

TS-D Series

Deaerator, Surge, and/or Condensate Control Panel



Description

A TS-D... series control system manages pump lead/lag operation of an individual deaerator (DA), surge tank, condensate tank, or a combination DA and surge/condensate tank for up to six pumps.

Each TS-D... control system includes a pre-programmed 6" or 10" touchscreen, programmable logic controller (PLC), and digital and analog inputs/outputs for monitoring and control.

Flexible communication interface options to the building management system (BMS) provide streamlined data collection, monitoring, and control.

Table of Contents

Caution	4
Introduction	5
System Features.....	6
Pump Lead/Lag Sequence of Operation	7
Feedwater Pumps Lead/Lag Operation	9
Feedwater Pumps Lead/Lag Alternation.....	10
General Setup	11
Current Switch Calibration	13
Alarms and Touchscreen Annunciations.....	14
Devices, Modbus Setup, and Parameters	15
Control System Nomenclature	16
Logging In.....	18
Configuration/Setup.....	20
Tank/Pump	21
Deaerator Tank Only	21
Surge Tank Only	29
Condensate Tank Only	37
Split or Dual Tank Deaerator and Surge.....	42
DA Tank Two Groups.....	50
Analog Inputs	58
Analog Outputs.....	60
RTD Inputs	62
VFD Option and PID	64
DA Water Level Control	67
DA Tank Steam Pressure	70
Date and Time	71
HMI (Human Machine Interface) IP Address	72
Setup Enable or Disable	74

Flow Totalization	76
Overview.....	80
General Split tank	80
General DA tank	81
General Surge tank	82
General Deaerator tank 2 groups.....	83
DA Lead/Lag Setup	84
DA lead/lag setup, based on feedwater pressure with starter control	84
DA lead/lag setup, based on feedwater pressure with VFD.....	85
DA lead/lag setup, based on header pressure and offset with starter control.....	86
DA lead/lag setup, based on header pressure and offset with VFD	87
Surge Tank Lead/Lag Setup	92
SRG lead/lag setup, based on transfer pressure with starter control	92
SRG lead/lag setup, based on transfer pressure with VFD.....	93
Condensate Tank Lead/Lag	98
Analog Display.....	101
DA Water Level	104
Surge Tank Water Level.....	105
DA Tank Steam Pressure	106
PID	107
Chemical Pump	108
Flow Totalization.....	110
Alarms.....	113
Program Information.....	115
Gateway/BMS Modbus TCP/IP Standard Interface	116
Appendix - RWF55 configuration for Modbus.....	119



Caution

SCC DA, surge, and condensate tank control system is a proprietary system. SCC Inc. will not assume responsibility for damage resulting from unauthorized modification to the system.

All activities such as mounting, installation, service work, etc. must be performed by qualified staff.

Before performing any work in the connection area of the DA, surge, and condensate tank control system, disconnect power from the main disconnect switch.

Protection against electrical shock hazard on the DA, surge, and condensate tank control system, as well as on all connected electrical components, must be ensured through proper wiring and grounding practices.

Fall or shock can adversely affect the functionality of the DA, surge, and condensate control system. The technician is solely responsible for verifying the correct field wiring practices.

Introduction

The DA, surge, and condensate tank control system is set to manage the operation, lead/lag, and rotation of the feedwater and/or transfer water pumps. It is also set to maintain an adjustable water level setpoint. The system can start and stop feed or transfer water pumps based on adjustable pressure setpoints. The system will provide appropriate information about the functionality and status of all pumps by monitoring the current switches, tank pressures, temperature, feedwater, and transfer water pressures.

System Features

- Maintaining feedwater and transfer water manifold pressures
- Maintaining DA and surge water level based on an adjustable setpoint
- Monitoring high water and low water float controller status
- Monitoring pump status via current switches
- Monitoring system alarms
- Feed and transfer water pumps' lead/lag and rotation based on run time in hours
- Monitoring DA steam pressure and steam pressure control (optional)
- Monitoring DA and surge tank water levels, and performing make up water controls
- Controlling pump ON/OFF
- Controlling pump with variable speed drives
- 6" or 10" touchscreen
- Modbus TCP/IP standard for BMS interface
- SCC Master lead/lag system interface
- Field configured RTD and analog inputs
- Optional BacNET, LonWorks, Johnson Controls N2, and Modbus RTU

Pump Lead/Lag Sequence of Operation

1. Each pump motor has a status monitoring current switch and a Hand-Off-Auto selector switch. Pump status and run mode are displayed on the HMI, indicating pump availability and readiness.
2. If the system's pumps are placed in HAND position, the pumps will continuously run, unless there is an alarm present or low/low water level is detected at the low water cutoff.
3. If the pumps are placed in the AUTO position, then the DA and Surge control system will monitor, start, and modulate all pump VFDs to maintain feedwater or transfer water pressure setpoints.
4. Starter pump motor start sequence of operation:
 - When all pumps are placed in AUTO position, the lead pump will be commanded ON, and will stay ON as long as there is no alarm or pump rotation.
 - If the feedwater or transfer water pressure drops below the minimum pressure setpoint for an adjustable time delay of 1 to 1800 seconds, lag 1 pump will start. With the lead and lag pumps running, if the feedwater pressure drops below the minimum water pressure setpoint again, lag 2 pump will start.
 - The system will continue adding pumps whenever the feed or transfer water pressure drops below the minimum allowable pressure setpoint.
 - When the combination of lead and lag pumps raise the feedwater pressure above an adjustable pressure setpoint for the adjustable time delay, the last lag pump will be dropped offline. If the pressure rises above the high pressure setpoint again, then the second to last lag pump will be dropped offline.
 - The system keeps on shutting down lag pumps whenever the feed or transfer water pressure rises above high pressure setpoint.
 - The RWF55 water level control will modulate the DA makeup valve to maintain the desired water level.
 - The RWF55 water level control will modulate the steam balancing valve to maintain DA steam pressure setpoint, if applicable.
 - The lead pump will be alternated based on lead pump operating time.
 - The lead pump rotation sequence is as follows: 1,2,3,4,5,6 – 2,3,4,5,6,1 – 3,4,5,6,1,2 etc.
 - If the lead pump fails, the first lag pump in the sequence will assume the lead position and start to run.
 - If the running lag pump fails, the next lag pump in line will start automatically.

Pump Lead/Lag Sequence of Operation (continued)

5. VFD pump motor start sequence of operation:

- When all pumps are placed in AUTO position, the lead pump drive will be commanded ON, and will stay ON as long as there is no alarm or pump rotation. If the feed or transfer water pressure is below setpoint, the system PLC executes a PID algorithm and determines a new output value for the lead pump drive.
- The lead pump drive will receive a modulating signal determined by the PID output. This signal will be between 4 and 20mA, 0 to 100%. The lead pump drive will modulate the feedwater pump to maintain feed or transfer water pressure setpoint.
- If the PID output reaches above the add pump percent setpoint for an adjustable time delay of 1 to 1800 seconds, the lag 1 pump drive will be started and receive the same modulating signal as the lead pump drive. The lag 1 pump drive will start modulating up, and continue to modulate up, as long as the actual feedwater pressure remains below setpoint. When the actual feedwater pressure approaches setpoint, the lead pump drive will start to modulate down to reach the lag pump drive modulating output.
- With the lead and lag pumps running, the pump VFDs will start to modulate the pumps up or down in unison to maintain setpoint. If the PID output reaches above the add pump percent setpoint again, the lag 2 pump drive will start up and receive the same modulating signal as the lead and lag 1 pump drives. The system will keep adding pumps whenever the PID output reaches above the add lag pump percent setpoint for the adjustable time delay. The PID will modulate the pump VFDs up or down to maintain the setpoint.
- The combination of the lead and lag pumps will continue to modulate up or down in unison to maintain feed or transfer water pressure setpoint.
- If feedwater valves start to close, and feedwater or transfer water pressure starts to rise, the PID output will start to modulate down all running pump VFDs in unison to maintain feedwater pressure setpoint. If the PID output drops below the drop pump percent setpoint for an adjustable time delay of 1 to 1800 seconds, the last lag pump will be turned off. If the PID output is still below the drop pump percent setpoint, then the second to last lag pump will be turned off.
- The system will keep shutting down lag pumps whenever the PID output stays below the drop pump percent setpoint for the adjustable time delay.

Feedwater Pumps Lead/Lag Operation

1. The feedwater pump control system for the DA is designed to have at least one pump running at all times.
2. The addition or subtraction of a lag pump from the feedwater supply header is controlled by the feedwater pump discharge pressure and/or the motor load current switch. To set up the lead/lag operation, the following data needs to be entered on the Configuration Screen of the touchscreen display:
 - Desired high pressure setpoint for the feedwater manifold.
 - Allowable minimum pressure in the feedwater manifold. This will provide the required flow through the feedwater valve. This is determined by noting the desired boiler operating pressure and the designed pressure drop across the modulating feedwater valve and associated piping. The minimum feedwater flow rate is determined by multiplying the boiler horse power (hp) by .069 GPM / BHP- a 100 hp boiler needs a minimum of 6.9 GPM of feedwater. It is best to multiply this number by 2 to allow for error, unknown losses, and pump wear. Check your boiler operating pressure and feedwater valve CV to make this calculation.
 - As an example, a 300 hp boiler will require $(.069 \times 300 \times 2)$ or 41.4 GPM across the modulating feedwater valve when operating at design pressure. Using the CV for the feedwater valve and boiler operating pressure, calculate the minimum feedwater pressure at the inlet of the modulating feedwater valve to achieve the desired flow. CV is the flow for 1 PSI pressure drop across the valve. If the CV for the feedwater valve is 10, then the DP across the valve at 41.4 GPM will be approximately 16 psi. Using this calculation, the minimum pressure that will deliver the 41.4 GPM across the feedwater valve is 100 PSI (desired boiler operating pressure) + 16 psi (pressure drop across the feedwater valve at 41.4 GPM) or 116 psi.

Feedwater Pumps Lead/Lag Alternation

- The lead pump will be alternated based on the lead pump operating runtime.
- The lead pump rotation sequence is as follows: 1,2,3,4,5,6 – 2,3,4,5,6,1 – 3,4,5,6,1,2 etc.
- If the lead pump or lag pump online fails, the next pump in the sequence will be started.
- The lead pump will run for the entire runtime duration.
- If no lag pumps are running and the runtime reaches the lead pump alternating time, the lag 1 pump will start and receive the same modulating signal as the lead pump. The lead and lag 1 pump will modulate up or down to maintain the setpoint for the entire duration of the overlap time.
- When the overlap time expires, the lag 1 pump will assume the lead pump position, and the lead pump will assume the last lag position. If the system has a total of three pumps, the lead pump will assume the lag 2 pump position. If lag 2 pump is not needed to maintain feedwater pressure setpoint, it will be turned off.

General Setup

1. Make sure the inlet and outlet manual isolation valves on the feedwater pump are open.
2. Insure all feedwater pump Hand-Off-Auto (H-O-A) switches are in the “OFF” position.
3. Check the rotation of the feedwater pump by following the pump manufacturer’s procedure. The pump can be “bumped” by momentarily turning the H-O-A selector switch to the “HAND” position, and back to “OFF”.
 - If the pump is rotating in the proper direction, proceed to the next pump.
 - If the pump is rotating backwards, make sure to shut the pump down and open the main disconnect switch to shut the power down. More than one disconnect may be needed to completely turn the power off.
 - Switch the position of any two pump motor leads on the motor starter load terminals.
 - Insure that the terminals are tight. Then close the main disconnect switch and place the pump switch in Hand position. Make sure that the pump’s rotation is verified. Do the same for the rest of the system’s pumps.
 - The pump rotation can be checked again by following the instructions in step 1.
4. Following the same procedure, check the rotation of the remaining pumps.
5. Calibrate and check the tank level control by following the supplied instructions for setup of the Siemens differential pressure (DP) transmitter and RWF55 loop controller.
 - Determine the desired DA operating water level, and set the desired level on the RWF55 loop controller setpoint.
 - If there are low and high water alarm points to be determined from the RWF55 input, set the alarm points in the RWF55 following the manufacturer’s supplied procedure, see RWF55 and DP setup illustration below.
6. To prevent the pumps from running dry, insure that the low/low water cutoff level control removes control power from the pump starters.
7. Open the isolation valve(s) between the surge tank transfer pumps and the DA tank level control valve.
8. Start the transfer pumps on the surge tank, and allow the DA to settle to its normal operating level. Adjust the RWF55 setpoint and PID algorithm to maintain the desired level. The adjustment of the PID will configure the allowable deviation above and below setpoint, as well as configure the rate of valve operation. The adjustment should be such that the valve does not rapidly cycle open or closed, nor deviate significantly above or below the desired water level before the valve responds. This adjustment will most likely have to be modified after the boilers are online and the system comes into equilibrium.

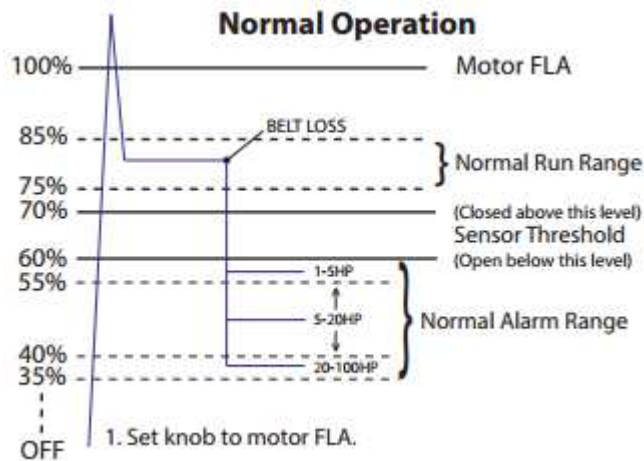
General Setup (continued)

9. Check for proper operation and indication of high and low water float controls, which are hardwired to the control panel.

Current Switch Calibration

Note: Please read current sensor installation instructions for detailed information.

1. Adjust knob on sensor fully clockwise to maximum full load amp (FLA).
2. With motor operating normally, adjust knob SLOWLY counter-clockwise until LED is lit.
3. Adjust knob counter-clockwise a few degrees more to prevent nuisance alarms.



Example how to calibrate current sensor with 10 FLA motor:

1. Adjust knob clockwise on sensor to 10 FLA.
2. With motor operating normally, adjust knob SLOWLY counter-clockwise until LED is lit, about 8 amps.
3. Adjust knob counter-clockwise to about 7 amps.

Alarms and Touchscreen Annunciations

1. DA high water level warning annunciates on the Overview Screen with red indicator.
2. DA low water level warning annunciates on the Overview Screen with red indicator.
3. DA low/low water level alarm. Pumps shut down.
4. SGR high water level warning annunciates on the Overview Screen with red indicator.
5. SGR low water level warning annunciates on the Overview Screen with red indicator.
6. SGR low/low water level. Pumps shut down.
7. Pump 1 Fail alarm. Annunciates when current switch is not on.
8. Pump 2 Fail alarm. Annunciates when current switch is not on.
9. Pump 3 Fail alarm. Annunciates when current switch is not on.
10. Pump 4 Fail alarm. Annunciates when current switch is not on.
11. Pump 5 Fail alarm. Annunciates when current switch is not on.
12. Pump 6 Fail alarm. Annunciates when current switch is not on.

Devices, Modbus Setup, and Parameters

Modbus RS485 details: 19200 baud, 8 stop bits, 1 data bit, no parity.

Addressing:

PLC - address 1

RWF55 (DA water level) - address 2

RWF55 (DA tank pressure) - address 3

RWF55 (SRG water level) - address 4

RWF55 (Backup DA water level) - address 5

RWF55 (Backup SRG water level) - address 6

Standard Modbus TCP/IP for BMS interface.

Additional configuration details for each device are provided as separate Appendixes at the end of this manual.

