	25	PSI	

MODBUS ADDRESSING

Modbus Register Address	Description	Read/ Write Allowed:	EGU for register = 0	EGU for register = 10000	Units	Notes:
40093	Condensate Return Temperature		-50	300	°F	
40094	Condensate Return Flow		0	100	GPM	
40095	Surge Tank Pump 1 Elapsed Time		0	10000	Hrs	2
40096	Surge Tank Pump 2 Elapsed Time		0	10000	Hrs	2
40097	Surge Tank Pump 3 Elapsed Time		0	10000	Hrs	2
40098	Feedwater Pump 1 Elapsed		0	10000	Hrs	
40099	Feedwater Pump 2 Elapsed		0	10000	Hrs	
40100	Feedwater Pump 3 Elapsed		0	10000	Hrs	
40101	Feedwater Pump 4 Elapsed		0	10000	Hrs	
40102	Chemical Pump Retransmit		0	100		
40103	Softener Regen. Time Remaining		0	10000		
40104	Hours Between Regeneration		0	10000	Hrs	
40105	spare					
40106	Controler Version					
40107						
40108						
40109						
40110						
40111						
40112						
40113						
40114						
40115						
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40121						
40122						
40123						
40124						
40125						
40126						
40127						
40128						

MODBUS ADDRESSING

Note: Modbus address “00xxx” means Holding Register xxx

Modbus Coil Address		Read/ Write Allowed	coil = 0	coil = 1		
00001	Feedwater Fault Pump Reset	Y	Normal	Reset		
00002	DA Level Control Valve Auto/Manual	Y	Manual	Auto		
00003	ST Level Control Valve Auto/Manual	Y	Manual	Auto		
00004	Feedwater Pump Demand Auto Manual	Y	Manual	Auto		
00005	Feedwater Pump Quantity Auto Manual	Y	Manual	Auto		
00006	Feedwater Pump Lead Rotate Auto Manual	Y	Manual	Auto		
00007	DA Pressure Control Valve Auto/Manual	Y	Manual	Auto		
00008	Transfer Pump Quantity Auto/Manual	Y	Manual	Auto		
00009	Transfer Pump Lead Select Auto/Manual	Y	Manual	Auto		
00010	Transfer Pump Fault Reset	Y	Normal	Reset		
00011	Remote Alarm Silence	Y	Normal	Reset		
00012	Water Softener Manual Regen Pushbutton	Y	Normal	Regen		
00013	Water Softener Schedule Enable/Disable	Y	Made	Open		
00014	Has DA Temperature	Y	Has Not	Has		
00015	Has DA Pressure	Y	Has Not	Has		
00016	Has Feedwater Header Pressure	Y	Has Not	Has		
00017	Has Steam Pressure	Y	Has Not	Has		
00018	Has Makeup Water Flow	Y	Has Not	Has		
00019	Has Makeup Water Pressure	Y	Has Not	Has		
00020	Has Condensate Return Temperature	Y	Has Not	Has		
00021	Has Condensate Return Flow	Y	Has Not	Has		
00022	Has Surge Tank Installed	Y	Has Not	Has		
00023	Has Feedwater Headered	Y	Has Not	Has		
00024	Feedwater Header is Pressure Based	Y	No	Yes		
00025	Has DA Pressure Control Valve	Y	Has Not	Has		
00026	Send Makeup Flow to CFP	Y	Disabled	Enabled		
00027	Transfer Pump Always On	Y	No	Yes		
00028	Has DA Level Control	Y	Has Not	Has		
00029	Synchronize Time	Y	Stop	Start		
00030	Has Surge Tank Level	Y	Has Not	Has		
00031	Feedwater Pressure Setpoint Auto/Manual	Y	Manual	Auto		
00032	Softener Regen Cancel	Y	Normal	Reset		
00033	spare					
00034	spare					
00035	spare					
00036	spare					
00037	spare					
00038	spare					
00039	spare					
00040	Common Alarm		Normal	Alarm		
00041	Feedwater Pressure High Alarm		Normal	Alarm		
00042	Feedwater Pressure Low Alarm		Normal	Alarm		
00043	Feedwater Pump 1 Lead		Not Lead	Is Lead		
00044	Feedwater Pump 2 Lead		Not Lead	Is Lead		

MODBUS ADDRESSING

MODBUS ADDRESSING NUMBERS (CONTINUED)

Modbus Coil Address		Read/ Write Allowed	coil = 0	coil = 1		
00045	Feedwater Pump 3 Lead		Not Lead	Is Lead		
00046	Feedwater Pump 4 Lead		Not Lead	Is Lead		
00047	Feedwater Pump 1 Fault		Normal	Alarm		
00048	Feedwater Pump 2 Fault		Normal	Alarm		
00049	Feedwater Pump 3 Fault		Normal	Alarm		
00050	Feedwater Pump 4 Fault		Normal	Alarm		
00051	DA Low Level Alarm		Normal	Alarm		
00052	DA High Level Alarm		Normal	Alarm		
00053	DA Low Pressure Alarm		Normal	Alarm		
00054	DA High Pressure Alarm		Normal	Alarm		
00055	Transfer Pump 1 Lead		Not Lead	Is Lead		
00056	Transfer Pump 2 Lead		Not Lead	Is Lead		
00057	Transfer Pump 3 Lead		Not Lead	Is Lead		
00058	Transfer Pump 1 Fault		Normal	Alarm		
00059	Transfer Pump 2 Fault		Normal	Alarm		
00060	Transfer Pump 3 Fault		Normal	Alarm		
00061	Surge Tank Low Level Alarm		Normal	Alarm		
00062	Surge Tank Low-Low Level Alarm		Normal	Alarm		
00063	Surge Tank High Level Alarm		Normal	Alarm		
00064	Softener Regenerating		Stop	Start		
00065	Feed Water Pump 1 Active		Stop	Start		
00066	Feed Water Pump 2 Active		Stop	Start		
00067	Feed Water Pump 3 Active		Stop	Start		
00068	Feed Water Pump 4 Active		Stop	Start		
00069	Transfer Pump 1 Active		Stop	Start		
00070	Transfer Pump 2 Active		Stop	Start		
00071	Transfer Pump 3 active		Stop	Start		
00072	Feed Water Pump 1 On		Stop	Start		
00073	Feed Water Pump 2 On		Stop	Start		
00074	Feed Water Pump 3 On		Stop	Start		
00075	Feed Water Pump 4 On		Stop	Start		
00076	DA Low-Low Level		Normal	Alarm		
00077	Surge Tank Low Level Switch		Normal	Alarm		
00078	Transfer Pump 1 On		Stop	Start		
00079	Transfer Pump 2 On		Stop	Start		
00080	Transfer Pump 3 On		Stop	Start		
00081	Boiler 1 On		Stop	Start		
00082	Boiler 2 On		Stop	Start		
00083	Boiler 3 On		Stop	Start		
00084	Boiler 4 On		Stop	Start		
00085	Water Softener Alarm		Normal	Alarm		
00086	Disable All	Y	Disabled	Enabled		
00087	Feedwater Pump 1 Start		Stop	Start		
00088	Feedwater Pump 2 Start		Stop	Start		
00089	Feedwater Pump 3 Start		Stop	Start		

MODBUS ADDRESSING

MODBUS ADDRESSING NUMBERS (CONTINUED)

Modbus Coil Address		Read/ Write Allowed	coil = 0	coil = 1		
00090	Feedwater Pump 4 Start		Stop	Start		
00091	Transfer Pump 1 Start		Stop	Start		
00092	Transfer Pump 2 Start		Stop	Start		
00093	Transfer Pump 3 Start		Stop	Start		
00094	Softener Start		Stop	Start		
00095	Feedwater Pump 1 Speed in Auto		On or Off	Auto		
00096	Feedwater Pump 2 Speed in Auto		On or Off	Auto		
00097	Feedwater Pump 3 Speed in Auto		On or Off	Auto		
00098	Feedwater Pump 4 Speed in Auto		On or Off	Auto		
00099	DA Valve Valve in Auto		On or Off	Auto		
00100	DA Pressure Valve in Auto		On or Off	Auto		
00101	Surge Tank MU Valve i Auto		On or Off	Auto		
00102	Chemical Feed Pump in Auto		On or Off	Auto		
00103	Spare		No	Yes		
00104	Spare		No	Yes		
00105	Transfer Pump 1 Speed in Auto		On or Off	Auto		
00106	Transfer Pump 2 Speed in Auto		On or Off	Auto		
00107	Transfer Pump 3 Speed in Auto		On or Off	Auto		
00108	Spare					
00109	Spare					

INPUT/OUTPUT BLOCK NUMBERS

Input and output block numbers are assigned according to the physical hardwired address. Knowing the signal channel number and I/O board slot number will allow you to determine the block number. The following table provides block numbers for all Feedwater Center Models. Disregard block numbers above the number of pumps in each model.

Block Numbers	Wiring Location		Description
	Board/Slot	I/O Channels	
600	CPU/0	AI.0.1	Deaerator Tank Level
601	CPU/0	AI.0.2	Feedwater PSI
602	CPU/0	RO.0.1	Common Alarm Relay
615	DIN/1	DI.1.1	Boiler Feed Pump 1 On
616	DIN/1	DI.1.2	Boiler Feed Pump 2 On
617	DIN/1	DI.1.3	Boiler Feed Pump 3 On
618	DIN/1	DI.1.4	Boiler Feed Pump 4 On
619	DIN/1	DI.1.5	Deaerator Level LoLo
620	DIN/1	DI.1.6	Surge Tank Level LoLo
621	DIN/1	DI.1.7	Surge Tank Pump 1 On
622	DIN/1	DI.1.8	Surge Tank Pump 2 On
623	DIN/1	DI.1.9	Surge Tank Pump 3 On
624	DIN/1	DI.1.10	Boiler 1 Run
625	DIN/1	DI.1.11	Boiler 2 Run
626	DIN/1	DI.1.12	Boiler 3 Run
627	DIN/1	DI.1.13	Boiler 4 Run
628	DIN/1	DI.1.14	H2O Soft Alarm
629	DIN/1	DI.1.15	Disable All (BAS Contact)
630	ROUT/2	RO.2.1	Boiler Feed Pump 1 Start Circuit
631	ROUT/2	RO.2.2	Boiler Feed Pump 2 Start Circuit
632	ROUT/2	RO.2.3	Boiler Feed Pump 3 Start Circuit
633	ROUT/2	RO.2.4	Boiler Feed Pump 4 Start Circuit
634	ROUT/2	RO.2.5	Surge Tank Pump 1 Start Circuit
635	ROUT/2	RO.2.6	Surge Tank Pump 2 Start Circuit
636	ROUT/2	RO.2.7	Surge Tank Pump 3 Start Circuit
637	ROUT/2	RO.2.8	Start Softener Regenerator
645	A/M-AOUT/3	AM.3.1	Boiler Feed Pump 1 Speed
646	A/M-AOUT/3	AM.3.2	Boiler Feed Pump 2 Speed
647	A/M-AOUT/3	AM.3.3	Boiler Feed Pump 3 Speed
648	A/M-AOUT/3	AM.3.4	Boiler Feed Pump 4 Speed
649	A/M-AOUT/3	AM.3.5	Spare

TROUBLESHOOTING

INPUT/OUTPUT BLOCK NUMBERS (CONTINUED)

Block Numbers	Wiring Location		Description
	Board/Slot	I/O Channels	
660	A/M-AOUT/4	AM.4.1	Deaerator PSI Control Valve
661	A/M-AOUT/4	AM.4.2	Surge Tank Make Up Water Valve
662	A/M-AOUT/4	AM.4.3	Make-Up Flow Retransmit to Chemical Feed Pump
663	A/M-AOUT/4	AM.4.4	DA Level Valve Demand
664	A/M-AOUT/4	AM.4.5	Spare
675	A/M-AOUT/5	AM.5.1	Surge Tank Pump 1 Speed
676	A/M-AOUT/5	AM.5.2	Surge Tank Pump 2 Speed
677	A/M-AOUT/5	AM.5.3	Surge Tank Pump 3 Speed
678	A/M-AOUT/5	AM.5.4	Spare
679	A/M-AOUT/5	AM.5.5	Spare
690	AIN/6	AI.6.1	Surge Tank Level
691	AIN/6	AI.6.2	Deaerator Tank Pressure
692	AIN/6	AI.6.3	Deaerator Tank Temperature
693	AIN/6	AI.6.4	Steam Pressure
694	AIN/6	AI.6.5	Make Up Water Flow
695	AIN/6	AI.6.6	Make Up Water Pressure
696	AIN/6	AI.6.7	Condensate Return Temperature
697	AIN/6	AI.6.8	Condensate Return Flow