Control System Nomenclature

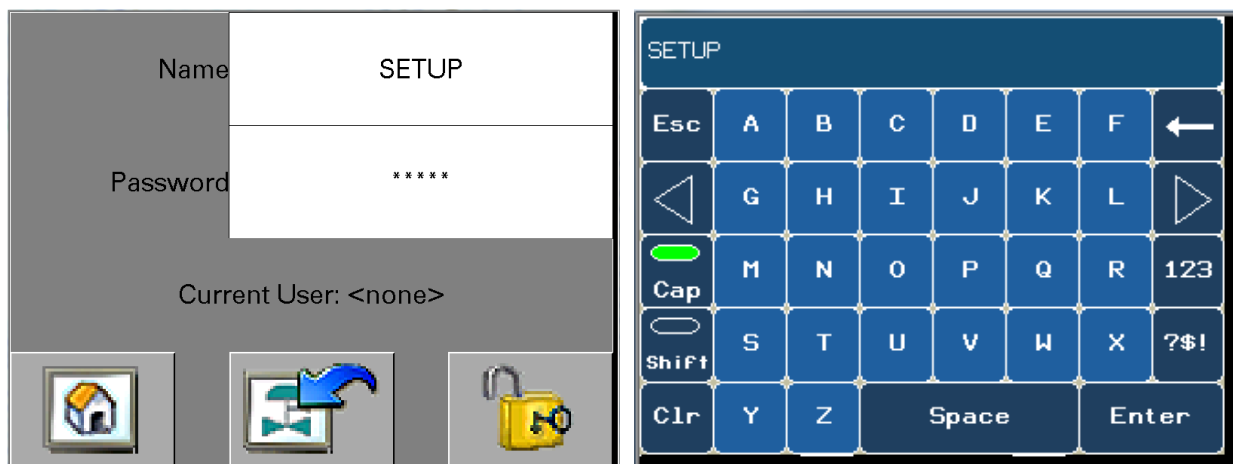
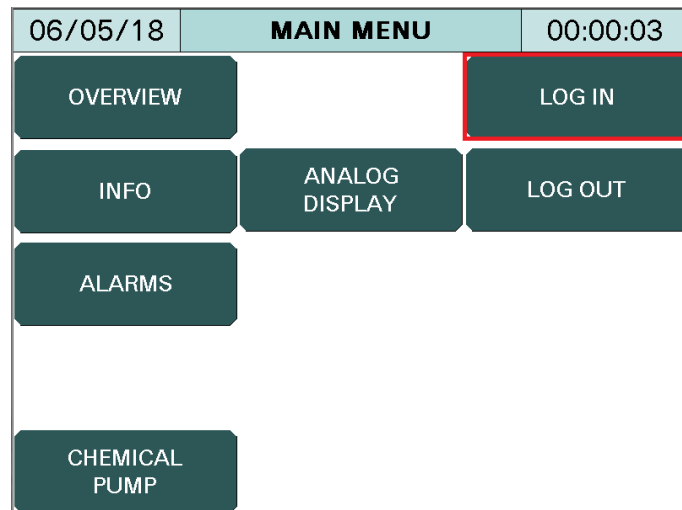
24ACH	24V AC Hot
24ACN	24V AC Neutral
485	RS485 Serial Protocol
AH	Alarm Horn
AI	Analog Input
ALM-SIL	Alarm-Silence
ANAIN	Analog Input Field Terminal
ANAOUT	Analog Output PLC Terminals
ANIN	Analog Input PLC Terminal
ANOT	Analog Output Field Terminal
A-OUT	Analog Output
BMS	Building Management System
CB	Circuit Breaker
CKT	Circuit
COND	Condensate
COND-H	COND Water Level High
COND-LO	COND Water Level Low
COND-LL	COND Water Level Low/Low
CR	Control Relay
CS	Current Switch
CTL	Control
CUR	Current
DA	Deaerator
DA-H	Deaerator High Water Signal
DA-L	Deaerator Water Level Low
DA-LL	Deaerator Water Level Low/Low
DC-	24VDC Negative Supply Terminal
DCIN	Direct Current Input 24VDC
DCOT	Direct Current Output 24VDC
DIDC	Digital Input Field Terminal
DIDC 24+	Digital Input 24 VDC Supply Terminal
DP	Differential Pressure
DS1	Disconnect Switch 1
ES	Ethernet Switch
FLA	Full Load Amperage
FLT	Flow Switch
FW	Feedwater
G1, G2	Group1, Group2
H, H1	Hot 120 VAC

Control System Nomenclature (continued)

HI	Water Level High
HMI	Human Machine Interface
HOA	Hand-Off-Auto
L1	Line 120VAC
LO	Water Level Low
LT	Light
MIN	Minimum
MTR	Motor
MUV	Make Up Valve
N, N1	Neutral
P-1_P-6	Pump 1 through 6
P1A	Pump 1 in Auto Position
P1CS--P6CS	Pumps Current Switches
P1H	Pump 1 in Hand Position
P1HA	Pump 1 Hand Auto
PC	Processor
PE	Potential Earth
PLC	Programmable Logic Controller
PMP	Pump Field Terminal
PNL	Panel
PWR	Power
RTD	Resistance Temperature Detector
RTDIN	RTD Inputs Terminals
RWF	RWF55 Controller
SH, SHLD	Shield
SRG	Surge
SRG-H	Surge High Water Signal
SRG-L	Surge Water Level Low
SRG-LL	Surge Water Level Low/Low
SS1	Select Switch Control Power ON/OFF
SS204_SS210	Select Switch Pump 1 to Pump 6
STR	Start
YSR	System Relay
TP	Transfer Pump
VALV	Valve
VFD	Variable Frequency Drive
WL	Water Level
XFMR	Transformer
XMTR	Transmitter

Logging In

When the touchscreen is powered up, the OVERVIEW screen will appear. Press the MAIN MENU button to navigate to the MAIN MENU screen. Press the LOG IN button to enter user name and password.



When the LOG IN screen pops up, tap the area next to 'Name' and a keypad will appear. Use the keypad to enter the name 'SETUP'. When finished, press ENTER.

Next, tap the area next to 'Password' and the same keypad will appear again. Enter the password, 'START', and press ENTER.

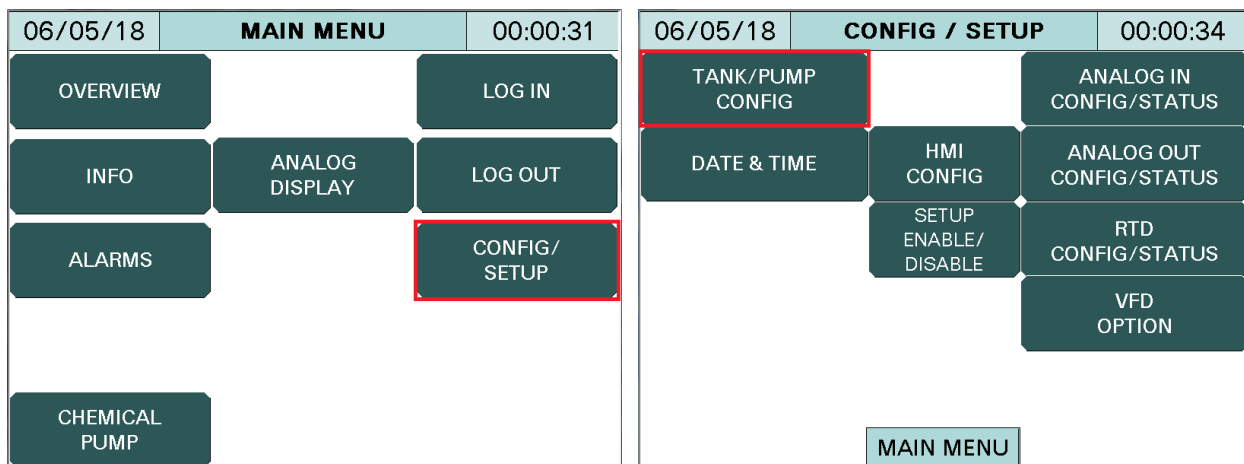
Logging In (continued)

When both the name and password have been entered, press the unlock icon. If successful, the CURRENT USER will change from 'Current User: <none>' to 'Current User: SETUP'. The login screen will automatically close, and the CONFIG/SETUP button will be displayed on the MAIN MENU screen.

Note: Password is needed to access the configuration and setup screens.

Configuration/Setup

The touchscreen needs to be configured for the equipment's features and options. Press CONFIG/SETUP, and then press TANK/PUMP CONFIG to display the TANK/PUMP CONFIG 1 screen.



The touchscreen can be configured for deaerator single tank, surge single tank, condensate single tank, or a combination of deaerator and surge, deaerator two groups, deaerator and condensate, surge and condensate, split, or dual tanks. The MAIN MENU and CONFIG/SETUP screens may vary after configurations.

WARNING!

Please note: PUMPS CONTROL selector switch located on the front of the control panel should be in OFF position while configuring and setting up the lead/lag system. Switch PUMPS CONTROL switch to ON when ready to run.

Configuration/Setup (continued)

Tank/Pump

Deaerator Tank Only

06/05/18	TANK/PUMP CONFIG 1	00:00:19
TANK SELECT:		
DA ONLY		
TANK TYPE:		
SPRAY		
DA		
ENTER TANK NAME		
DEAERATOR		
ENTER PUMP NAME		
FW PUMP		
←	CONFIG	→

TANK SELECT - Select **DA ONLY**

- NOT CONFIGURED
- DA ONLY
- SRG ONLY
- DA & SRG
- DA & COND
- SRG & COND
- COND ONLY
- DA 2 GROUPS


TANK TYPE - Select **SPRAY** or **TRAY**

- SPRAY
- TRAY

ENTER TANK NAME - User configured, up to 12 characters. The default tank name for Deaerator is DA. The tank name is also displayed on the title bar of the OVERVIEW screen.

ENTER PUMP NAME - User configured, up to 14 characters. The default pump name is FW PUMP.

Configuration/Setup (continued)

Press NEXT button  to display TANK/PUMP CONFIG 2 screen.


06/05/18	TANK/PUMP CONFIG 2	00:00:33
ENTER TOTAL NUMBER OF PUMPS:		6
FW PUMP AVAILABLE	NOT AVAILABLE	
3	3	
DA WATER LEVEL:		
RWF55		
DA TANK PRESS:		
RWF55		
DA PUMPS CONFIG		
	CONFIG	HARD RESET

Image shown is configured for 3 feedwater pumps.

ENTER TOTAL NUMBER OF PUMPS - For stand alone DA tank only, the total number of pumps is always 6.

FW PUMP AVAILABLE - Up to 6 pumps.

FW PUMP NOT AVAILABLE - Total number of pumps minus feedwater pumps available.
(Image above shows **FW PUMP NOT AVAILABLE**: $6-3=3$)

DA WATER LEVEL:

- **NONE**: Select NONE if water level is not controlled by RWF55 controller.
- **RWF55**: Select RWF55 if water level is controlled by RWF55 controller.

DA TANK PRESS:

- **NONE**: Select NONE if there is no DA tank pressure
- **RWF55**: Select RWF55 if DA tank pressure is controlled by RWF55 controller.
- **ANALOG INPUT**: Select ANALOG INPUT if DA tank pressure sensor is connected to ANALOG INPUT card 1, channel 3.

HARD RESET - Press the HARD RESET button to acknowledge tank/pump configuration, and to populate timers and counters with default parameters. A pop up window will appear. To acknowledge the changes, press the OK button, seen in the image below.

Configuration/Setup (continued)

06/05/18	TANK/PUMP CONFIG 2	00:00:52
ENTER TOTAL NUMBER OF PUMPS:		6
FW PUMP		
AVAILABLE #	System configured will be set back to factory default?	
3	To proceed, press OK. To quit, press CANCEL.	
DA WATER		
RWF		
DA TANK		
RWF		
	OK	CANCEL
DA PUMPS CONFIG		
←	CONFIG	HARD RESET

Press 'OK' to accept the factory default parameters, otherwise press 'CANCEL'.

Factory default parameters:

- All pumps are disabled
- Lead/lag pumps not selected
- Start delay: 15 seconds
- Stop delay: 15 seconds
- Minimum run time: 600 seconds
- Alternate time: 24 hours
- Overlap time: 30 seconds
- Lead pump search timer: 3 seconds
- Feedback pumps fail timer: 15 seconds

Note: Do not press HARD RESET button again unless the information on the TANK/PUMP CONFIG screen 1 and screen 2 has changed.

Press DA PUMPS CONFIG button to display the DA PUMPS CONFIG 1 screen.

Configuration/Setup (continued)

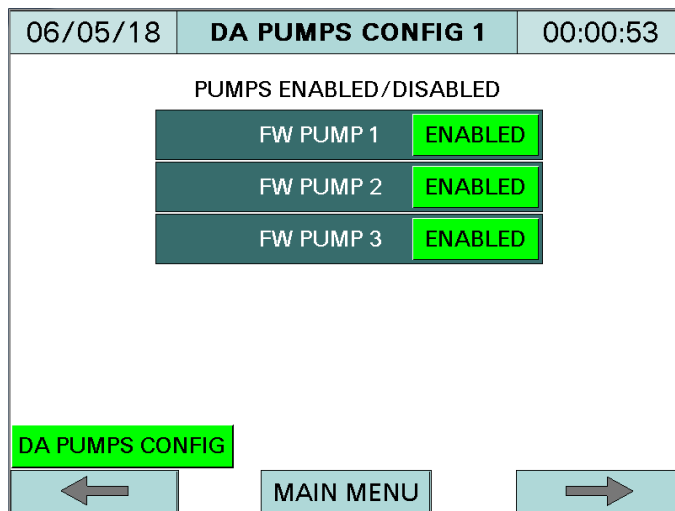



Image shown is configured for 3 feedwater pumps.

PUMPS ENABLED/DISABLED - Enable the available pumps. Press ENABLED/DISABLED button to enable or disable related pumps.

Press NEXT button  to display DA PUMPS CONFIG 2 screen.

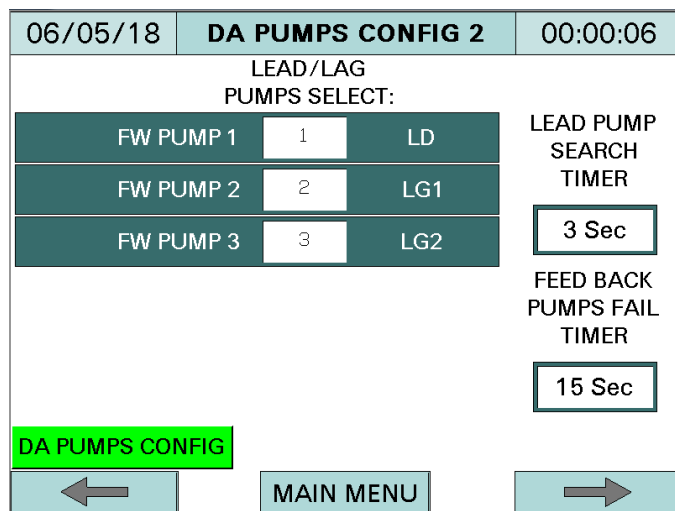


Image shown is configured for 3 feedwater pumps.

LEAD/LAG PUMPS SELECT:

- 1 – Lead
- 2 – Lag 1
- 3 – Lag 2
- 4 – Lag 3


Configuration/Setup (continued)

- 5 – Lag 4
- 6 – Lag 5

Any pump can be set to be the lead pump, just enter '1' in the lead/lag pumps select box. Lag pumps can be in any order within the group. If there are four pumps, the first four numbers (1, 2, 3, and 4) can be entered in any order (2-1-3-4, 3-1-2-4, 4-1-3-2, and so on).

LEAD PUMP SEARCH TIMER - The adjustable time delay allows for the selected lead pump's status and availability to be detected. The default setup time is 3 seconds.

FEEDBACK PUMPS FAIL TIMER - The adjustable time delay when the pumps' current switches fail to energize. The default setup time is 15 seconds. A pump failure alarm will appear after the FEEDBACK PUMP FAIL TIMER expires. The system will search for and start the next available pump.

Press NEXT button  to display DA PUMPS CONFIG 3 screen.

06/05/18		DA PUMPS CONFIG 3		00:00:34	
WATER TEMPERATURE		PUMP MODE		LEAD/LAG	
ENABLED		REMOTE SW		DISABLED	
WATER LEVEL SWITCHES		PUMPS START		FW PRESSURE CONTROL	
HIGH	ENABLED	HEADER PRESSURE WITH SP OFFSET		DISABLED	
LOW	ENABLED	SRG WATER LEVEL		NONE	
RWF WL ALARM ACTIVATE					
HIGH	DISABLED				
LOW	DISABLED				
DA PUMPS CONFIG					
←		MAIN MENU		→	

WATER TEMPERATURE - To display the water temperature on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

WATER LEVEL SWITCHES - To display the high and low water level float switches, and to activate the water level warnings on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

RWF WL ALARM ACTIVATION - High and low water level alarms can be controlled by DA high and DA low level float switches, or by soft setup in the RWF55 water level control configuration. To activate the RWF55 water level alarms, press HIGH or LOW ENALBED/DISABLED buttons to

Configuration/Setup (continued)

ENABLED. See page 67, “Configuration - DA Water Level Control”, to set the high and low water level alarm setpoints.

PUMP MODE - Select feedwater pump control mode.

- **LEAD/LAG:** Pumps are controlled by lead/lag mode. See page 7, “Pump Lead/Lag Sequence of Operations”, for details.
- **ALTERNATE:** With alternate mode, the lead pump will initially run, and the lag pump will start to run when the lead pump fails. When the ALTERNATE TIME expires, the current lead pump will switch to become the lag pump, and the lag pump will switch to become the lead pump.

REMOTE SW (SWITCH) – Press ENABLED/DISABLED button to ENABLED if the system has remote switch to control the pumps. When REMOTE SW is enabled, the status button will be displayed on the OVERVIEW screen with default text ‘OFF/B1 ON’. The ‘B1 ON’ text can be configured up to 7 characters. Note: password is needed to change the ‘B1 ON’ text.


PUMPS START - Pumps lead/lag process variable can be based on FW PRESSURE CONTROL or BOILER START CONTROL. Press FW PRESSURE CONTROL/BOILER START CONTROL button to select the control method.

HEADER PRESSURE WITH SP OFFSET - Press ENABLED/DISABLED button to ENABLED if the boiler header pressure sensor is connected to ANALOG INPUT card 1, channel 4. The feedwater pressure setpoint is based on both steam header pressure, plus offset.

SRG WATER LEVEL - This option is for Deaerator tank only with Surge water level

- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller. The surge tank water level and setpoint will be displayed on the OVERVIEW screen.