TROUBLESHOOTING

FEEDWATER CENTER SENSOR DATA

Temperature				Temperature Transmitters											
Thermistor				0-25 F				0-200 F				0-500 F			
deg. F	ohms	Volts @ '+' Terminal	AIN %	Fg	mA	Volts @ '+' Terminal	AIN %	Fg	mA	Volts @ '+' Terminal	AIN %	Fg	mA	Volts @ '+' Terminal	AIN %
-50	335058	0.145	0.00	0.0	4.00	1.00	0.00	0	4.00	1.00	0.00	0	4.00	1.00	0.00
-45	283052	0.171	1.43	0.5	4.32	1.08	2.00	5	4.40	1.10	2.50	10	4.32	1.08	2.00
-40	239832	0.200	2.86	1.0	4.64	1.16	4.00	10	4.80	1.20	5.00	20	4.64	1.16	4.00
-35	203803	0.234	4.29	1.5	4.96	1.24	6.00	15	5.20	1.30	7.50	30	4.96	1.24	6.00
-30	173678	0.272	5.71	2.0	5.28	1.32	8.00	20	5.60	1.40	10.00	40	5.28	1.32	8.00
-25	148416	0.316	7.14	2.5	5.60	1.40	10.00	25	6.00	1.50	12.50	50	5.60	1.40	10.00
-20	127171	0.365	8.57	3.0	5.92	1.48	12.00	30	6.40	1.60	15.00	60	5.92	1.48	12.00
-15	109254	0.419	10.00	3.5	6.24	1.56	14.00	35	6.80	1.70	17.50	70	6.24	1.56	14.00
-10	94104	0.480	11.43	4.0	6.56	1.64	16.00	40	7.20	1.80	20.00	80	6.56	1.64	16.00
-5	81258	0.548	12.86	4.5	6.88	1.72	18.00	45	7.60	1.90	22.50	90	6.88	1.72	18.00
0	70338	0.622	14.29	5.0	7.20	1.80	20.00	50	8.00	2.00	25.00	100	7.20	1.80	20.00
5	61031	0.704	15.71	5.5	7.52	1.88	22.00	55	8.40	2.10	27.50	110	7.52	1.88	22.00
10	53081	0.793	17.14	6.0	7.84	1.96	24.00	60	8.80	2.20	30.00	120	7.84	1.96	24.00
15	46270	0.889	18.57	6.5	8.16	2.04	26.00	65	9.20	2.30	32.50	130	8.16	2.04	26.00
20	40424	0.992	20.00	7.0	8.48	2.12	28.00	70	9.60	2.40	35.00	140	8.48	2.12	28.00
25	35394	1.101	21.43	7.5	8.80	2.20	30.00	75	10.00	2.50	37.50	150	8.80	2.20	30.00
30	31055	1.218	22.86	8.0	9.12	2.28	32.00	80	10.40	2.60	40.00	160	9.12	2.28	32.00
35	27306	1.340	24.29	8.5	9.44	2.36	34.00	85	10.80	2.70	42.50	170	9.44	2.36	34.00
40	24058	1.468	25.71	9.0	9.76	2.44	36.00	90	11.20	2.80	45.00	180	9.76	2.44	36.00
45	21239	1.601	27.14	9.5	10.08	2.52	38.00	95	11.60	2.90	47.50	190	10.08	2.52	38.00
50	18787	1.737	28.57	10.0	10.40	2.60	40.00	100	12.00	3.00	50.00	200	10.40	2.60	40.00
55	16649	1.876	30.00	10.5	10.72	2.68	42.00	105	12.40	3.10	52.50	210	10.72	2.68	42.00
60	14783	2.018	31.43	11.0	11.04	2.76	44.00	110	12.80	3.20	55.00	220	11.04	2.76	44.00
65	13149	2.160	32.86	11.5	11.36	2.84	46.00	115	13.20	3.30	57.50	230	11.36	2.84	46.00
70	11717	2.302	34.29	12.0	11.68	2.92	48.00	120	13.60	3.40	60.00	240	11.68	2.92	48.00
75	10460	2.444	35.71	12.5	12.00	3.00	50.00	125	14.00	3.50	62.50	250	12.00	3.00	50.00
80	9353	2.584	37.14	13.0	12.32	3.08	52.00	130	14.40	3.60	65.00	260	12.32	3.08	52.00
85	8377	2.721	38.57	13.5	12.64	3.16	54.00	135	14.80	3.70	67.50	270	12.64	3.16	54.00
90	7516	2.855	40.00	14.0	12.96	3.24	56.00	140	15.20	3.80	70.00	280	12.96	3.24	56.00
95	6754	2.984	41.43	14.5	13.28	3.32	58.00	145	15.60	3.90	72.50	290	13.28	3.32	58.00
100	6079	3.110	42.86	15.0	13.60	3.40	60.00	150	16.00	4.00	75.00	300	13.60	3.40	60.00
105	5479	3.230	44.29	15.5	13.92	3.48	62.00	155	16.40	4.10	77.50	310	13.92	3.48	62.00
110	4947	3.345	45.71	16.0	14.24	3.56	64.00	160	16.80	4.20	80.00	320	14.24	3.56	64.00
115	4472	3.455	47.14	16.5	14.56	3.64	66.00	165	17.20	4.30	82.50	330	14.56	3.64	66.00
120	4050	3.559	48.57	17.0	14.88	3.72	68.00	170	17.60	4.40	85.00	340	14.88	3.72	68.00
125	3672	3.657	50.00	17.5	15.20	3.80	70.00	175	18.00	4.50	87.50	350	15.20	3.80	70.00
130	3334	3.750	51.43	18.0	15.52	3.88	72.00	180	18.40	4.60	90.00	360	15.52	3.88	72.00
135	3031	3.837	52.86	18.5	15.84	3.96	74.00	185	18.80	4.70	92.50	370	15.84	3.96	74.00
140	2760	3.919	54.29	19.0	16.16	4.04	76.00	190	19.20	4.80	95.00	380	16.16	4.04	76.00
145	2516	3.995	55.71	19.5	16.48	4.12	78.00	195	19.60	4.90	97.50	390	16.48	4.12	78.00
150	2297	4.066	57.14	20.0	16.80	4.20	80.00	200	20.00	5.00	100.00	400	16.80	4.20	80.00
155	2099	4.133	58.57	20.5	17.12	4.28	82.00					410	17.12	4.28	82.00
160	1921	4.194	60.00	21.0	17.44	4.36	84.00					420	17.44	4.36	84.00
165	1760	4.252	61.43	21.5	17.76	4.44	86.00					430	17.76	4.44	86.00
170	1614	4.305	62.86	22.0	18.08	4.52	88.00					440	18.08	4.52	88.00
175	1483	4.354	64.29	22.5	18.40	4.60	90.00					450	18.40	4.60	90.00
180	1363	4.400	65.71	23.0	18.72	4.68	92.00					460	18.72	4.68	92.00
185	1255	4.443	67.14	23.5	19.04	4.76	94.00					470	19.04	4.76	94.00
190	1156	4.482	68.57	24.0	19.36	4.84	96.00					480	19.36	4.84	96.00
195	1067	4.518	70.00	24.5	19.68	4.92	98.00					490	19.68	4.92	98.00
200	985.1	4.552	71.43	25.0	20.00	5.00	100.00					500	20.00	5.00	100.00
205	910.7	4.583	72.86												
210	842.7	4.611	74.29												
215	780.6	4.638	75.71												
220	723.8	4.663	77.14												
225	671.8	4.685	78.57												
230	624.1	4.706	80.00												
235	580.4	4.726	81.43												
240	540.2	4.744	82.86												
245	503.2	4.760	84.29												
250	469.2	4.776	85.71												
255	437.9	4.790	87.14												
260	409.0	4.804	88.57												
265	382.3	4.816	90.00												
270	357.7	4.827	91.43												
275	334.9	4.838	92.86												
280	313.9	4.848	94.29												
285	294.3	4.857	95.71												
290	276.3	4.866	97.14												
295	259.5	4.874	98.57												
300	243.9	4.881	100.00												

TROUBLESHOOTING

EXAMINE BLOCKWARE TROUBLESHOOTING SCREEN

This screen is used by technicians to troubleshoot blockware logic and field wiring problems. The screen allows the technician to view all inputs and outputs of any block in the Feedwater Center in near real time.

NOTE

All data displayed is in 0.00 - 100.00% (analog) or 0 -1 (discrete) format. The Engineering Units from other LCD display screens are not applied to the examine screen.

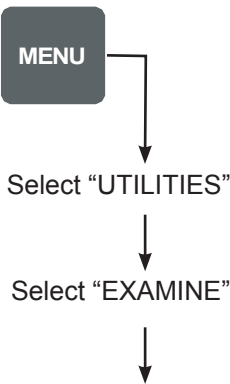
The examine screen only displays data. The user can not change any blockware data from the examine screen.

The up and down arrows scroll the displayed block numbers up and down one line or one page at a time.

Alternatively, to display a specific block number, type in the block number on the numeric keypad, and then press ENTER.

The examine screen can show different levels of detail:

Select the Aux Outs and Inputs to show these values. An Aux Out is offset and shows the type of output (i.e. 7.NOT is the Not output from block 7). An Input is shown with an astric * and then block number that is the input.



EXAMINE			
B4	PWC		1
4.LOBAT	Clock Battery Low Volt		0
*2	*REMOTE ALARM SILENCE		0
B6	PB		0
6.NOT	NOT		1
B7	PB		1
7.NOT	NOT		0
B8	PSCHED		3.00
8.PRI	PRIMARY PAGER		1.00
8.BACK	BACKUP PAGER		2.00
B9	PAGER		0
9.ACK	ACK PENDING		0
9.NMDM	NO MODEM INSTALLED		1
Start Blk:	4 Aux Outs: ON	Inputs: ON	



Scroll one line at a time, or one page at a time with arrow keys.

TROUBLESHOOTING

DOWNLOADING BLOCKWARE INTO THE FEEDWATER CENTER

The blockware logic is created and edited with the PWC_Edit configuration software on a MS Windows 98 up to XP based personal computer. All blockware soft wiring, screen creation, and chart data entry is done in PWC_Edit on the computer. Block parameters can be edited either in PWC_Edit or from the LCD display via the Edit Parameters Menu.

The Feedwater Center's CPU has a programming port connector marked COM 1 that is dedicated to blockware down loading and up loading with PWC_Edit. The P/N 92402 cable is wired straight through, pin-pin, with one male DB-9 and one female DB-9 connector at each end. The programming port is always configured as 38,400 baud, odd parity.

WARNING:

During the down load process, the Feedwater Center stops executing the blockware, and outputs are frozen at the last value. After the down load completes, the Feedwater Center automatically turns off all outputs, re-boots, and then re-starts the blockware. Do not down load blockware unless you are familiar with the operation of all connected equipment, and the consequences of rapid stopping and starting of this equipment. This can cause equipment damage, operator injury, or death.

TROUBLESHOOTING

HISTORICAL UTILITIES DISPLAY SCREEN

The Historical Utilities is used to troubleshoot the historical memory. This page should only be used in cases when memory is damaged by changing the time and date on the Feedwater Center. While the various utilities screens are shown, all data recording is disabled.

- 1) Checks to see if the board is present or not, performs a write test, displays the down demand status and number of charts currently defined.
- 2) Shows the lookup table. Enter a starting address and press enter. Displays the first timestamp in each address
- 3) Scans the entire media and store the first timestamp in each address in the lookup table
- 4) Enter a start address and an end address. This will scan the address range for problems such as:
 - Unreadable addresses
 - Invalid timestamps
 - Future timestamps
 - Dates out of order
 - Time range within an address >32 hrs.
- 5) Same as 4) only scans the entire card. Takes more than 10 minutes
- 6) Enter a start address and end address. Erases addresses in that range
- 7) Erases the entire card

Historical Utilities

Recording Disabled For Utility Screens

Choose a Function

- 1) Test Storage Media
- 2) View Lookup Table
- 3) Rebuild Lookup Table
- 4) Scan Address Range for Problems
- 5) Scan Entire Media for Problems
- 6) Erase Address Range
- 7) Erase Entire Media

Press ESC, HOME or MENU to EXIT

Note:

For Troubleshooting Purposes.
Use only when adjusting Time/Date.