Configuration/Setup (continued)

Press NEXT button  to display DA PUMPS CONFIG 4 screen.

06/05/18	DA PUMPS CONFIG 4			00:00:36
PUMPS RUN TIME	HH	MM	SS	DAYS
FW PUMP 1	0:	0:	0	0
FW PUMP 2	0:	0:	0	0
FW PUMP 3	0:	0:	0	0

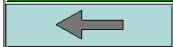




DA PUMPS CONFIG				
	MAIN MENU			

Image shown is configured for 3 feedwater pumps.

PUMPS RUN TIME - All pumps' run time is displayed in hours, minutes, seconds, and then accumulated into days. The PUMPS RUN TIME could be reset to 0 (zero) by pressing and holding the RESET button until it turns green. Pressing the RESET button again will start the pump run time clock, and change the button color to gray.

Press NEXT button  to display DA PUMPS CONFIG 5 screen.

06/21/18	DA PUMPS CONFIG 5		00:00:29
LOW FW Press ALARM	DISABLED		
HIGH FW Press ALARM	DISABLED		
DA WATER LEVEL BACKUP	NOT CONNECT		
CHEMICAL PUMP	DISABLED		

DA PUMPS CONFIG		
	MAIN MENU	

LOW FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the low feedwater pressure alarm.


Configuration/Setup (continued)


HIGH FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the high feedwater pressure alarm.

Go to page 84, "MAIN MENU >> LEAD/LAG SETUP >> DA >>... DA LEAD/LAG 5", to set high and low alarm setpoints.

DA WATER LEVEL BACKUP - Press NOT CONNECT/CONNECTED button to CONNECTED if there is a backup RWF55 for water level.

CHEMICAL PUMP - Press ENABLED/DISABLED button to ENABLED if there is a chemical pump.

Press NEXT button  to display DA PUMPS CONFIG 6 screen.

06/05/18	DA PUMPS CONFIG 6	00:00:45	
ALARM OPTIONS			
		ALARM RESET	ALARM SOUND
DA HIGH WATER	WARNING	MANUAL	DISABLED
DA LOW WATER	WARNING	MANUAL	DISABLED
DA PUMPS CONFIG			
	MAIN MENU		

DA high or low water can be set to alarm or warning. Press WARNING/ALARM button to select between them.

DA HIGH OR LOW WATER WARNING - The high or low water status 'HW' or 'LW' will be blinking and displayed on the OVERVIEW screen when high or low water is present.

DA HIGH OR LOW WATER ALARM:

- **ALARM RESET:** Select MANUAL reset if DA manual restarts requested or AUTO reset if DA will restart automatically with clear condition.
- **ALARM SOUND:** Press ENABLED/DISABLED button to ENABLED to activate the buzzer's sound for high and low water level alarms.

Configuration/Setup (continued)

Surge Tank Only

06/05/18	TANK/PUMP CONFIG 1	00:00:14
<div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">TANK SELECT:</div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">SRG ONLY</div>		
<div style="margin: 10px auto; width: 100px;">SRG</div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">ENTER TANK NAME</div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">SURGE TANK</div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">ENTER PUMP NAME</div> <div style="border: 1px solid black; padding: 2px; margin: 5px auto; width: 100px;">TRANSFER PUMP</div>		
←	CONFIG	→


TANK SELECT - Select **SRG ONLY**

- NOT CONFIGURED
- DA ONLY
- SRG ONLY
- DA & SRG
- DA & COND
- SRG & COND
- COND ONLY
- DA 2 GROUPS

ENTER TANK NAME - User configured, up to 12 characters. The default tank name is SURGE TANK. The tank name is also displayed on the title bar of the OVERVIEW screen.

ENTER PUMP NAME - User configured, up to 14 characters. The default pump name is TRANSFER PUMP.

Configuration/Setup (continued)

Press NEXT button  to display TANK/PUMP CONFIG 2 screen.


06/05/18	TANK/PUMP CONFIG 2	00:00:53
ENTER TOTAL NUMBER OF PUMPS:		2
TRANSFER PUMP		
AVAILABLE		
2		
SRG WATER LEVEL:		
RWF55		
SG PUMPS CONFIG		
	CONFIG	HARD RESET

Image shown is configured for the first 2 transfer pumps.

ENTER TOTAL NUMBER OF PUMPS - The total number of transfer pumps used in the system. Up to 6 pumps can be used.

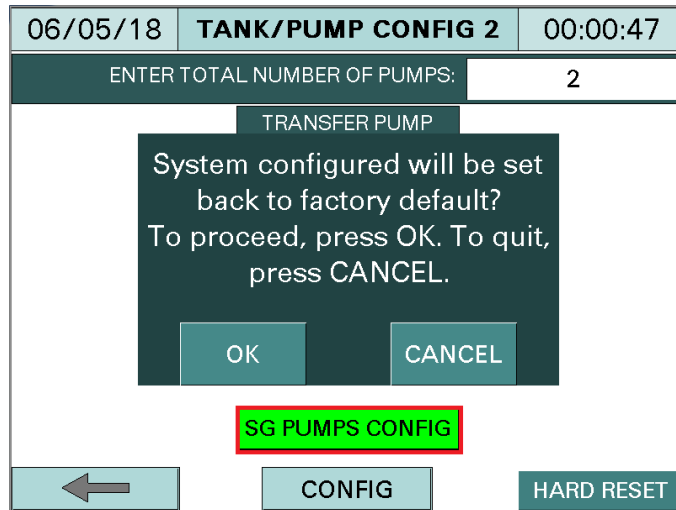
TRANSFER PUMP AVAILABLE - Same as total number of pumps.

SRG WATER LEVEL:

- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller.

HARD RESET - Press the HARD RESET button to acknowledge tank/pump configuration, and to populate timers and counters with default parameters. A pop up window will appear. To acknowledge the changes, press the OK button, seen in the image below.

Configuration/Setup (continued)



Press 'OK' to accept the factory default parameters, otherwise press 'CANCEL'.

Factory default parameters:

- All pumps are disabled
- Lead/lag pumps not selected
- Start delay: 15 seconds
- Stop delay: 15 seconds
- Minimum run time: 600 seconds
- Alternate time: 24 hours
- Overlap time: 30 seconds
- Lead pump search timer: 3 seconds
- Feedback pumps fail timer: 15 seconds

Press SRG PUMPS CONFIG button to display the SRG PUMPS CONFIG 1 screen.

Configuration/Setup (continued)

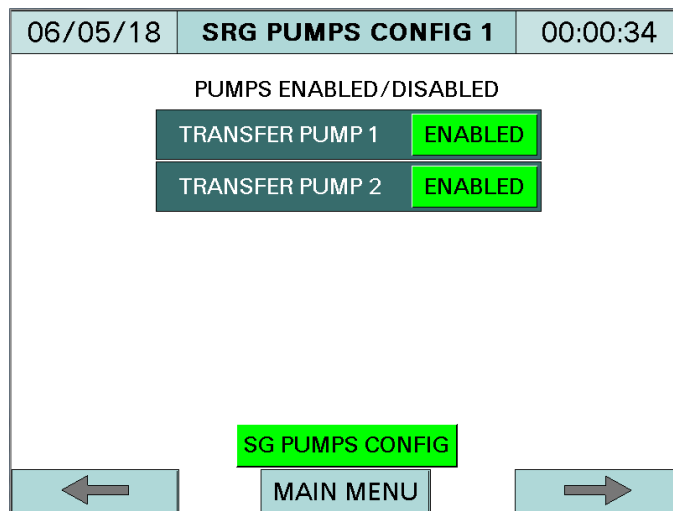



Image shown is configured for the first 2 transfer pumps.

PUMPS ENABLED/DISABLED - Enable the available pumps. Press ENABLED/DISABLED button to enable or disable each specific pump.

Press NEXT button  to display SRG PUMPS CONFIG 2 screen.

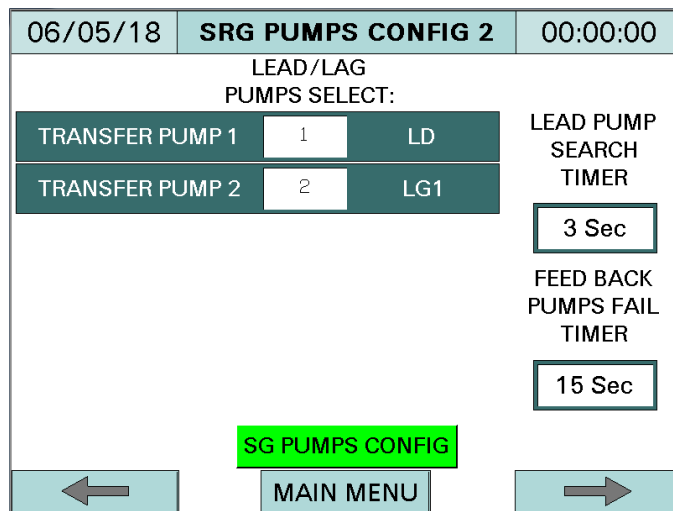


Image shown is configured for the first 2 transfer pumps.

LEAD/LAG PUMPS SELECT:

- 1 – Lead
- 2 – Lag 1
- 3 – Lag 2


Configuration/Setup (continued)

- 4 – Lag 3
- 5 – Lag 4
- 6 – Lag 5

Any pump can be set to be the lead pump, just enter '1' in the lead/lag pumps select box. Lag pumps can be in any order within the group. If there are four pumps, the first four numbers (1, 2, 3, and 4) can be entered in any order (2-1-3-4, 3-1-2-4, or 4-1-3-2 and so on).

LEAD PUMP SEARCH TIMER - The adjustable time delay allows for the selected lead pump's status and availability to be detected. The default setup time is 3 seconds.

FEEDBACK PUMPS FAIL TIMER - The adjustable time delay when the pumps' current switches fail to energize. The default setup time is 15 seconds. A pump failure alarm will appear after the FEEDBACK PUMP FAIL TIMER expires. The system will search for and start the next available pump.

Press NEXT button  to display SRG PUMPS CONFIG 3 screen.

06/05/18	SRG PUMPS CONFIG 3	00:00:17
WATER TEMPERATURE		PUMP MODE LEAD/LAG
ENABLED		REMOTE SW DISABLED
WATER LEVEL SWITCHES		DA WATER LEVEL
HIGH	ENABLED	NONE
LOW	ENABLED	
RWF WL ALARM ACTIVATE		
HIGH	DISABLED	
LOW	DISABLED	
SG PUMPS CONFIG		
←		MAIN MENU
		→

WATER TEMPERATURE - To display the water temperature on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

WATER LEVEL SWITCHES - To display the high and low water level float switches, and to activate the water level warnings on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

RWF WL ALARM ACTIVATION - High and low water level alarms can be controlled by SRG high and SRG low level float switches, or by soft setup in the SRG RWF55 water level control configuration. To activate the SRG RWF55 water level alarms, press HIGH or LOW .

Configuration/Setup (continued)

ENALBED/DISABLED buttons to ENABLED. Go to page 67, “Configuration - DA Water Level Control”, to set the high and low water level alarm setpoints for Surge Water Level.

TRANSFER PUMP MODE - Select transfer pump control mode.


- **LEAD LAG:** Pumps are controlled by lead/lag mode. See page 7, “Pump Lead/Lag Sequence of Operations”, for details.
- **ALTERNATE:** With alternate mode, the lead pump will initially run, and the lag pump will start to run when the lead pump fails. When the ALTERNATE TIME expires, the current lead pump will switch to become the lag pump, and the lag pump will switch to become the lead pump.

REMOTE SW (SWITCH) - Press ENABLED/DISABLED button to ENABLED if the system has remote switch to control the pumps. When REMOTE SW is enabled, the status button will be displayed on the OVERVIEW screen with default text ‘OFF/B1 ON’. The ‘B1 ON’ text can be configured up to 7 characters. Note: password is needed to change the ‘B1 ON’ text.

DA WATER LEVEL - This option is for Surge tank only with DA water level

- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller. The DA tank water level and setpoint will be displayed on the OVERVIEW screen.

Configuration/Setup (continued)

Press NEXT button  to display SRG PUMPS CONFIG 4 screen.


06/05/18	SRG PUMPS CONFIG 4				00:00:15
PUMPS RUN TIME		HH	MM	SS	DAYS
TRANSFER PUMP 1	0:	0:	0	0	RESET
TRANSFER PUMP 2	0:	0:	0	0	RESET

SG PUMPS CONFIG

← MAIN MENU →

Image shown is configured for the first 2 transfer pumps.

PUMPS RUN TIME - All pumps' run time is displayed in hours, minutes, seconds, and then accumulated into days. The PUMPS RUN TIME could be reset to 0 (zero) by pressing and holding the RESET button until it turns green. Pressing the RESET button again will start the pump run time clock, and change the button color to gray.

Press NEXT button  to display SRG PUMPS CONFIG 5 screen.

06/05/18	SRG PUMPS CONFIG 5		00:00:40
LOW TP Press ALARM	DISABLED		
HIGH TP Press ALARM	DISABLED		
SRG WATER LEVEL BACKUP	NOT CONNECT		

SG PUMPS CONFIG

← MAIN MENU →


Configuration/Setup (continued)

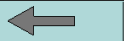
LOW TP Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the low transfer pump pressure alarm.

HIGH TP Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the high transfer pump pressure alarm.

Go to page 92, "MAIN MENU >> LEAD/LAG SETUP >> SURGE >>... SRG LEAD/LAG 5", to set high and low alarm setpoints.

SRG WATER LEVEL BACKUP - Press NOT CONNECT/CONNECTED button to CONNECTED if there is a backup RWF55 for water level.

Press NEXT button  to display SRG PUMPS CONFIG 6 screen.

06/05/18	SRG PUMPS CONFIG 6	00:00:36	
ALARM OPTIONS			
		ALARM RESET	ALARM SOUND
SRG HIGH WATER	WARNING	MANUAL	DISABLED
SRG LOW WATER	WARNING	MANUAL	DISABLED
SG PUMPS CONFIG			
	MAIN MENU		

SRG high or low water can be set to alarm or warning. Press WARNING/ALARM button to select between them.

SRG HIGH OR LOW WATER WARNING: The high or low water status 'HW' or 'LW' will be blinking and displayed on the OVERVIEW screen when high or low water is present.

SRG HIGH OR LOW WATER ALARM:

- **ALARM RESET:** Select MANUAL reset if SRG manual restarts requested or AUTO reset if SRG tank will restart automatically with clear condition.
- **ALARM SOUND:** Press ENABLED/DISABLED button to ENABLED to activate the buzzer's sound for high and low water level alarms.

Configuration/Setup (continued)

Condensate Tank Only

06/05/18	TANK/PUMP CONFIG 1	00:00:14
TANK SELECT: COND ONLY		
COND ENTER TANK NAME COND TANK ENTER PUMP NAME TRANSFER PUMP		
←	CONFIG	→


TANK SELECT - Select **COND ONLY**


- NOT CONFIGURED
- DA ONLY
- SRG ONLY
- DA & SRG
- DA & COND
- SRG & COND
- COND ONLY
- DA 2 GROUPS

ENTER TANK NAME - User configured, up to 12 characters. The default tank name is COND TANK. The tank name is also displayed on the title bar of the OVERVIEW screen.

ENTER PUMP NAME - User configured, up to 14 characters. The default pump name is TRANSFER PUMP.

Configuration/Setup (continued)

Press NEXT button  to display TANK/PUMP CONFIG 2 screen.

06/05/18	TANK/PUMP CONFIG 2	00:00:13
ENTER TOTAL NUMBER OF PUMPS:		2
TRANSFER PUMP AVAILABLE		2
COND WATER LEVEL:		NONE
CD PUMPS CONFIG		
	CONFIG	HARD RESET

ENTER TOTAL NUMBER OF PUMPS - The total number of transfer pumps. This is only used for the last two pumps, pumps 5 and 6.

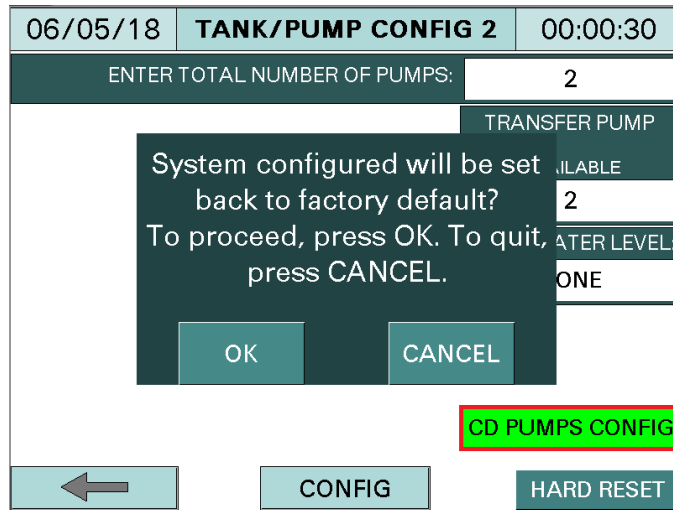
TRANSFER PUMP AVAILABLE - Two

COND WATER LEVEL:

- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller.

HARD RESET - Press the HARD RESET button to acknowledge tank/pump configuration and to populate timers and counters with default parameters. A pop up window will appear. To acknowledge the changes, press the OK button, seen in the image below.

Configuration/Setup (continued)

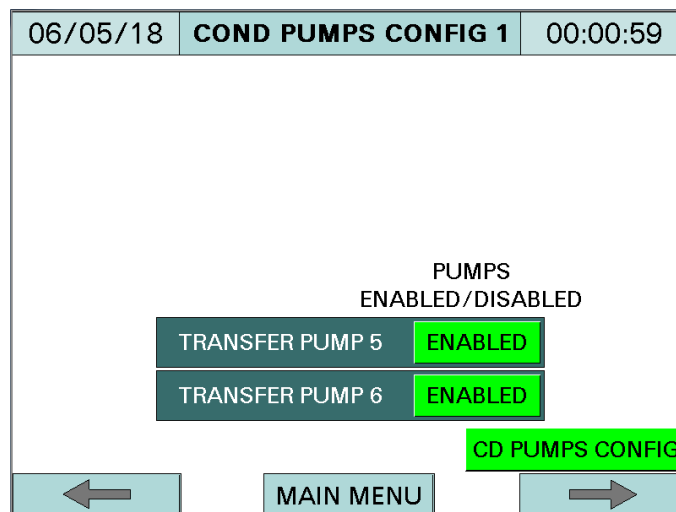


Press 'OK' to accept the factory default parameters, otherwise press 'CANCEL'.

Factory default parameters:


- All pumps are disabled
- Start delay: 10 seconds
- Stop delay: 10 seconds
- Start lag pump base on timer: 10 seconds
- Start lead pump base on timer: 10 seconds
- Feedback pump 5 fail timer: 10 seconds
- Feedback pump 6 fail timer: 10 seconds

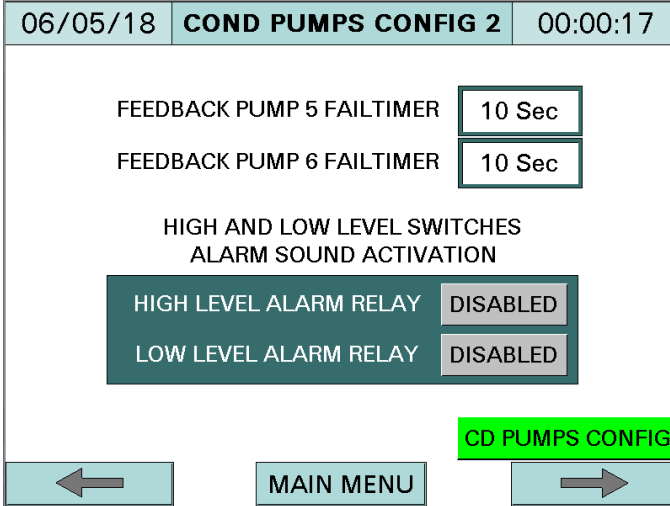
Press COND PUMP CONFIG button to display COND PUMP CONFIG 1 screen.



Configuration/Setup (continued)

PUMPS ENABLED/DISABLED - Enable the available pumps. Press ENABLED/DISABLED button to enable or disable related pumps.


Press NEXT button  to display COND PUMP CONFIG 2 screen.



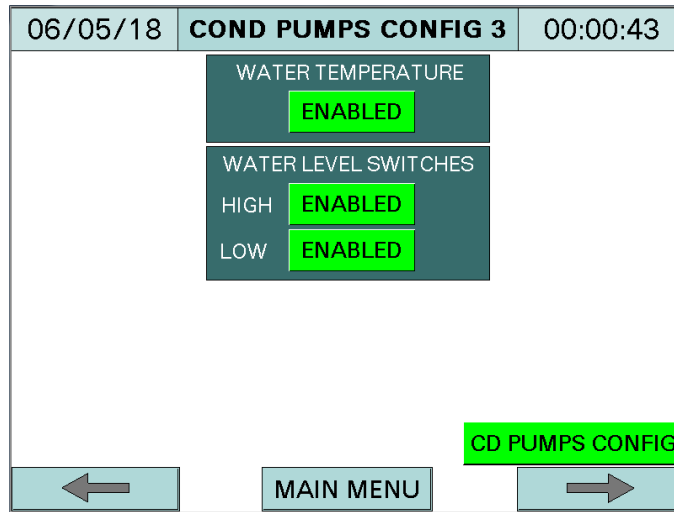
06/05/18	COND PUMPS CONFIG 2	00:00:17
FEEDBACK PUMP 5 FAILTIMER	10 Sec	
FEEDBACK PUMP 6 FAILTIMER	10 Sec	
HIGH AND LOW LEVEL SWITCHES ALARM SOUND ACTIVATION		
HIGH LEVEL ALARM RELAY	DISABLED	
LOW LEVEL ALARM RELAY	DISABLED	
CD PUMPS CONFIG		
←	MAIN MENU	→

FEEDBACK PUMP 5 AND PUMP 6 FAIL TIMER - The adjustable time delay when the pumps' current switches fail to energize. The default setup time is 10 seconds. A pump failure alarm will appear after the FEEDBACK PUMP FAIL TIMER expires. The system will search for and start the next available pump.

HIGH AND LOW LEVEL SWITCHES ALARM SOUND ACTIVATION - Press ENABLED/DISABLED button to ENABLED to activate the buzzer's sound for high and low water level alarms.


Press NEXT button  to display COND PUMP CONFIG 3 screen.

Configuration/Setup (continued)



WATER TEMPERATURE - To display the water temperature on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

WATER LEVEL SWITCHES - To display the high and low water level float switches, and to activate the water level warnings on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

Press NEXT button  to display COND PUMP CONFIG 4 screen.

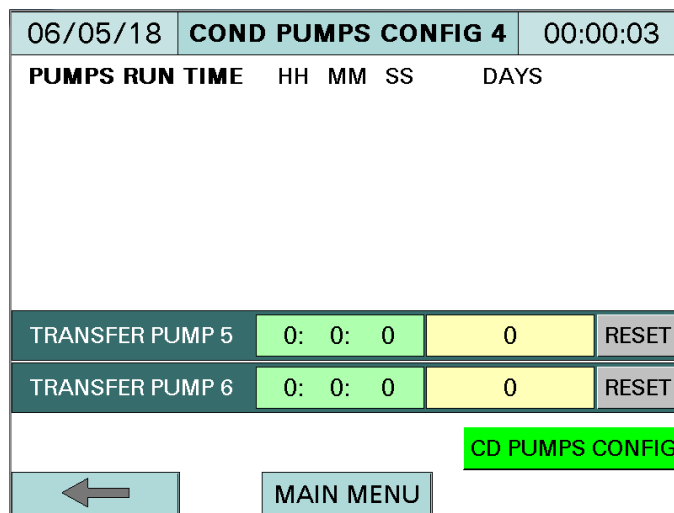


Image shown is configured for the last 2 transfer pumps.

PUMPS RUN TIME - All pumps run time is displayed in hours, minutes, seconds, and then accumulated into days. The PUMPS RUN TIME could be reset to 0 (zero) by pressing and holding the RESET button until it turns green. Pressing the RESET button again will start the pump run time clock, and change the button color to gray.

Configuration/Setup (continued)

Split or Dual Tank Deaerator and Surge

For DA/SRG combination system, the first four pumps are dedicated for feedwater, and the last two pumps are dedicated for transfer water. Note: always configure DA feedwater pumps first, and then configure the surge tank transfer water pumps.

06/05/18	TANK/PUMP CONFIG 1	00:00:20
TANK SELECT:		
DA & SRG		
TANK TYPE:		
SPLIT SPRAY		
DA	SRG	
ENTER TANK NAME	ENTER TANK NAME	
DA	SURGE TANK	
ENTER PUMP NAME	ENTER PUMP NAME	
FW PUMP	TRANSFER PUMP	
←	CONFIG	→

TANK SELECT - Select **DA & SRG**

- NOT CONFIGURED
- DA ONLY
- SRG ONLY
- DA & SRG
- DA & COND
- SRG & COND
- COND ONLY
- DA 2 GROUPS


TANK TYPE - Select **SPLIT or DUAL; SPRAY or TRAY**

- **SPLIT:** The combination of deaerator and surge, deaerator and condensate, or surge and condensate in one split tank.
- **DUAL:** Two separate tanks.
- **SPRAY**
- **TRAY**

ENTER TANK NAME - User configured, up to 12 characters. The default tank name for deaerator is DA, and the default name for surge tank is SURGE TANK. The tank name is also displayed on the title bar of the OVERVIEW screen.

Configuration/Setup (continued)

ENTER PUMP NAME - User configured, up to 14 characters. The default pump name for deaerator is FW PUMP, and the default name for surge tank is TRANSFER PUMP.

Press NEXT button  to display TANK/PUMP CONFIG 2 screen.

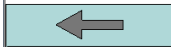
06/05/18		TANK/PUMP CONFIG 2		00:00:30	
ENTER TOTAL NUMBER OF PUMPS:				6	
FW PUMP NOT AVAILABLE AVAILABLE		TRANSFER PUMP AVAILABLE			
2 2		2			
DA WATER LEVEL:		SRG WATER LEVEL:			
RWF55		RWF55			
DA TANK PRESS:					
RWF55					
DA PUMPS CONFIG		SG PUMPS CONFIG			
		CONFIG		HARD RESET	

Image shown is configured for 2 feedwater and 2 transfer water pumps.

ENTER TOTAL NUMBER OF PUMPS - For split or dual tank, always enter 6 for total number of pumps. The actual number of pumps will be configured in FW PUMP AVAILABLE, FW PUMP NOT AVAILABLE, and TRANSFER PUMP AVAILABLE.

All feedwater pumps and transfer pumps need to be configured. There are always 4 pumps allocated for feedwater. If there are only two actual feedwater pumps, enter '2' in the FW PUMP AVAILABLE and enter '2' in the FW PUMP NOT AVAILABLE.

ENTER TOTAL NUMBER OF PUMPS - Always 6 pumps.

FW PUMP AVAILABLE - Up to 4 pumps.

FW PUMP NOT AVAILABLE - 4 feedwater pumps minus feedwater pumps available.

TRANSFER PUMP AVAILABLE - Up to 2 pumps.

DA WATER LEVEL or SRG WATER LEVEL:

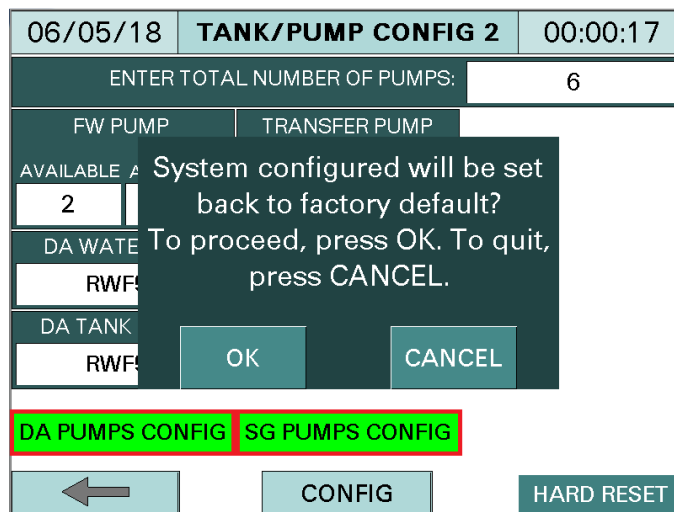
- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller.

Configuration/Setup (continued)

DA TANK PRESS:

- **NONE:** Select NONE if there is no DA tank pressure.
- **RWF55:** Select RWF55 if DA tank pressure is controlled by RWF55 controller.
- **ANALOG INPUT:** Select ANALOG INPUT if DA tank pressure sensor is connected to ANALOG INPUT card 1, channel 3.

HARD RESET - Press the HARD RESET button to acknowledge tank/pump configuration and to populate timers and counters with default parameters. A pop up window will appear. To acknowledge the changes, press the OK button, seen in the image below.



Press 'OK' to accept the factory default parameters, otherwise press 'CANCEL'.

Factory default parameters:

- All pumps are disabled
- Lead/lag pumps not selected
- Start delay: 15 seconds
- Stop delay: 15 seconds
- Minimum run time: 600 seconds
- Alternate time: 24 hours
- Overlap time: 30 seconds
- Lead pump search timer: 3 seconds
- Feedback pumps fail timer: 15 seconds

Configuration/Setup (continued)

Press DA PUMPS CONFIG button to configure for DA feedwater pumps. When finished, press SRG PUMPS CONFIG to configure for surge tank transfer pumps.

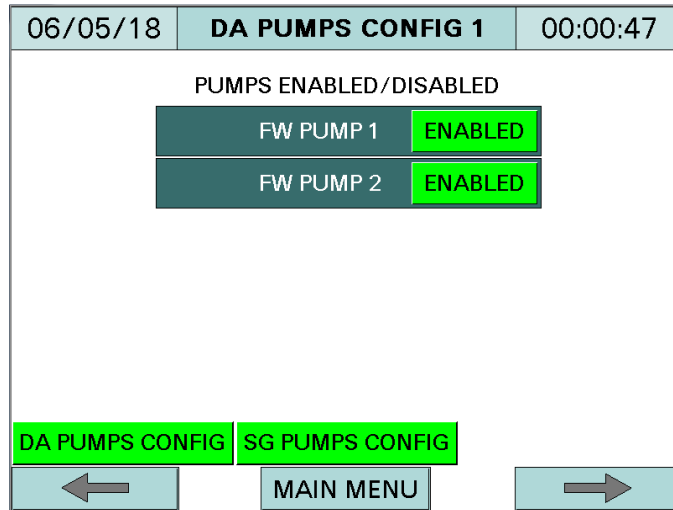


Image shown is configured for 2 feedwater pumps.

PUMPS ENABLED/DISABLED - Enable the available pumps. Press ENABLED/DISABLED button to enable or disable related pumps.

Press NEXT button  to display next DA PUMPS CONFIG 2 screen.

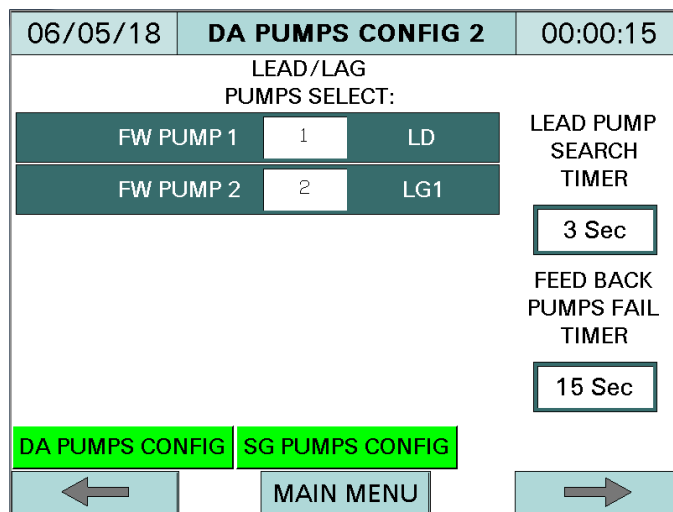


Image shown is configured for 2 feedwater pumps.

Configuration/Setup (continued)

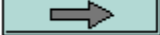
LEAD/LAG PUMPS SELECT:



- 1 – Lead
- 2 – Lag 1
- 3 – Lag 2
- 4 – Lag 3
- 5 – Lag 4
- 6 – Lag 5

Any pump can be set to be the lead pump, just enter '1' in the lead/lag pumps select box. Lag pumps can be in any order within the group. If there are four pumps, the first four numbers (1, 2, 3, and 4) can be entered in any order (2-1-3-4, 3-1-2-4, or 4-1-3-2 and so on).

LEAD PUMP SEARCH TIMER - The adjustable time delay allows for the selected lead pump's status and availability to be detected. The default setup time is 3 seconds.

FEEDBACK PUMPS FAIL TIMER - The adjustable time delay when the pumps' current switches fail to energize. The default setup time is 15 seconds. A pump failure alarm will appear after the FEEDBACK PUMP FAIL TIMER expires. The system will search for and start the next available pump.

Press NEXT button  to display DA PUMPS CONFIG 3 screen.

06/05/18	DA PUMPS CONFIG 3	00:00:43
WATER TEMPERATURE ENABLED		PUMP MODE LEAD/LAG
WATER LEVEL SWITCHES HIGH ENABLED LOW ENABLED		REMOTE SW DISABLED
RWF WL ALARM ACTIVATE HIGH DISABLED LOW DISABLED		PUMPS START FW PRESSURE CONTROL
		HEADER PRESSURE WITH SP OFFSET DISABLED
DA PUMPS CONFIG SG PUMPS CONFIG		
	MAIN MENU	

Configuration/Setup (continued)

WATER TEMPERATURE - To display the water temperature on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

WATER LEVEL SWITCHES - To display the high and low water level float switches, and to activate the water level warnings on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

RWF WL ALARM ACTIVATION - High and low water level alarms can be controlled by DA high and DA low level float switches, or by soft setup in the RWF55 water level control configuration. To activate the RWF55 water level alarms, press HIGH or LOW ENALBED/DISABLED buttons to ENABLED. Go to page 67, "Configuration - DA Water Level Control" to set the high and low water level alarm setpoints.