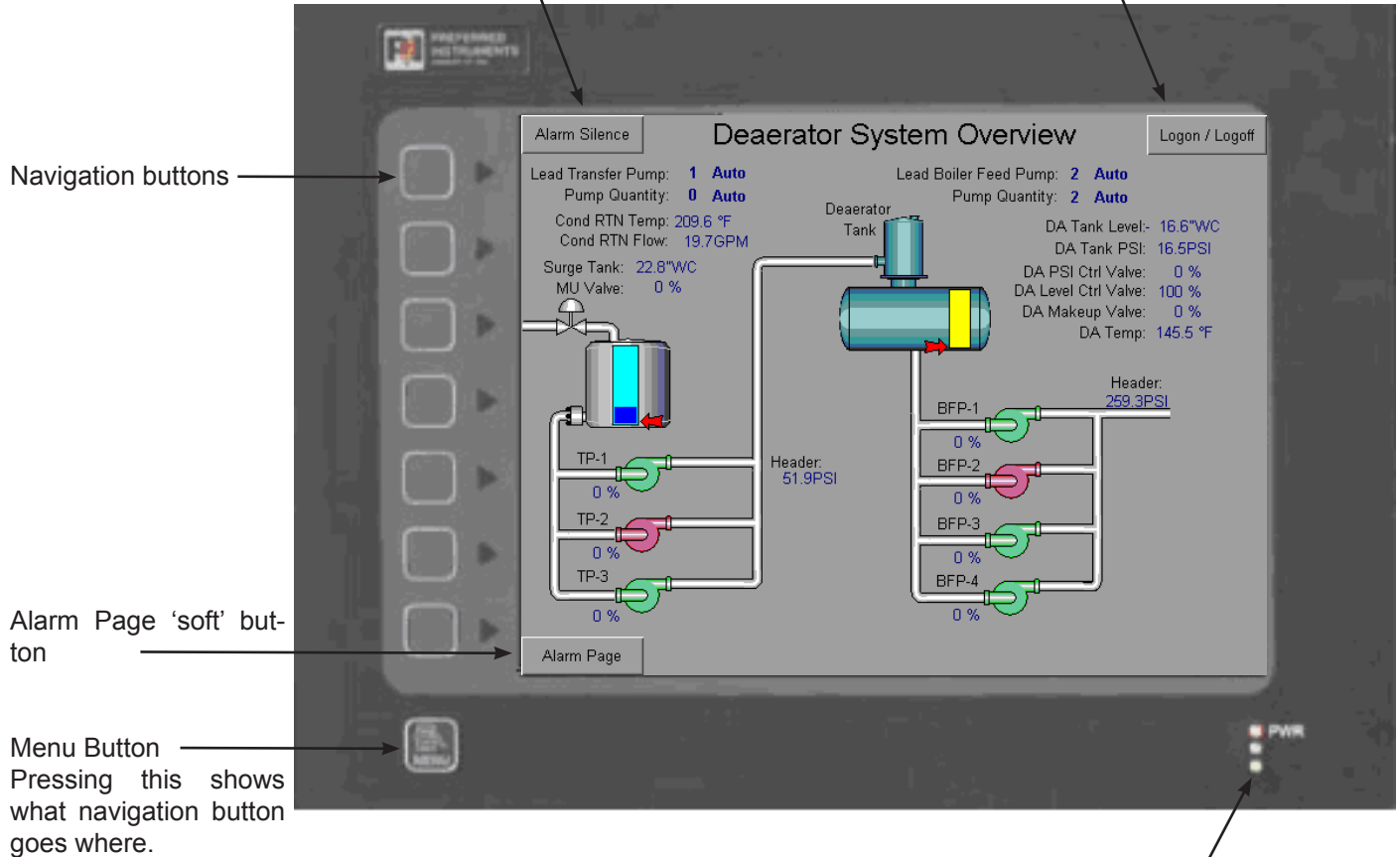
TOUCHSCREEN DISPLAY NAVIGATION

Alarm Silence Button:

Press button to silence alarm horn or bell.

Login Button:

Press Button to show the User Login Screen.



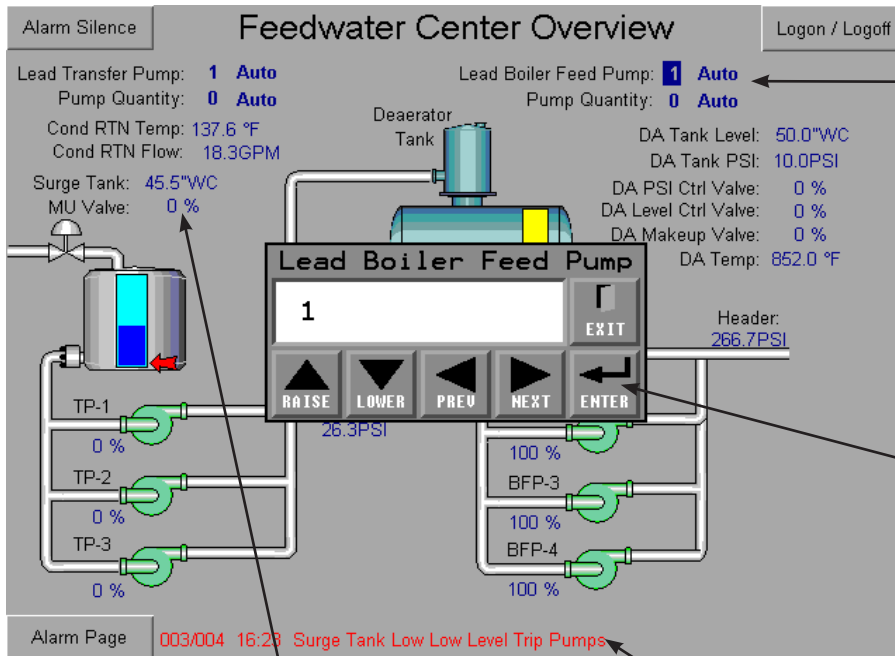
Main Page / OIT Buttons

The 10" OIT screen includes eight buttons, seven of them are the screen navigation buttons, and one is the Menu button. The Menu button brings up a pop up window showing the user where each of the seven navigation buttons go to.

Front Panel LEDs:

- Red On = Unit is powered and running an application.
- Yellow On = Valid Compact Flash card present.
- Green On = No Alarm present
- Green Flash = Alarm present

TOUCHSCREEN DISPLAY NAVIGATION



Editable Values:

Are soft buttons that can be edited, touching them brings up a value editing box. Editable values are shown in Bold Blue, when selected they get highlighted in a navy blue box and when touched again bring up value editing.

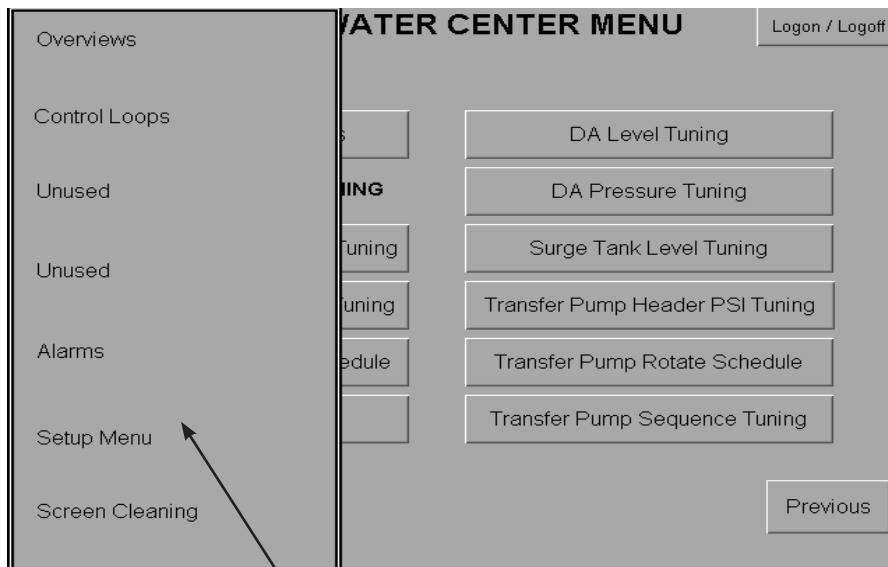
Value Editing Box.

Input Values:

Values read from the PWC, these are Read only Values.

Alarm Line:

The most recent alarms are flashed on this bottom line, the line scrolls through all un-acknowledged alarms.