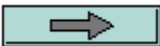
PUMP MODE - Select feedwater pump control mode.

- **LEAD/LAG:** Pumps are controlled by lead/lag mode. See page 7, "Pump Lead/Lag Sequence of Operations", for details.
- **ALTERNATE:** With alternate mode, the lead pump will initially run, and the lag pump will start to run when the lead pump fails. When the ALTERNATE TIME expires, the current lead pump will switch to become the lag pump, and the lag pump will switch to become the lead pump.

REMOTE SW (SWITCH) – Press ENABLED/DISABLED button to ENABLED if the system has remote switch to control the pumps. When REMOTE SW is enabled, the status button will be displayed on the OVERVIEW screen with default text 'OFF/B1 ON'. The 'B1 ON' text can be configured up to 7 characters. Note: password is needed to change the 'B1 ON' text.

PUMPS START - Pumps lead/lag process variable could be based on FW PRESSURE CONTROL or BOILER START CONTROL. Press FW PRESSURE CONTROL/BOILER START CONTROL button to select the control method.


HEADER PRESSURE WITH SP OFFSET - Press ENABLED/DISABLED button to ENABLED if a boiler header pressure sensor is connected to ANALOG INPUT card 1, channel 4. The feedwater pressure setpoint is based on both steam header pressure, plus offset.

Press NEXT button  to display DA PUMPS CONFIG 4 screen.

Configuration/Setup (continued)

06/05/18		DA PUMPS CONFIG 4			00:00:52	
PUMPS RUN TIME		HH	MM	SS	DAYS	
FW PUMP 1		0:	0:	0	0	RESET
FW PUMP 2		0:	0:	0	0	RESET
DA PUMPS CONFIG		SG PUMPS CONFIG				
←		MAIN MENU		→		

PUMPS RUN TIME - All pumps run time is displayed in hours, minutes, seconds, and then accumulated into days. The PUMPS RUN TIME could be reset to 0 (zero) by pressing and holding the RESET button until it turns green. Pressing the RESET button again will start the pump run time clock, and change the button color to gray.

Press NEXT button  to display DA PUMPS CONFIG 5 screen.

06/05/18		DA PUMPS CONFIG 5			00:00:51	
LOW FW Press ALARM		DISABLED				
HIGH FW Press ALARM		DISABLED				
DA WATER LEVEL BACKUP		NOT CONNECT				
CHEMICAL PUMP		DISABLED				
DA PUMPS CONFIG		SG PUMPS CONFIG				
←		MAIN MENU		→		

LOW FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the low feedwater pressure alarm.


HIGH FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the high feedwater pressure alarm.

Configuration/Setup (continued)

Go to page 84, “MAIN MENU >> LEAD/LAG SETUP >> DA >>... DA LEAD/LAG 5”, to set high and low alarm setpoints.

DA WATER LEVEL BACKUP - Press NOT CONNECT/CONNECTED button to CONNECTED if there is a backup RWF55 for water level.

CHEMICAL PUMP - Press ENABLED/DISABLED button to ENABLED if there is a chemical pump.

Press NEXT button  to display DA PUMPS CONFIG 6 screen.

06/05/18	DA PUMPS CONFIG 6	00:00:45	
ALARM OPTIONS			
		ALARM RESET	ALARM SOUND
DA HIGH WATER	WARNING	MANUAL	DISABLED
DA LOW WATER	WARNING	MANUAL	DISABLED
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="background-color: #00FF00; padding: 5px; border: 1px solid black;">DA PUMPS CONFIG</div> <div style="background-color: #CCCCCC; padding: 5px; border: 1px solid black;">←</div> <div style="background-color: #CCCCCC; padding: 5px; border: 1px solid black;">MAIN MENU</div> </div>			

DA high or low water can be set to alarm or warning. Press WARNING/ALARM button to select between them.

DA HIGH OR LOW WATER WARNING: The high or low water status ‘HW’ or ‘LW’ will be blinking and displayed on the OVERVIEW screen when high or low water is present.

DA HIGH OR LOW WATER ALARM:

- **ALARM RESET:** Select MANUAL reset if DA manual restarts requested or AUTO reset, DA will restart automatically with clear condition.
- **ALARM SOUND:** Press ENABLED/DISABLED button to ENABLED to activate the buzzer’s sound for high and low water level alarms.

Press SRG PUMPS CONFIG button, and follow all SRG PUMPS CONFIG screens on pages 29 to 36 to configure the transfer pumps.

A similar configuration applies for combination of deaerator and condensate or surge and condensate.

Configuration/Setup (continued)

DA Tank Two Groups

For DA tank two groups, the first four pumps are dedicated for group one, and the last two pumps are dedicated for group two. Note: always configure DA group one pumps first, and then configure the group two pumps.

06/21/18	TANK/PUMP CONFIG 1	00:00:36
TANK SELECT: DA 2 GROUPS		
DA G1		DA G2
ENTER TANK NAME G1	ENTER TANK NAME G2	
ENTER PUMP NAME G1 PUMP	ENTER PUMP NAME G2 PUMP	
←	CONFIG	→


TANK SELECT - Select **DA 2 GROUPS**

- NOT CONFIGURED
- DA ONLY
- SRG ONLY
- DA & SRG
- DA & COND
- SRG & COND
- COND ONLY
- **DA 2 GROUPS**

ENTER TANK NAME - User configured, up to 12 characters. The tank name is also displayed on the title bar of the OVERVIEW screen.

ENTER PUMP NAME - User configured, up to 14 characters.

Configuration/Setup (continued)

Press NEXT button  to display TANK/PUMP CONFIG 2 screen.

06/21/18		TANK/PUMP CONFIG 2		00:00:40	
ENTER TOTAL NUMBER OF PUMPS:				6	
G1 PUMP		G2 PUMP			
AVAILABLE	NOT AVAILABLE	AVAILABLE			
2	2	2			
DA WATER LEVEL:					
RWF55					
DA TANK PRESS:					
RWF55					
G1 PUMPS CONFIG			G2 PUMPS CONFIG		
←		CONFIG		HARD RESET	

Image shown is configured for 2 pumps group 1 and 2 pumps group 2.

ENTER TOTAL NUMBER OF PUMPS - For DA 2 groups, always enter 6 for total number of pumps. The actual number of pumps will be configured in G1 PUMP AVAILABLE, G1 PUMP NOT AVAILABLE, and G2 PUMP AVAILABLE.

All HP pumps and LP pumps need to be configured. There are always 4 pumps allocated for high pressure pumps. If there are only two actual high pressure pumps, enter '2' in the HP PUMP AVAILABLE and enter '2' in the HP PUMP NOT AVAILABLE.

ENTER TOTAL NUMBER OF PUMPS - Always 6 pumps.

G1 PUMP AVAILABLE - Up to 4 pumps.

G1 PUMP NOT AVAILABLE - 4 HP pumps minus HP pumps available.

G2 PUMP AVAILABLE - Up to 2 pumps.

DA WATER LEVEL:

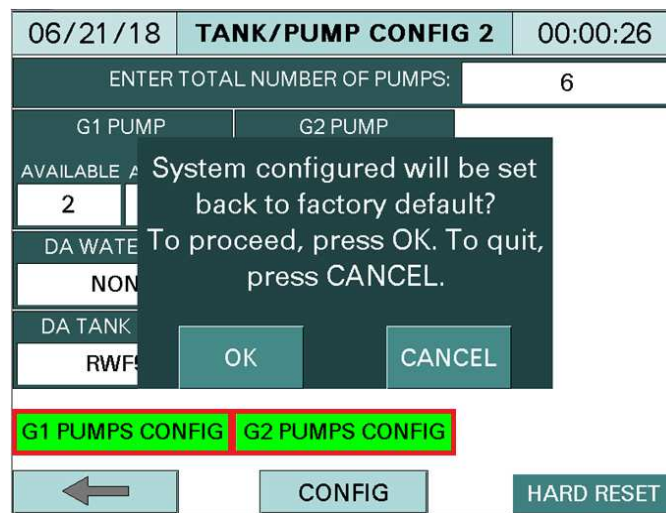
- **NONE:** Select NONE if water level is not controlled by RWF55 controller.
- **RWF55:** Select RWF55 if water level is controlled by RWF55 controller.

DA TANK PRESS:

- **NONE:** Select NONE if there is no DA tank pressure.
- **RWF55:** Select RWF55 if DA tank pressure is controlled by RWF55 controller.
- **ANALOG INPUT:** Select ANALOG INPUT if DA tank pressure sensor is connected to ANALOG INPUT card 1, channel 3.

Configuration/Setup (continued)

HARD RESET - Press the HARD RESET button to acknowledge tank/pump configuration and to populate timers and counters with default parameters. A pop up window will appear. To acknowledge the changes, press the OK button, seen in the image below.



Press 'OK' to accept the factory default parameters, otherwise press 'CANCEL'.

Factory default parameters:

- All pumps are disabled
- Lead/lag pumps not selected
- Start delay: 15 seconds
- Stop delay: 15 seconds
- Minimum run time: 600 seconds
- Alternate time: 24 hours
- Overlap time: 30 seconds
- Lead pump search timer: 3 seconds
- Feedback pumps fail timer: 15 seconds

Configuration/Setup (continued)

Press G1 PUMPS CONFIG button to configure for group 1 pumps. When finished, press G2 PUMPS CONFIG to configure for group 2 pumps.

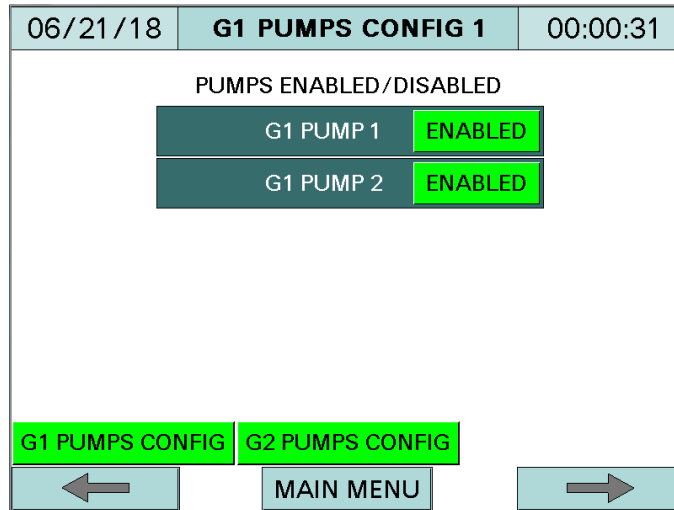


Image shown is configured for 2 pumps in group 1.

PUMPS ENABLED/DISABLED - Enable the available pumps. Press ENABLED/DISABLED button to enable or disable related pumps.

Press NEXT button  to display next G1 PUMP CONFIG 2 screen.

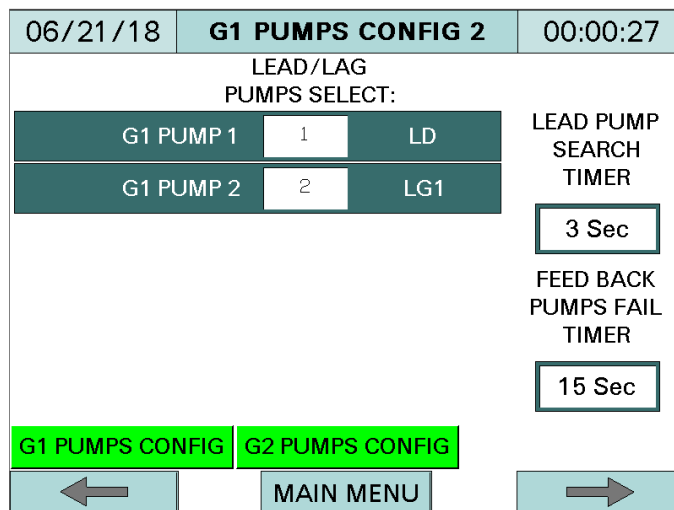


Image shown is configured for 2 pumps in group 1.

Configuration/Setup (continued)

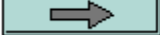
LEAD/LAG PUMPS SELECT:



- 1 – Lead
- 2 – Lag 1
- 3 – Lag 2
- 4 – Lag 3
- 5 – Lag 4
- 6 – Lag 5

Any pump can be set to be the lead pump, just enter '1' in the lead/lag pumps select box. Lag pumps can be in any order within the group. If there are four pumps, the first four numbers (1, 2, 3, and 4) can be entered in any order (2-1-3-4, 3-1-2-4, or 4-1-3-2 and so on).

LEAD PUMP SEARCH TIMER - The adjustable time delay allows for the selected lead pump's status and availability to be detected. The default setup time is 3 seconds.

FEEDBACK PUMPS FAIL TIMER - The adjustable time delay when the pumps' current switches fail to energize. The default setup time is 15 seconds. A pump failure alarm will appear after the FEEDBACK PUMP FAIL TIMER expires. The system will search for and start the next available pump.

Press NEXT button  to display G1 PUMP CONFIG 3 screen.

06/21/18	G1 PUMPS CONFIG 3	00:00:18
WATER TEMPERATURE ENABLED		PUMP MODE LEAD/LAG
WATER LEVEL SWITCHES HIGH ENABLED LOW ENABLED		REMOTE SW DISABLED
RWF WL ALARM ACTIVATE HIGH DISABLED LOW DISABLED		PUMPS START FW PRESSURE CONTROL
		HEADER PRESSURE WITH SP OFFSET DISABLED
G1 PUMPS CONFIG G2 PUMPS CONFIG		
	MAIN MENU	

Configuration/Setup (continued)

WATER TEMPERATURE - To display the water temperature on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

WATER LEVEL SWITCHES - To display the high and low water level float switches, and to activate the water level warnings on the OVERVIEW SCREEN, press ENABLED/DISABLED button to ENABLED.

RWF WL ALARM ACTIVATION - High and low water level alarms can be controlled by DA high and DA low level float switches, or by soft setup in the RWF55 water level control configuration. To activate the RWF55 water level alarms, press HIGH or LOW ENALBED/DISABLED buttons to ENABLED. Go to page 56, "Configuration - DA Water Level Control" to set the high and low water level alarm setpoints.

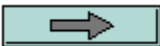
PUMP MODE - Select feedwater pump control mode.

- **LEAD/LAG:** Pumps are controlled by lead/lag mode. See page 7, "Pump Lead/Lag Sequence of Operations", for details.
- **ALTERNATE:** With alternate mode, the lead pump will initially run, and the lag pump will start to run when the lead pump fails. When the ALTERNATE TIME expires, the current lead pump will switch to become the lag pump, and the lag pump will switch to become the lead pump.

REMOTE SW (SWITCH) – Press ENABLED/DISABLED button to ENABLED if the system has remote switch to control the pumps. When REMOTE SW is enabled, the status button will be displayed on the OVERVIEW screen with default text 'OFF/B1 ON'. The 'B1 ON' text can be configured up to 7 characters. Note: password is needed to change the 'B1 ON' text.

PUMPS START - Pumps lead/lag process variable could be based on FW PRESSURE CONTROL or BOILER START CONTROL. Press FW PRESSURE CONTROL/BOILER START CONTROL button to select the control method.


HEADER PRESSURE WITH SP OFFSET - Press ENABLED/DISABLED button to ENABLED if a boiler header pressure sensor is connected to ANALOG INPUT card 1, channel 4. The feedwater pressure setpoint is based on both steam header pressure, plus offset.

Press NEXT button  to display G1 PUMP CONFIG 4 screen.

Configuration/Setup (continued)

06/21/18	G1 PUMPS CONFIG 4				00:00:49
PUMPS RUN TIME		HH	MM	SS	DAYS
G1 PUMP 1	0:	0:	0	0	RESET
G1 PUMP 2	0:	0:	0	0	RESET
G1 PUMPS CONFIG		G2 PUMPS CONFIG			
←		MAIN MENU		→	

PUMPS RUN TIME - All pumps run time is displayed in hours, minutes, seconds, and then accumulated into days. The PUMPS RUN TIME could be reset to 0 (zero) by pressing and holding the RESET button until it turns green. Pressing the RESET button again will start the pump run time clock, and change the button color to gray.

Press NEXT button  to display G1 PUMPS CONFIG 5 screen.

06/21/18	G1 PUMPS CONFIG 5				00:00:52
LOW FW Press ALARM		DISABLED			
HIGH FW Press ALARM		DISABLED			
DA WATER LEVEL BACKUP		NOT CONNECT			
CHEMICAL PUMP		DISABLED			
G1 PUMPS CONFIG		G2 PUMPS CONFIG			
←		MAIN MENU		→	


LOW FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the low feedwater pressure alarm.

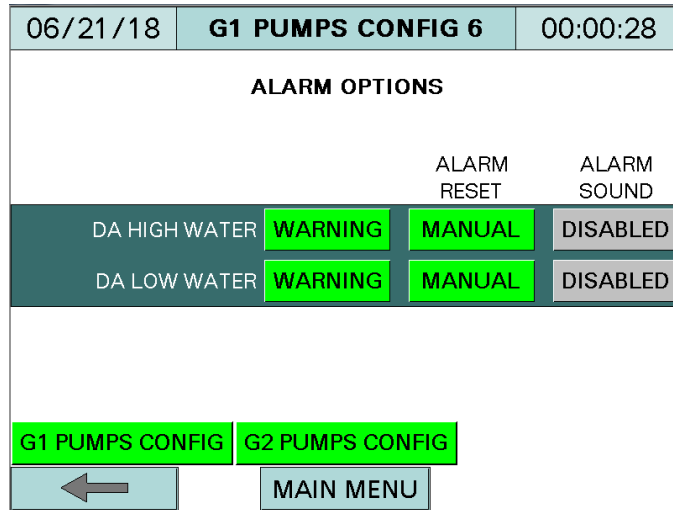
HIGH FW Press ALARM - Press ENABLED/DISABLED button to ENABLED to activate the high feedwater pressure alarm.

Configuration/Setup (continued)

Go to page 84, “MAIN MENU >> LEAD/LAG SETUP >> DA >>... DA LEAD/LAG 5”, to set high and low alarm setpoints.

DA WATER LEVEL BACKUP - Press NOT CONNECT/CONNECTED button to CONNECTED if there is a backup RWF55 for water level.

Press NEXT button  to display G1 PUMPS CONFIG 6 screen.



DA high or low water can be set to alarm or warning. Press WARNING/ALARM button to select between them.

DA HIGH OR LOW WATER WARNING: The high or low water status ‘HW’ or ‘LW’ will be blinking and displayed on the OVERVIEW screen when high or low water is present.

DA HIGH OR LOW WATER ALARM:

- **ALARM RESET:** Select MANUAL reset if DA manual restarts requested or AUTO reset, DA will restart automatically with clear condition.
- **ALARM SOUND:** Press ENABLED/DISABLED button to ENABLED to activate the buzzer’s sound for high and low water level alarms.

Press G2 PUMPS CONFIG button, and follow all G2 PUMPS CONFIG screens to configure the group 2 pumps.

Configuration/Setup (continued)

Analog Inputs

From CONFIG/SETUP screen, press ANALOG IN CONFIG/STATUS to display the AI CARD #1 CONFIG screen.

06/05/18	CONFIG / SETUP	00:00:30	06/05/18	AI CARD #1 CONFIG	00:00:14	
TANK/PUMP CONFIG		ANALOG IN CONFIG/STATUS	CARD#1 ANALOG INPUT 1			
DATE & TIME	HMI CONFIG	ANALOG OUT CONFIG/STATUS	NAME: FW Press			
DA WATER LEVEL	SETUP ENABLE/DISABLE	RTD CONFIG/STATUS	DATA CONVERSION AVERAGE TIME: 10			
TANK STEAM PRESSURE		VFD OPTION	ANALOG SIGNAL IN: mA			
SRG WATER LEVEL			ACTUAL UNIT: PSI			
	MAIN MENU		RAW_MIN: 0.1	AI_MIN: 0.0 mA	SPAN_MIN: 0.00	
			RAW_IN: 800.0	AI_IN: 12.0 mA	ACTUAL: 100.00	
			RAW_MAX: 1600.0	AI_MAX: 20.0 mA	SPAN_MAX: 200.00	
					PSI	
			←	CONFIG	STATUS	→

There are four configurable analog inputs per analog input card. The configuration on this screen is for a 4-20mA pressure transmitter, connected to analog input number one. It must be used for feedwater pressure.

Note: Analog input channel 1 is dedicated for feedwater pressure, analog input channel 2 is dedicated for transfer pump pressure, analog input channel 3 is dedicated for DA tank pressure, and analog input 4 is dedicated for boiler header pressure, if applicable.

NAME - Label for analog input channel 1.

DATA CONVERSION AVERAGE TIME - Sets the data conversion average time used to average the incoming signal. This is useful when the signal is not steady.

SELECT ANALOG SIGNAL IN - Select VOLT for voltage input or mA for current input.

SELECT ACTUAL UNIT - Select the unit for the actual monitored value.


RAW_IN, RAW_MIN, and RAW_MAX - Digital values in the PLC. RAW_MIN and RAW_MAX are adjustable only if an offset is needed.

AI_IN, AI_MIN, and AI_MAX - Monitored transmitter input signal, minimum and maximum values.

SPAN_MIN, SPAN_MAX - Minimum and maximum transmitter span.











ACTUAL - Actual measured value.

Configuration/Setup (continued)

Press NEXT button  to configure the remaining analog inputs.

Press CONFIG button to navigate back to CONFIG/SETUP screen.

Press STATUS button to display AI_CARD #1 STATUS screen. This is used for troubleshooting purposes only.

06/06/18	AI_CARD #1 STATUS	00:00:22
	ERROR RESET	
	GENERAL ERROR	
	ADAPTER NUMBER ERROR	
	CONVERSION ERROR CHANNEL 1	
	CONVERSION ERROR CHANNEL 2	
	CONVERSION ERROR CHANNEL 3	
	CONVERSION ERROR CHANNEL 4	
	AVERAGE SETTING ERROR	
 		

ERROR RESET - Press momentary error reset button once all errors are acknowledged.

GENERAL ERROR - The gray/red indicator will turn red if any error occurs for analog input channel 1 through analog input channel 4, or for analog input adapter number.

ADAPTER NUMBER ERROR - The gray/red indicator will turn red if ANALOG INPUT CARD 1 is installed in a different location than its assigned location.

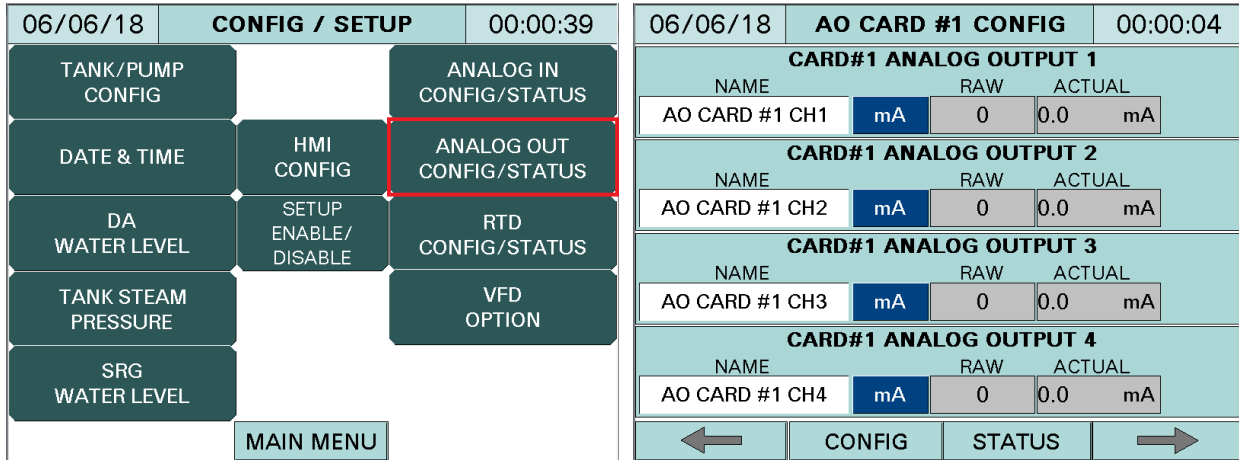
CONVERSION ERROR CHANNEL 1, CHANNEL 2, CHANNEL 3, and CHANNEL 4 - The gray/red indicator will turn red when conversion data fails.

AVERAGE SETTING ERROR - The gray/red indicator will turn red when data conversion average time setting fails.

Configuration/Setup (continued)

Analog Outputs

From CONFIG/SETUP screen, press ANALOG OUT CONFIG/STATUS.



NAME - Label for each analog output.

VOLT/mA - Select VOLT for voltage output or mA for current output signal.

RAW - Digital value in the PLC.

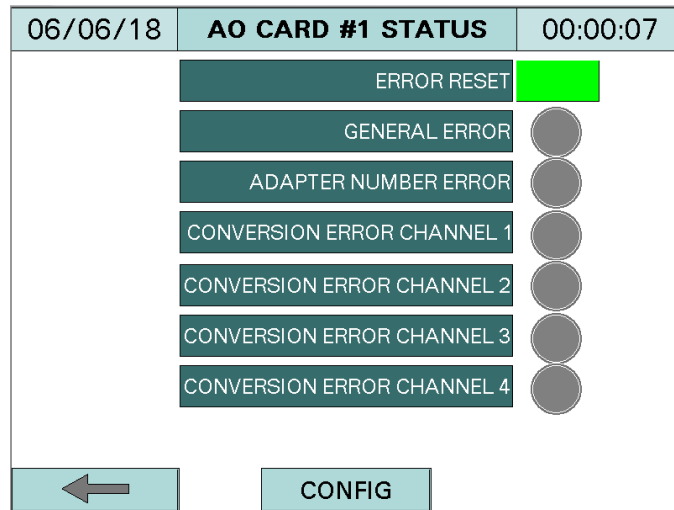
ACTUAL - Actual measured value.

Press CONFIG button to navigate back to CONFIG/SETUP screen.

Configuration/Setup (continued)

Press NEXT button  to continue for the second ANALOG OUT CARD.

Press STATUS button to display AO_CARD #1 STATUS screen. This is used for troubleshooting purposes only.



ERROR RESET - Press momentary error reset button once all errors are acknowledged.

GENERAL ERROR - The gray/red indicator will turn red if any error occurs to analog output channel 1 through analog output channel 4, or for analog output adapter number.

ADAPTER NUMBER ERROR - The gray/red indicator will turn red if ANALOG OUTPUT CARD 1 is installed in a different location than its assigned location.

CONVERSION ERROR CHANNEL 1, CHANNEL 2, CHANNEL 3, and CHANNEL 4 - The gray/red indicator will turn red when conversion data fails.

Configuration/Setup (continued)

RTD Inputs

From CONFIG/SETUP screen, press RTD CONFIG/STATUS.

06/06/18	CONFIG / SETUP	00:00:39	06/06/18	RTD CONFIG	00:00:35
TANK/PUMP CONFIG		ANALOG IN CONFIG/STATUS	RTD UNIT: °F		
DATE & TIME	HMI CONFIG	ANALOG OUT CONFIG/STATUS	RTD TEMPERATURE CH1		
DA WATER LEVEL	SETUP ENABLE/DISABLE	RTD CONFIG/STATUS	NAME	DA WATER TEMP	260 °F AVERAGE 1
TANK STEAM PRESSURE		VFD OPTION	RTD TEMPERATURE CH2		
SRG WATER LEVEL			NAME	SRG WATER TEMP	260 °F AVERAGE 1
	MAIN MENU		RTD TEMPERATURE CH3		
			NAME	CON WATER TEMP	260 °F AVERAGE 1
			RTD TEMPERATURE CH4		
			NAME	RTD CH4	260 °F AVERAGE 1
			←	CONFIG	STATUS

Note: RTD input 1 is dedicated for DA water temperature, RTD input 2 is dedicated for surge water temperature, and RTD input 3 is dedicated for condensate water temperature. All RTDs are 1000 Ohm.









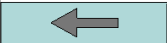
RTD UNIT - Select Fahrenheit or Celsius.

NAME - Label for each RTD input.

AVERAGE - Sets the data conversion average time, used to average the incoming signal. This is useful when the signal is not steady.

Press STATUS button to display RTD STATUS screen. This is used for troubleshooting purposes only.

Configuration/Setup (continued)

06/06/18	RTD STATUS	00:00:25
	ERROR RESET	
	GENERAL ERROR	
	ADAPTER NUMBER ERROR	
	CONVERSION ERROR CHANNEL 1	
	CONVERSION ERROR CHANNEL 2	
	CONVERSION ERROR CHANNEL 3	
	CONVERSION ERROR CHANNEL 4	
	AVERAGE SETTING ERROR	
	CONFIG	

ERROR RESET - Press momentary error reset button once all errors are acknowledged.

GENERAL ERROR - The gray/red indicator will turn red if any error occurs from RTD channel 1 through RTD channel 4, or for RTD adapter number.

ADAPTER NUMBER ERROR - The gray/red indicator will turn red if RTD CARD 1 is installed in a different location than its assigned location.

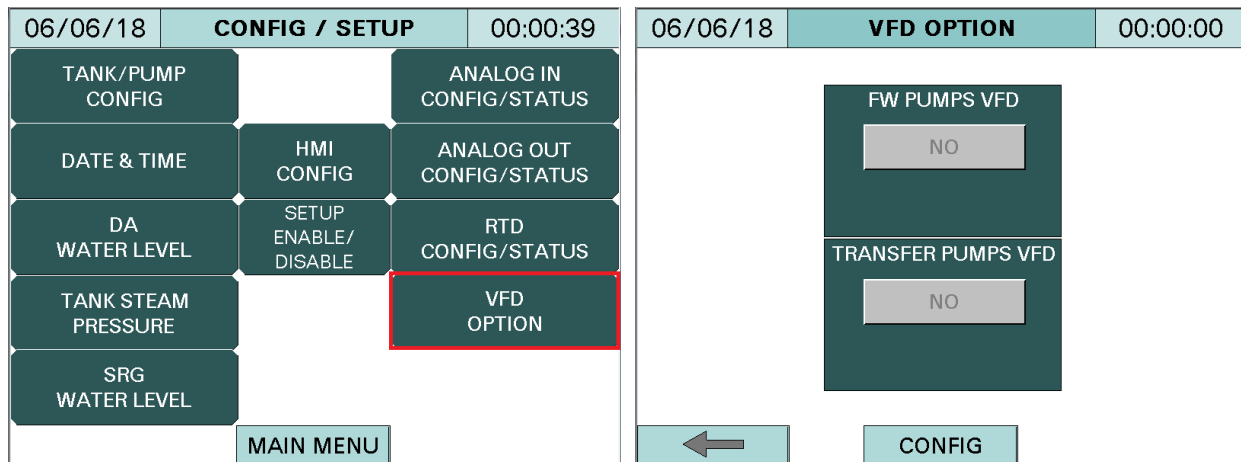
CONVERSION ERROR CHANNEL 1, CHANNEL 2, CHANNEL 3, and CHANNEL 4 - The gray/red indicator will turn red when conversion data fails.

AVERAGE SETTING ERROR - The gray/red indicator will turn red when data conversion average time setting fails.

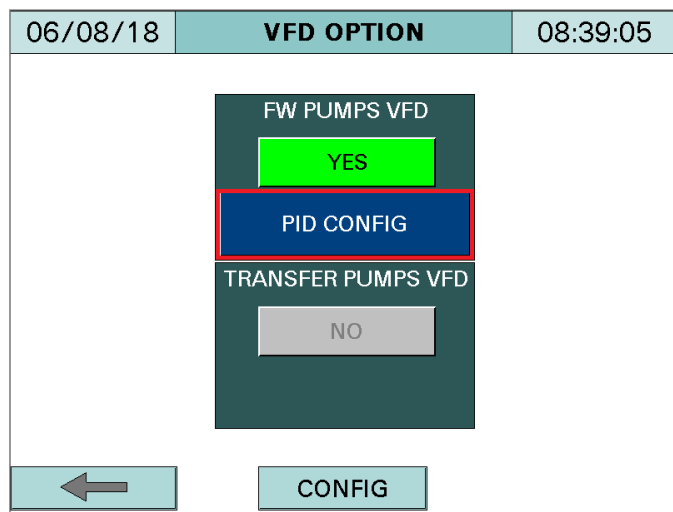
Configuration/Setup (continued)

VFD Option and PID

From CONFIG/SETUP screen, press VFD OPTION.



Toggle the FW PUMPS VFD YES/NO to YES if there are variable frequency drives connected to DA feedwater pumps. Toggle the TW PUMPS VFD YES/NO to YES for transfer water pumps. The PID CONFIG buttons will appear on the screen if FW PUMPS VFD and/or TW PUMPS VFD buttons are set to YES.



Press CONFIG button to navigate to CONFIG/SETUP screen.

Press PID CONFIG button to display the FWP_PID SETUP 1 screen.

Configuration/Setup (continued)

06/06/18		FWP_PID SETUP 1		00:00:18	
VFD INPUT TYPE	SETPOINT	100.0			
4-20mA	MEASURED PV	99.0			
PID OUTPUT	SAMPLE TIME	1000			
4000	INPUT FILTER	70			
% PID OUTPUT	PROPORTIONAL GAIN_P	100			
100 %	INTEGRAL TIME_I	1			
	DIFFERENTIAL GAIN_Dk	0			
	DIFFERENTIAL TIME_Dt	1			
←		CONFIG			

VFD INPUT TYPE - Select between 4-20mA, 0-10V, or 0-5V.

PID OUTPUT - Displays PID output as digital number, range from 0 to 4000.

%PID OUTPUT - Displays PID output as percentage, range from 0 to 100.

SETPOINT - Displays the feedwater pump setpoint.

MEASURED PV - Displays the measured process variable value.

SAMPLE TIME - Sets the sample time. The default setting is 1000.

INPUT FILTER - Sets the input filter. The default setting is 70.

PROPORTIONAL GAIN_P - Sets the proportional gain P. The default setting is 100.

INTEGRAL TIME_I - Sets the integral time I. The default setting is 1.

DIFFERENTIAL GAIN_Dk - Sets the differential gain Dk. The default setting is 0.

DIFFERENTIAL TIME_Dt - Sets the differential time Dt. The default setting is 1.

PID Controller: A PID controller continuously calculates an error value as the difference between a SETPOINT and a MEASURED PV and applies a correction based on proportional, integral, and derivative terms.