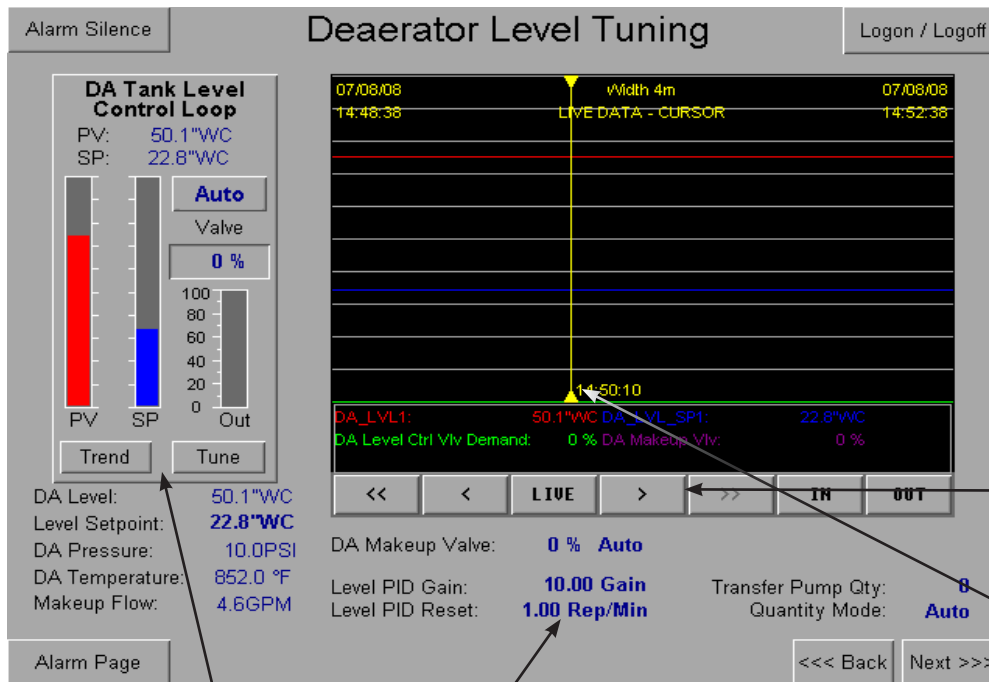


Menu Button Popup

This window pops up when the menu button is pressed, it shows which navigation goes to what page.

TOUCHSCREEN DISPLAY NAVIGATION

TUNING SCREENS



Tune Trend Buttons

Trend is the normal view, when Tune is pressed, on the bottom right of the screen tuning parameters appear. In this box there is also an Auto/Man button and a speed/valve control. You have to be in Manual mode to change the speed/valve %.

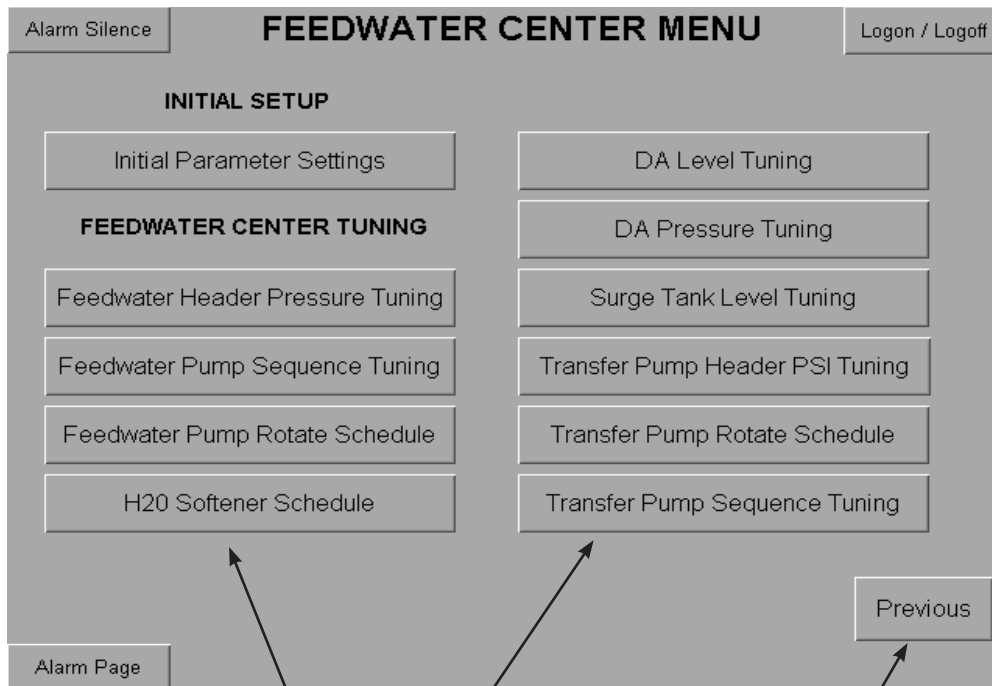
Tuning navigation

Using the BACK and NEXT buttons you can navigate through the different tuning screens.

Graph Buttons:

The graph shows LIVE data normally, you can use the arrows to go back and forth through previous times to view events. You can also touch anywhere on the graph and bring up the cursor so you can view exactly at what time an event happened. Pressing IN and OUT creates a smaller or bigger timeline. Pressing the LIVE button gets rid of the cursor.

TOUCHSCREEN DISPLAY NAVIGATION



System Menu

Each of these pushbuttons brings up another screen or menu. The Initial parameter settings button brings you to the basic setup page where the sensors pumps and scope of things used in the system is determined.

Previous

Using the Previous button, the last screen seen before entering the system menu screen will be navigated to.

TOUCHSCREEN DISPLAY NAVIGATION

Alarm Silence

Logon / Logoff

BOILER FEED PUMP LEAD/LAG SEQUENCE TUNING

HEADER/DEMAND BASED LAG PUMP START-STOP:

- 15 PSI, SP DEVIATION START LAG
- 80 DEMAND %, ADD A LAG PUMP
- 15 SECONDS, ADD A LAG DELAY

- 0 PSI, SP DEVIATION STOP LAG
- 5 DEMAND %, STOP A LAG PUMP
- 15 SECONDS, STOP A LAG DELAY

ADDITIONAL PUMP START/STOP PREVENTION:

- 30 SECONDS, ADDITIONAL PUMP START DELAY
- 30 SECONDS, ADDITIONAL PUMP STOP DELAY

Previous

Alarm Page

Parameter Tuning Page

On the parameter tuning screen each parameter is editable and needs to be checked and set during commissioning of the system.