Proportional Response

The proportional component depends only on the difference between the setpoint and the process variable. This difference is referred to as the error term. The proportional gain determines the ratio of output response to the error signal. In general, increasing the proportional gain will increase the speed of the control system response. However, if the proportional gain is too large, the process variable will begin to oscillate. If the proportional gain is increased further, the oscillations will become larger, and the system will become unstable and may even oscillate out of control.

Configuration/Setup (continued)

Integral Response

The integral component sums the error term over time. The result is that even a small error term will cause the integral component to increase slowly. The integral response will continually increase over time, unless the error is zero. The effect is to drive the steady-state error to zero. Steady-state error is the final difference between the process variable and setpoint. A phenomenon called integral windup results when integral action saturates a controller without the controller driving the error signal toward zero.

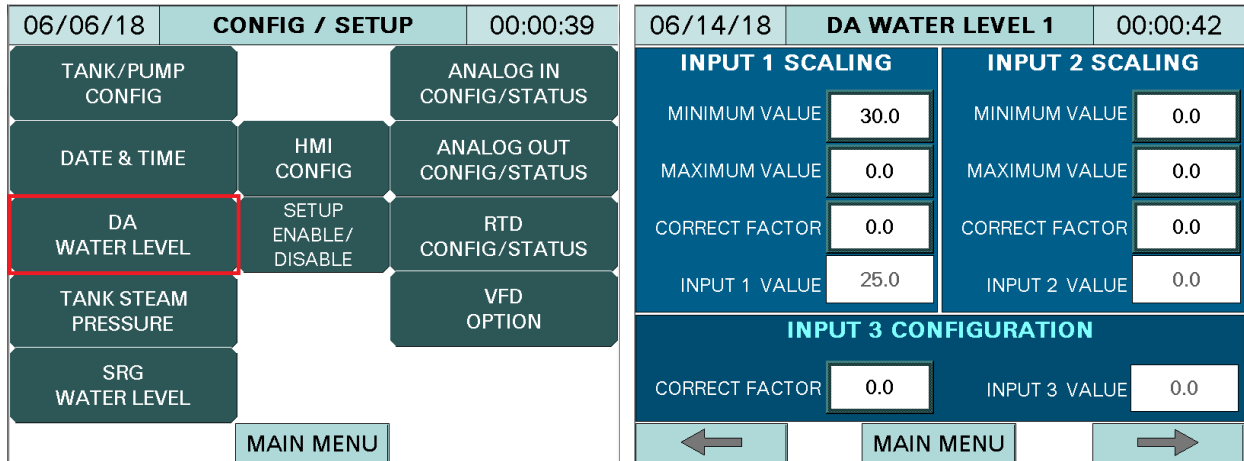
Derivative Response

The derivative component causes the output to decrease if the process variable is increasing rapidly. The derivative response is proportional to the rate of change of the process variable. Increasing the derivative time will cause the control system to react more strongly to changes in the error term and will increase the speed of the overall control system response. Since the derivative response is highly sensitive to noise in the process variable signal, most practical control systems use a very small derivative time. If the sensor feedback signal is noisy, or if the control loop rate is too slow, the derivative response can make the control system unstable. The same applies for the transfer water pumps' PID.

Configuration/Setup (continued)

DA Water Level Control

From CONFIG/SETUP screen, press DA WATER LEVEL to display DA WATER LEVEL 1 screen.



INPUT 1 SCALING:


- **MINIMUM VALUE:** Sets the minimum water level setpoint.
- **MAXIMUM VALUE:** Sets the maximum water level setpoint.
- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 1 VALUE:** Displays the input, actual water level.

INPUT 2 SCALING: (DO NOT USE)

- **MINIMUM VALUE:** Sets the minimum value.
- **MAXIMUM VALUE:** Sets the maximum value.
- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 2 VALUE:** Displays the input 2 value.

INPUT 3 CONFIGURATION: (DO NOT USE)

- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 3 VALUE:** Displays the input 3 value.

Press NEXT button  to display DA WATER LEVEL 2 screen.

(This NEXT button appears only when DA RWF water level alarm activation for High or Low water levels is ENABLED. See DA PUMPS CONFIG 3 screen.)

Configuration/Setup (continued)

06/13/18	DA WATER LEVEL 2	00:00:40
WATER LEVEL DISPLAY MAX		100.0 "WC
WATER LEVEL DISPLAY MIN		0.0 "WC
WATER LEVEL WARNING SETPOINT		
HIGH	WATER LEVEL	
60.0 "WC	54.5 "WC	
LOW	SETPOINT	
50.0 "WC	55.0 "WC	
←		MAIN MENU

WATER LEVEL DISPLAY MAX: Sets the maximum water level, and is used for water level display on the OVERVIEW screen. In order to display the corresponding water level, use the maximum water level setup in the RWF55 controller and enter it here. The default setup is 30"WC.

WATER LEVEL DISPLAY MIN: Sets the minimum water level, and is used for minimum water level display on the OVERVIEW screen. The default setup is 0"WC.

WATER LEVEL WARNING SETPOINT:

- **HIGH:** High water level limit. Warning light HW will be blinking on OVERVIEW and DA WATER LEVEL screens if water level is at or above the high limit.
- **LOW:** Low water level limit. Warning light LW will be blinking on OVERVIEW and DA WATER LEVEL screens if water level is at or below the low limit.

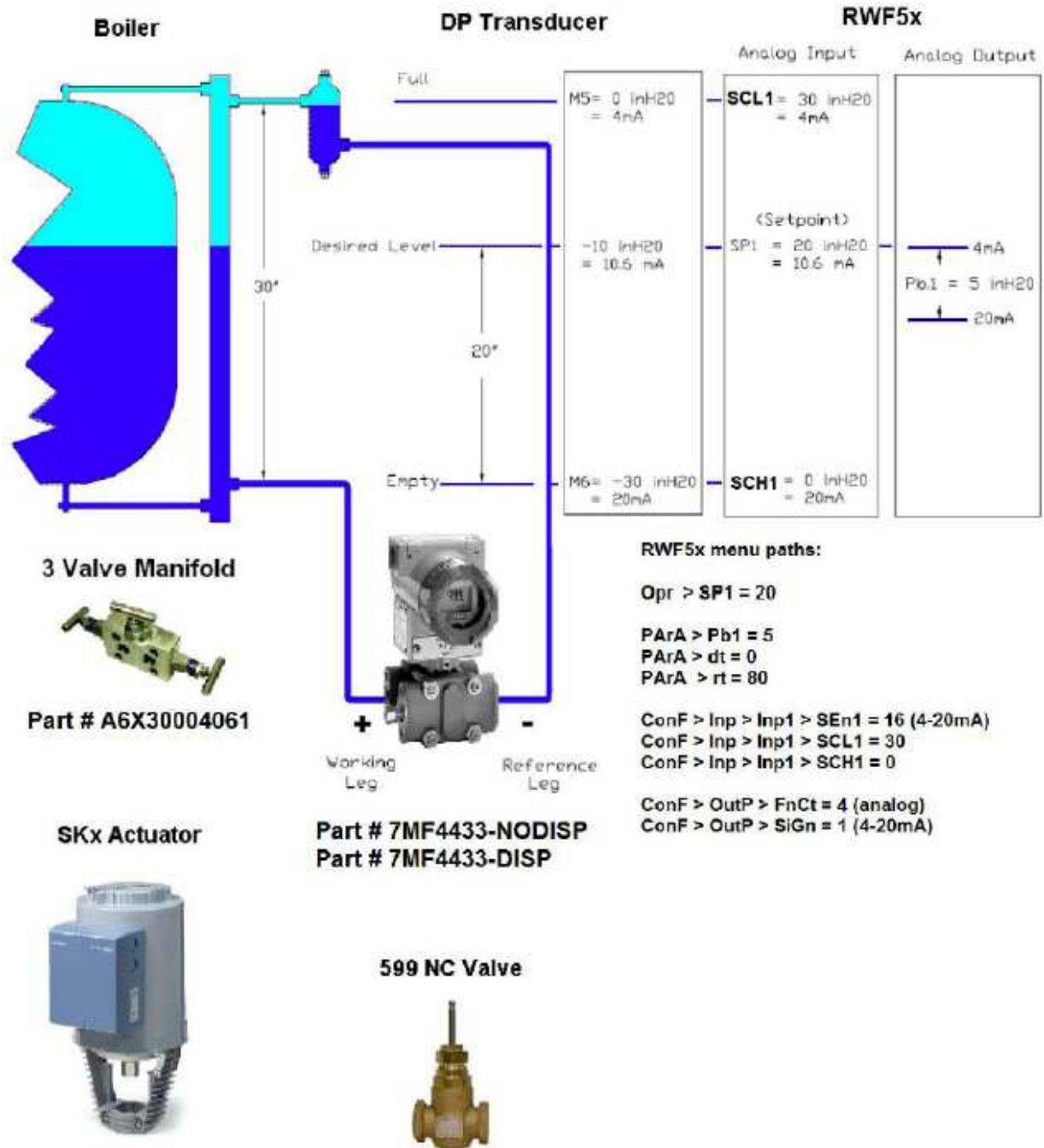
WATER LEVEL - Displays the actual water level.

SETPOINT - Displays the setpoint.

Illustration of general information for system settings can be seen below. Please refer to the RWF55 and DP pressure transmitter manuals for proper settings.

Configuration/Setup (continued)

Water level controls with Siemens DP pressure transmitter and RWF55.
The same configuration applies for surge tank water level.



Configuration/Setup (continued)

DA Tank Steam Pressure

From CONFIG/SETUP screen, press TANK STEAM PRESSURE to display STEAM PRESSURE screen.

06/06/18		CONFIG / SETUP		00:00:39		06/14/18		TANK STEAM PRESS		00:00:02	
TANK/PUMP CONFIG				ANALOG IN CONFIG/STATUS		INPUT 1 SCALING MINIMUM VALUE <input type="text" value="0.0"/> MAXIMUM VALUE <input type="text" value="10.0"/> CORRECT FACTOR <input type="text" value="0.0"/> INPUT 1 VALUE <input type="text" value="5.0"/>		INPUT 2 SCALING MINIMUM VALUE <input type="text" value="0.0"/> MAXIMUM VALUE <input type="text" value="0.0"/> CORRECT FACTOR <input type="text" value="0.0"/> INPUT 2 VALUE <input type="text" value="0.0"/>		INPUT 3 CONFIGURATION CORRECT FACTOR <input type="text" value="0.0"/> INPUT 3 VALUE <input type="text" value="0.0"/>	
DATE & TIME		HMI CONFIG		ANALOG OUT CONFIG/STATUS							
DA WATER LEVEL		SETUP ENABLE/DISABLE		RTD CONFIG/STATUS							
TANK STEAM PRESSURE				VFD OPTION							
SRG WATER LEVEL											
		MAIN MENU								← MAIN MENU	

INPUT 1 SCALING:

- **MINIMUM VALUE:** Sets the minimum pressure setpoint.
- **MAXIMUM VALUE:** Sets the maximum pressure setpoint.
- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 1 VALUE:** Displays the actual pressure.

INPUT 2 SCALING: (DO NOT USE)

- **MINIMUM VALUE:** Sets the minimum value.
- **MAXIMUM VALUE:** Sets the maximum value.
- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 2 VALUE:** Displays the input 2 value.

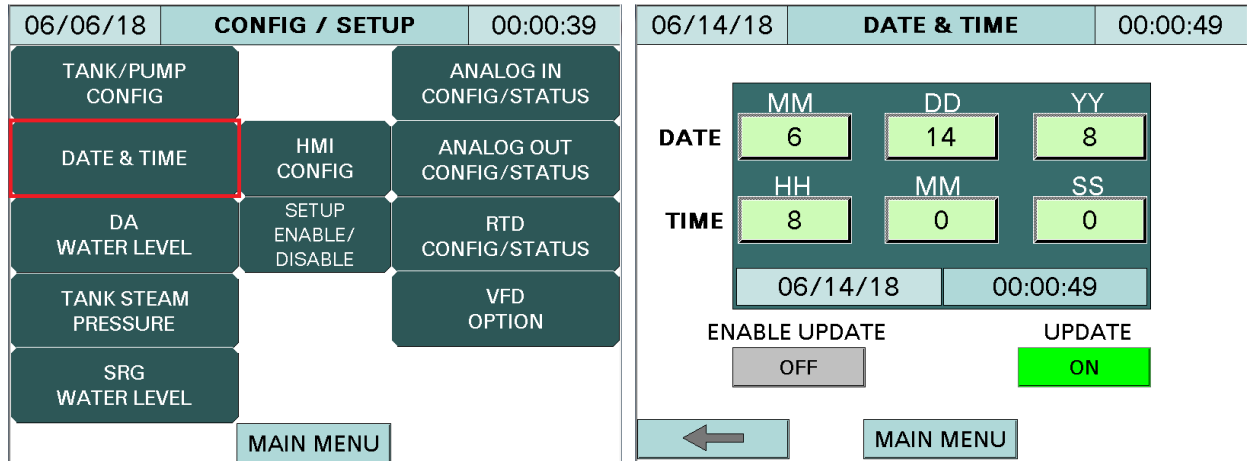
INPUT 3 CONFIGURATION: (DO NOT USE)

- **CORRECT FACTOR:** Sets the correct factor.
- **INPUT 3 VALUE:** Displays the input 3 value.

Configuration/Setup (continued)

Date and Time

From CONFIG/SETUP screen, press DATE & TIME.



DATE:

- **MM** - Sets the month (01 = January; 02 = Feb;...12 = December)
- **DD** - Sets the day (01 to 31 days)
- **YY** - Sets the year (displaying only the last two digits)

TIME:

- **HH** - Sets the hour (00 to 24 hours)
- **MM** - Sets the minute (00 to 60 minutes)
- **SS** - Sets the second (00 to 60 seconds)

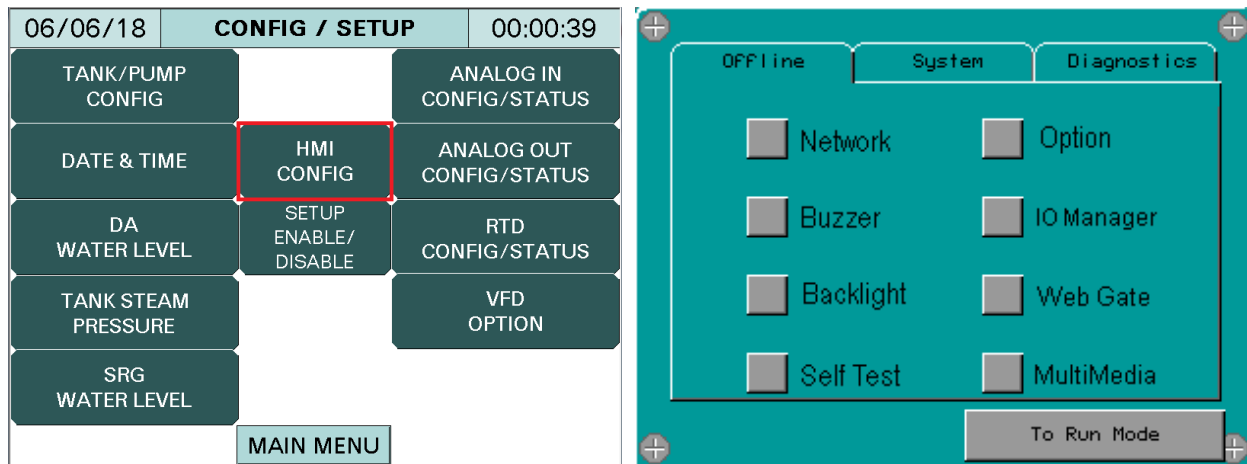
To update date and time: Set the desired date and time, and press ENABLE UPDATE to ON. Then press UPDATE to ON. The date and time will be updated within 60 seconds. Toggle the UPDATE button back to OFF.

Note: The ENABLE UPDATE button will be momentary ON, and then turn OFF by itself.

Configuration/Setup (continued)

HMI (Human Machine Interface) IP Address

The runtime configuration menu allows you to change offline and system settings. To change the IP address, press HMI CONFIG on the CONFIG/SETUP screen.



Press the Offline tab, and then press the Network icon.



Press 'OK' when prompted to work offline. The HMI will then reboot into the network setting screen.