TOUCHSCREEN DISPLAY NAVIGATION

Alarm Silence

Logon / Logoff

Initial Setup Parameters

SENSORS:

DA TEMPERATURE (AI 6.1): Installed

DA PRESSURE (AI 6.2): Installed

FEEDWATER PRESSURE (AI 6.3): Installed

TRANSFER HEADER PRESSURE (AI 6.4): Installed

MAKE UP FLOW (AI 6.5): Installed

MAKE UP PRESSURE (AI 6.6): Installed

CONDENSATE RETURN TEMP (AI 6.7): Installed

CONDENSATE RETURN FLOW (AI 6.8): Installed

SCOPE:

SURGE TANK IN USE: Installed

FEEDWATER PIPING: Boiler Specific

FEEDWATER CONTROL: Per Boiler

DA PSI CONTROL VALVE: Disabled

SEND MU FLOW TO CFP: Yes

QUANTITY OF PUMPS:

FEEDWATER PUMPS: 4

TRANSFER PUMPS: 3

Previous

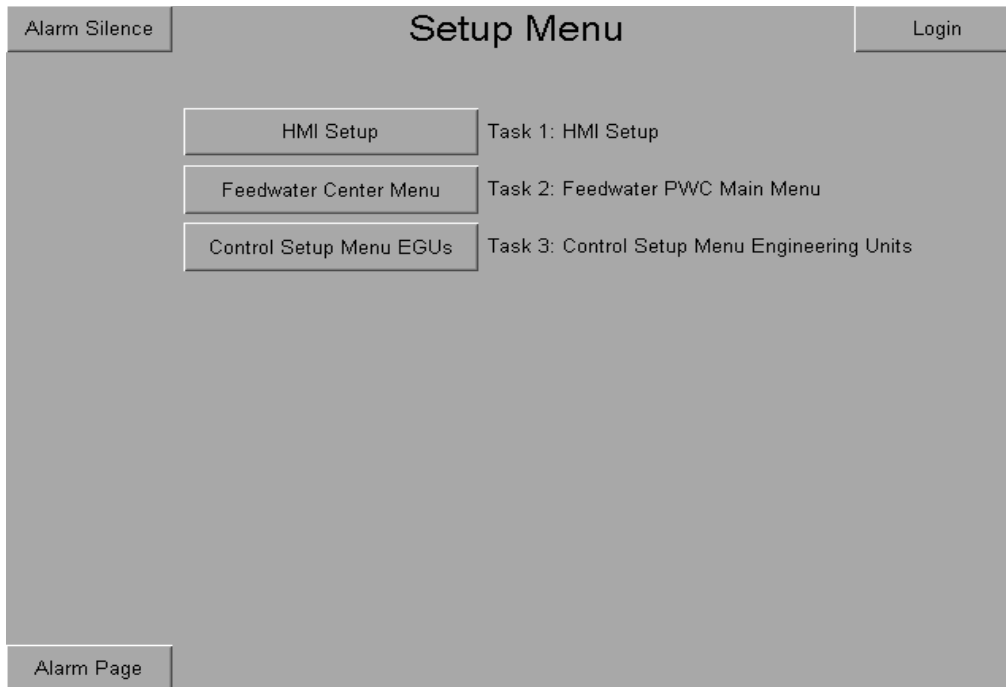
Alarm Page

Parameter editing:
Each of these parameters are editable, select and then push again to bring up the value editing box.

Initial Setup Parameters

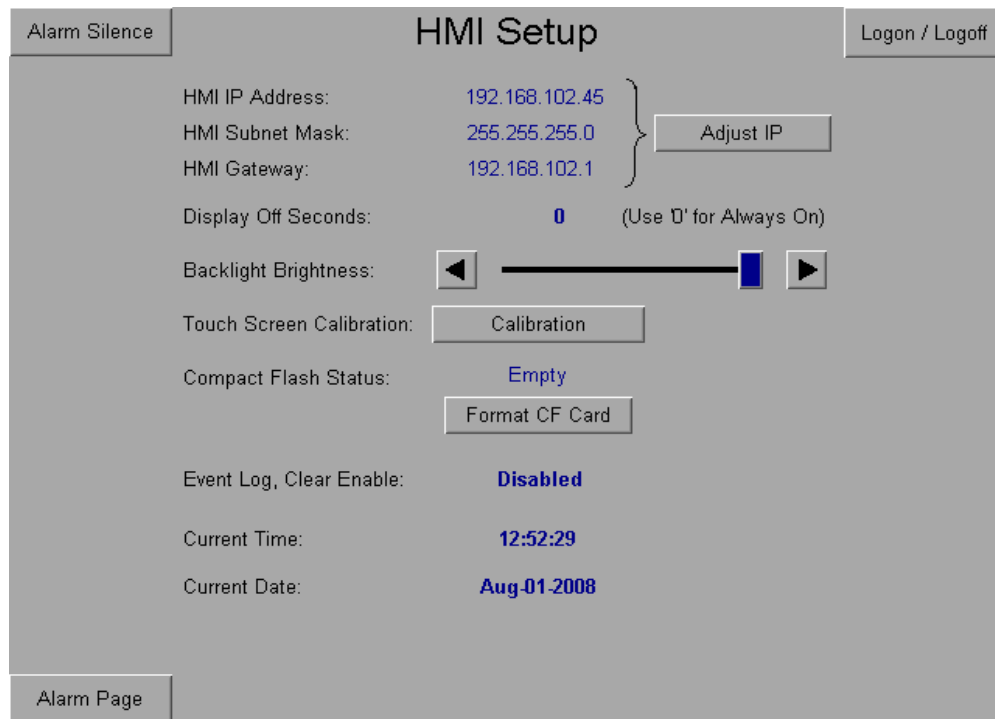
Initial parameters page is where the operator puts in what kind of setup is at the facility. The amount of feedwater and transfer pumps, surge tank use, piping, etc.

TOUCHSCREEN DISPLAY NAVIGATION



Setup Menu Page:

From here you can go into the HMI setup, the Feedwater Center Menu, and the Control setup Menu EGUs (Engineering Units.)



OIT JC-FWC-XX Version:
Below the current date is the OIT and the Controller versions.

TOUCHSCREEN DISPLAY NAVIGATION

Alarm Silence	Control Setup				Login				
						Sensors:	Zero:	Span:	EGU:
						DA Tank Level	0.0	66.6	WC"
						DA Tank PSI	0.0	50.0	PSI
						DA Tank Temperature	0.0	500.0	°F
						Feed Water HDR PSI	0.0	300.0	PSI
						Condensate Transfer PSI	0.0	100.0	PSI
						Soft Water Make Up Flow	0.0	30.0	GPM
						Surge Tank level	0.0	66.6	WC"
						Soft Water Make Up PSI	0.0	100.0	PSI
						Condensate Return Flow	0.0	30.0	GPM
						Condensate Return Temp	0.0	500.0	°F
Alarm Page									

Control Setup:

This is where the zero and span of the sensors are entered. If the DA tank level sensor reads 66.6"WC at its highest, and 0 at its lowest, you would put zero in the zero and 66.6 in the span. The same goes for the pressure, temperature and flow sensors. Any unused sensors can be left blank ie Zero: 0 Span: 0.

SPECIFICATIONS

MODEL NUMBER LIST

Model	Description	Hardware Summary
-FC	Full Control	PWCN4-CDRO00A
-NV	No VSDs	PWCN4-CDROxxA
-NS	No Surge Tank/Transfer Pumps	PWCN4-CDHO0xA
-NVS	No VSDs and no Surge Tank/Transfer Pump	PWCN4-CDHxxxx

FWC	-FC	-NV	-NS	-NVS
DIN				
FW Pump Running	4	4	4	4
Boiler Running	4	4	4	4
TP Pump Running	3	3		
DA Low Level Cutoff Switch	1	1	1	1
ST Low Level Cutoff Switch	1	1		1
Water Softener Alarm	1	1	1	1
Disable	1	1	1	1
AIN				
DA Level	1	1	1	1
DA Temp	1	1	1	
DA PSI	1	1	1	
FW Header PSI	1	1	1	1
Steam PSI	1	1	1	
Makeup Flow	1	1	1	
Makeup Pressure	1	1	1	
Condensate Return Temp	1	1	1	
Condensate Return Flow	1	1	1	
Surge Tank Level	1	1		
DOUT				
FW Pump Start	4	4	4	4
TP Pump Start	3	3		
Water Softener Regen Cycle	1	1	1	
AOUT				
FW Pump Speed	4		4	
TP Pump Speed	3			
ST MU Water Valve	1	1		
Chem Feed Pump	1	1	1	
DA PSI Control Valve	1	1	1	
DA Level Control Valve	1	1	1	

SPECIFICATIONS

FEEDWATER CENTER CONTROLLER PART LIST

Description	Part Number
CPU Board	190601
Modem Board Daughter Board	190603
32 Mb Historical Memory Daughter Board	190604
14 pt field wiring connector	92343
120 V Discrete Input Board, 15 channel	190608
20 pt field wiring connector	92347
6 pt field wiring connector	92314
2 A slo-blo fuse	92361
Hand-Off-Auto Relay Output Board, 5 channel	190611
10 pt field wiring connector	92315
6 pt field wiring connector	92314
2 A slo-blo fuse	92361
Relay Output Board, 8 channel	190617
18 pt field wiring connector	92346
6 pt field wiring connector	92314
2 A slo-blo fuse	92361
Universal Analog Input Board, 8 channel	190609
12 pt field wiring connector	92379
Input Type Selector Jumper	190620
Input Type Selector Window	90190
Auto-Manual Station Analog Output Board, 5 channel	190613
Isolated 135 ohm Output Daughter Board	190615
Isolated 4-20 mA Output Daughter Board	190616
15 pt field wiring connector	92345
Keyboard	90180
Clock Battery	92326
26 pin cable	92359
LCD Display	92357
Protective Window	92377
20 pin cable	92358
Power Input Board	190619
4 pt field wiring connector	92348
2 A slo-blo fuse	92361
8 A slo-blo fuse	92328
12 A slo-blo fuse	92329
DC Power Supply	92356
Mother Board	190600
PWC Edit Software	PWC_Edit
Download Cable, 6 ft	92402

SPECIFICATIONS

FEEDWATER CENTER SPECIFICATIONS

Mechanical:

Enclosure Size: 35" H x 20" W x 10"
Enclosure Type: Wall Mount, NEMA 4
Mounting Hole Pattern: (4) 5/16" dia.
Weight: 70 lbs.

Environmental:

Operating Temp: 32 to 122oF (0 to 50oC)
Storage Temp: -20 to 150oF (-28 to 65oC)
Humidity Limits: 15 to 95% (non-condensing)

Performance:

Accuracy: 0.15% Analog I/O 70 F
Resolution: 16 bit input / 11 bit output
Execution Cycle: Five per second
Non-Volatile Memory Life: 15 yrs

Operator Control Panel:

LCD Display: Monochrome, LED Backlit
Size: 2.75" H x 5" W Alphanumeric: 16 Lines
x 40 characters Graphics: 160 x 240 pixels
Push buttons: Membrane, tactile feedback with full numeric keypad and cursor arrow keys
Faceplate: Mylar, splash proof

Electrical:

Feedwater Center Power Requirements: 120 Vac (+/- 15%)
0.5 A internal + external Aux. Output
120 V Load
Auxiliary 120 Vac Load: 11 A maximum (total of all modules + Auxiliary Output Terminal F3)
24 Vdc Field Power Supply: 300 mA (CPU terminal 7) Each CPU & AIN Analog Input: 35 mA
5 Vdc Field Power Supply: Each CPU & AIN Analog Input: 15 mA
15 Vdc Field Power Supply: Each AIN Analog Input: 35 mA

CPU Board (190601):

Analog Inputs: Quantity: 2
Each channel independently field selectable as:
- 2 wire 4-20 mA
- 10k Thermistor (-50 to +300 F)
Relay Output: Quantity: 1
SPDT, 8 FLA, ½ Hp-120 Vac
Real Time Clock: Battery Backed, 2 Yrs without AC Power
Historical Memory: 32 Mb, non-volatile, plug-in daughter board (Optional)
Communications: Programming Port
Building Automating Interface
- RS485 2 wire, optically isolated, 1200-38400 Baud Modbus RTU or ASCII Slave Protocols
- Telephone Modem, plug-in daughter-board (Optional)

DIN Board (190608):

Discrete Inputs: Quantity: 15
120 Vac, 15 mA
Status LED for each Input channel

HOA-ROUT Board, Hand-Off-Auto Relay Output (190611):

Discrete Outputs: Quantity: 5
Isolated Relay Contact with Hand-Off-Auto Bypass Toggle Switch.
Relay and Toggle Switch: SPST NO, 8 FLA, ½ Hp-120 Vac
Green LED indicates CPU 'Auto' Command (each channel)

Red LED indicates contact output status
Toggle Switch position monitored by Feedwater Center CPU

ROUT Board, Relay Output (190617):

Discrete Outputs: Quantity: 8
(2) SPDT, (6) SPST NO
8 FLA, ½ Hp-120 Vac
Red LED indicated Feedwater Center CPU Command (each channel)

AIN Board, Universal Analog Input (190609):

Analog Inputs: Quantity: 8
Each channel independently field selectable as:
2 wire 4-20 mA
10k Thermistor (-50 to +300 F)
Type J Thermocouple (0-1000 F)
Type K Thermocouple (0-2000 F)
5 Vdc / 15 mA
0-15 Vdc Pulse, 4000 Hz - 0.25 ppm
Red LED for each channel indicates when signal is within -3 to +103% range

A/M-AOUT Board, Auto/Manual Station Analog Output (190613):

Analog Inputs: Quantity: 5
Each channel independently field selectable as:
3 wire Pot
Compatible with Honeywell Series 90 Input Mod Motors
(1) 190615 plug-in daughter board for each output
(1) 190616 plug-in daughter board for each output
Isolated 135 ohm
Isolated 4-20 mA

Isolated 24 Vdc power is provided
650 ohm maximum loop load
Output Bargraph for each channel
10 segments, 5% resolution
Auto/Manual Switch and Manual Station Knob for each channel
Manual Mode capability when Feedwater Center CPU is not running

Specifications subject to change without notice.

NOTES:



Preferred Instruments

<http://www.PreferredInstruments.com>

Preferred Instruments
A Division of Preferred Utilities Mfg. Corp.

31-35 South St.

Danbury, CT 06810

Phone: (203) 743-6741

Fax: (203) 798-7313

Email: info@preferred-mfg.com