Configuration/Setup (continued)

The screenshot shows a configuration screen with three tabs: 'Static IP', 'DHCP', and 'MAC/DNS'. The 'Static IP' tab is active. Below the tabs are three input fields, each with four digits in separate boxes:

- IP Address:** 192, 168, 1, 58
- Subnet Mask:** 255, 255, 254, 0
- Default Gateway:** 192, 168, 1, 1

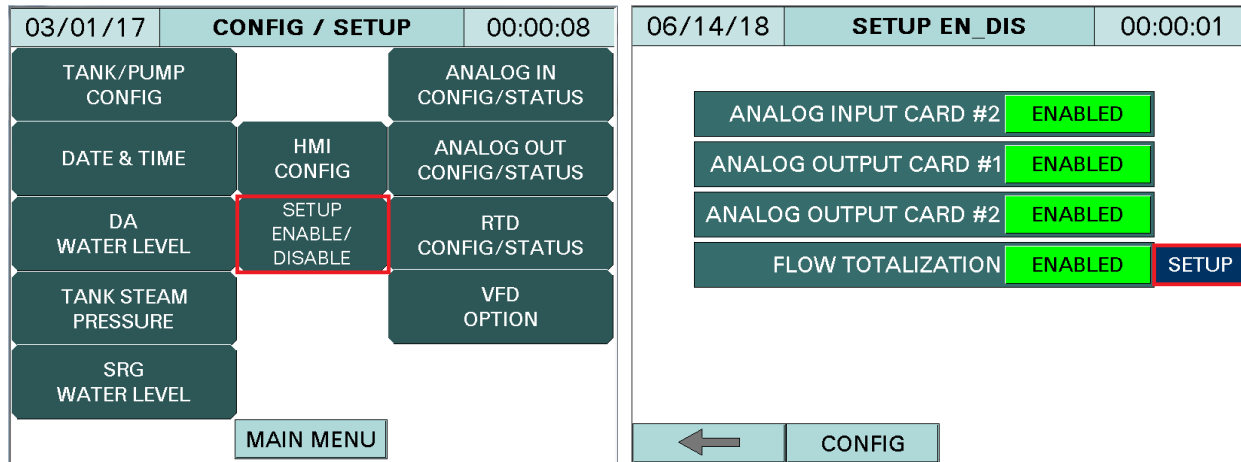
This screen will allow the IP address to be changed. When complete, press 'OK'. This will bring back the HMI System Configuration page. Press 'To Run Mode' to apply any changes. The HMI will reboot with the new IP address settings.

If the DA is connected to an SCC Master lead/lag panel, do not change the default IP address (192.168.1.58) in the touchscreen. Change the IP address at the Master panel, if needed.

Configuration/Setup (continued)

Setup Enable or Disable

From CONFIG/SETUP screen, press SETUP ENABLE/DISABLE to display SETUP EN_DIS screen.



Analog input card #2 - Press ENABLED/DISABLED button to ENABLED if second analog input card is installed.

Analog output card #1 - Press ENABLED/DISABLED button to ENABLED if first analog output card is installed.

Analog output card #2 - Press ENABLED/DISABLED button to ENABLED if second analog output card is installed.

Flow Totalization - Press ENABLED/DISABLED button to ENABLED if second analog input card is installed. Up to four analog input channels can be configured for flow totalization. Press SETUP button to setup totalization.

Configuration/Setup (continued)

06/21/18	TOTALIZATION SETUP	00:00:28										
<table border="1"><tr><td>PUMP 1</td><td>ENABLED</td></tr><tr><td>PUMP 2</td><td>ENABLED</td></tr><tr><td>PUMP 3</td><td>ENABLED</td></tr><tr><td>PUMP 4</td><td>ENABLED</td></tr><tr><td>GROUP UNIT</td><td>SAME</td></tr></table>			PUMP 1	ENABLED	PUMP 2	ENABLED	PUMP 3	ENABLED	PUMP 4	ENABLED	GROUP UNIT	SAME
PUMP 1	ENABLED											
PUMP 2	ENABLED											
PUMP 3	ENABLED											
PUMP 4	ENABLED											
GROUP UNIT	SAME											
←	MAIN MENU	CONFIG										

Tags **PUMP 1**, **PUMP 2**, **PUMP 3**, and **PUMP 4** are configured in NAME of analog input card 2 from channel 5 to channel 8. Press ENABLED/DISABLED to ENABLED if flow meters are connected to analog input card 2 from channel 5 to channel 8.

GROUP UNIT:

- **SAME:** Select SAME if group 1 and group 2 totalization have the same units. The grand total of the two groups will be calculated and displayed in the totalization screens.
- **DIFFERENT:** Select DIFFERENT if group 1 or group 2 have different units. There is no grand total calculation for two groups with different units.

Note for group totalization:

Analog input channel 5 and 6 can be setup for group 1 totalization.
Analog input channel 7 and 8 can be setup for group 2 totalization.

Configuration/Setup (continued)

Flow Totalization

From CONFIG/SETUP screen, press FLOW TOTALIZATION to display FLOW TOTALIZATION screen.

06/14/18		CONFIG / SETUP	00:00:03		06/21/18		FLOW TOTALIZATION	00:00:18	
TANK/PUMP CONFIG			ANALOG IN CONFIG/STATUS		PUMP 1+2	1500	TOT. UNIT	GPM	
DATE & TIME	HMI CONFIG		ANALOG OUT CONFIG/STATUS		PUMP 1	1000	OFF	PUMP 1	
DA WATER LEVEL	SETUP ENABLE/DISABLE		RTD CONFIG/STATUS		PUMP 2	500	OFF	PUMP 2	
TANK STEAM PRESSURE			VFD OPTION		PUMP 3+4	1500	TOT. UNIT	GPM	
SRG WATER LEVEL			FLOW TOTALIZATION		PUMP 3	1000	OFF	PUMP 3	
	MAIN MENU				PUMP 4	500	OFF	PUMP 4	
					GRAND TOTAL	3000	OFF	RESET	
					←			MAIN MENU	

The FLOW TOTALIZATION button is displayed only when the flow totalization option is enabled in configuration SETUP ENABLE/DISABLE screen. The data information will be displayed after each pump flow totalization is configured.

All tags PUMP 1+2, PUMP P1, PUMP P2, PUMP P3+P4, PUMP P3, PUMP P4, and GRAND TOTAL are configured up to 12 characters with password protection. Leave the **ON/OFF** button to OFF and press to ON after PUMP 1, PUMP 2, PUMP 3, and PUMP 4 are configured.

Note: Units can be selected when all totalizations are in OFF mode.

PUMP 1+2: Displays the totalization of PUMP 1 and PUMP 2.

TOT. UNIT: Select unit for group 1. Group 1 includes PUMP 1 and PUMP 2.

PUMP 1: Displays the totalization of PUMP 1. Press PUMP 1 button to go to TOTAL PUMP 1 screen. The TOTAL PUMP 1 screen will be examined on page 78.

PUMP 2: Displays the totalization of PUMP 2. Press PUMP 2 button to go to TOTAL PUMP 2 screen.

PUMP 3+4: Displays the totalization of PUMP 3 and PUMP 4.

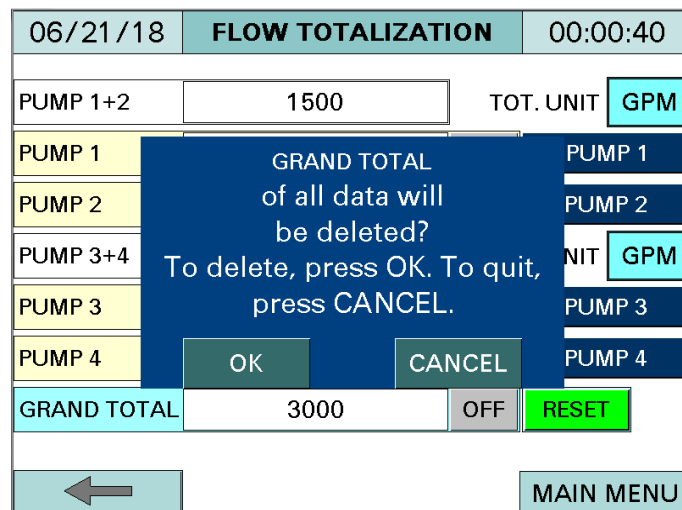
Configuration/Setup (continued)

TOT.UNIT: Select unit for group 2. Group 2 includes PUMP 3 and PUMP 4. Unit can only be selected when PUMP 3 and PUMP 4 are in OFF mode.

PUMP 3: Displays the totalization of PUMP 3. Press PUMP 3 button to go to TOTAL PUMP 3 screen.

PUMP 4: Displays the totalization of PUMP 4. Press PUMP 4 button to go to TOTAL PUMP 4 screen.

GRAND TOTAL: Displays the totalization of PUMP 1, PUMP 2, PUMP 3, and PUMP 4 if the TOTAL UNIT of group 1 and group 2 are the same. The grand total can be reset to 0 (zero) by pressing the RESET button. A pop up window will be displayed, as seen below.



To acknowledge the changes, press the 'OK' button, otherwise press 'CANCEL'.
Note: All the RESET buttons will work when all the totalizations are deactivated.

Press PUMP 1 button to display PUMP 1 screen.

Configuration/Setup (continued)

06/21/18	TOTALPUMP 1	00:00:13
TOTALIZATION		OFF
UNIT		GPM
ACTUAL FLOW		
10.0	GPM	
TOTAL PUMP 1		
100	Gal	RESET
GRAND TOTAL PUMP 1		
1000	Gal	RESET
←		MAIN MENU

TOTALIZATION:

- **ON:** Activate the flow totalization.
- **OFF:** Deactivate the flow totalization.

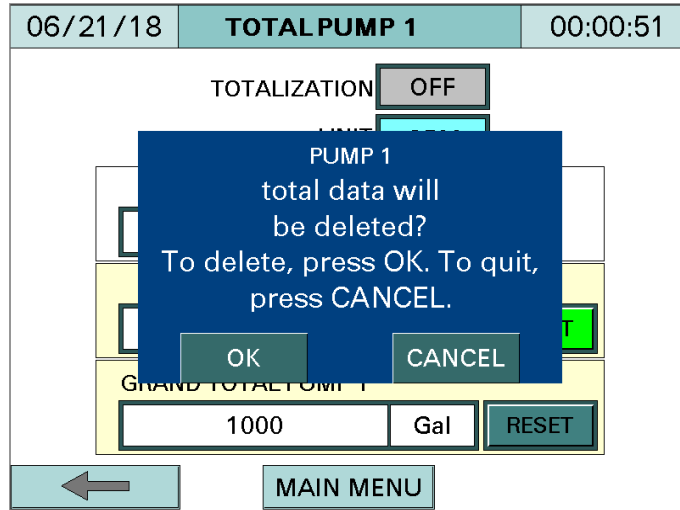
UNIT - Selects unit. The button will turn to green and back to cyan color when unit is selected to next unit. Note that totalization is OFF to select unit.

- **PSI:** Not applicable
- **A:** Not applicable
- **GPS:** Gallon per second
- **GPM:** Gallon per minute
- **GPH:** Gallon per hour
- **LbPS:** Pound per second
- **LbPM:** Pound per minute
- **LbPH:** Pound per hour
- **LPM:** Litter per minute
- **“WC:** Not applicable
- **°F:** Not applicable
- **°C:** Not applicable

ACTUAL FLOW - Displays the actual flow.

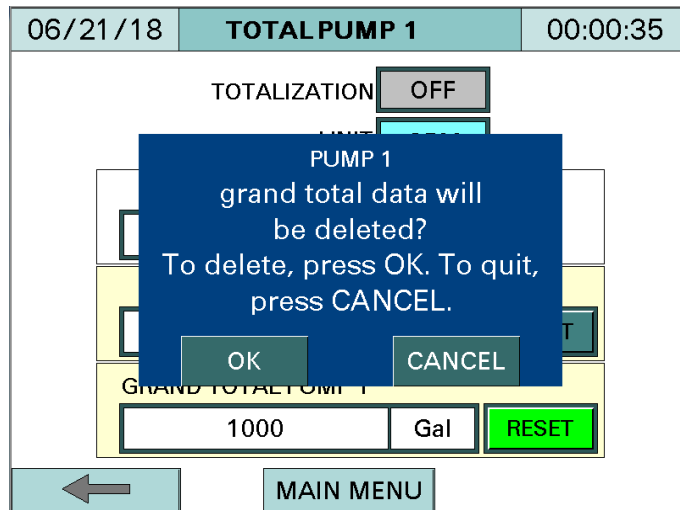
Configuration/Setup (continued)

TOTAL PUMP 1 - Displays the total pump 1 flow. The total pump 1 flow could be reset to 0 (zero) by pressing the RESET button. A pop up window will be displayed, as seen below.



To acknowledge the changes, press the 'OK' button, otherwise press 'CANCEL'.

GRAND TOTAL PUMP 1 - Displays the grand total pump 1 flow. The grand total pump 1 flow could be reset to 0 (zero) by pressing the 'RESET' button. A pop up window will be displayed, as seen below.



To acknowledge the changes, press the 'OK' button, otherwise press 'CANCEL'.

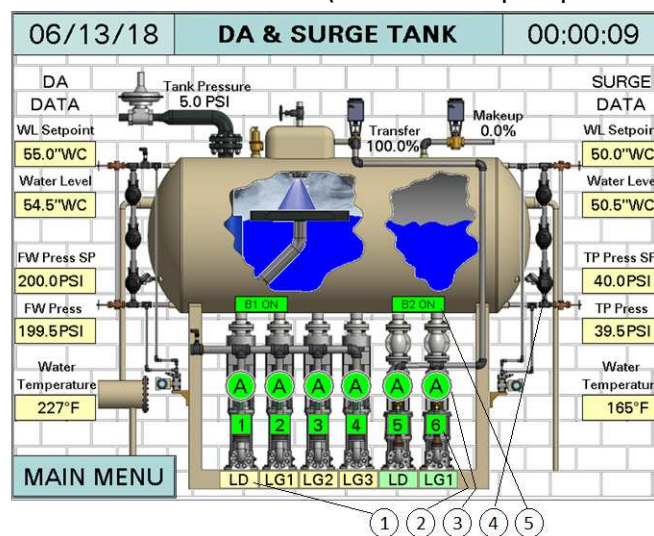
Similar configurations apply for PUMP 2, PUMP 3, or TOTAL P4.

Overview

From MAIN MENU screen, press OVERVIEW to display the configured system overview.

General Split tank

DA and Surge tank with water level controllers (4 feedwater pumps and 2 transfer pumps)



- 1 Pump lead or lag designation
 - Yellow rectangles designate FW pumps
 - LD: FW lead pump
 - LG1, LG2, ... LG5: FW lag 1 pump, FW lag 2 pump, FW lag 5 pump
 - Green rectangles designate transfer pumps
 - LD: transfer lead pump
 - LG1: transfer lag 1 pump

- 2 Square indicator: pump feedback
 - Green: pump proven, current switch energized, or VFD run dry contact closed
 - White blinking: pump not proven, current switch not energized, or VFD run dry contact open
 - Numbers indicate pump order number

- 3 Round indicator color: pump status; Letter: HAND-OFF-AUTO position indication
 - Green: pump on
 - Gray: pump off
 - Letter A: Auto (pump in auto lead/lag mode)
 - Letter H: Hand (pump continuously running with LWCO satisfied)
 - Letter O: Off (pump off)
 - Letter F: pump failed

Overview (continued)

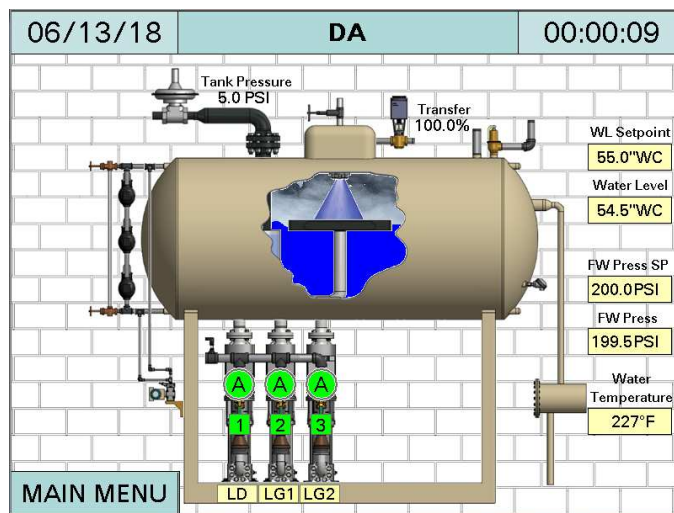
- 4 Water level float switches
 - Top float switch: high water level
 - Middle float switch: low water level
 - Bottom float switch: low/low water level

- 5 Remote switches
 - Green: remote switch on
 - Gray: remote switch off

Note: The actual OVERVIEW SCREEN may vary based on system requirements.

General DA tank

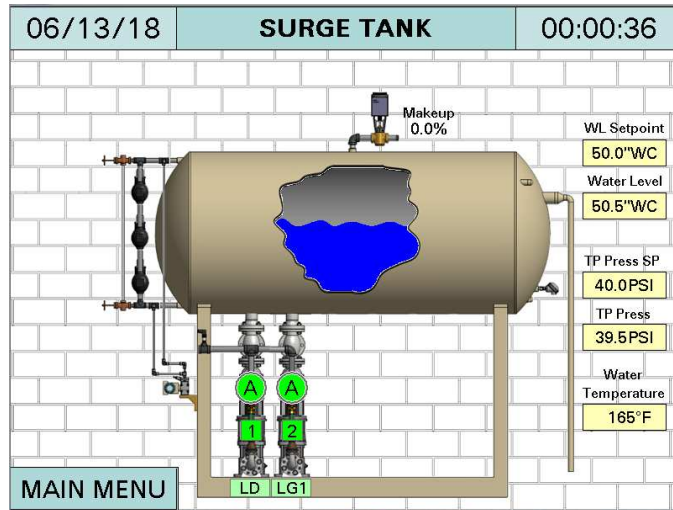
DA tank with water level controller (3 feedwater pumps)



Overview (continued)

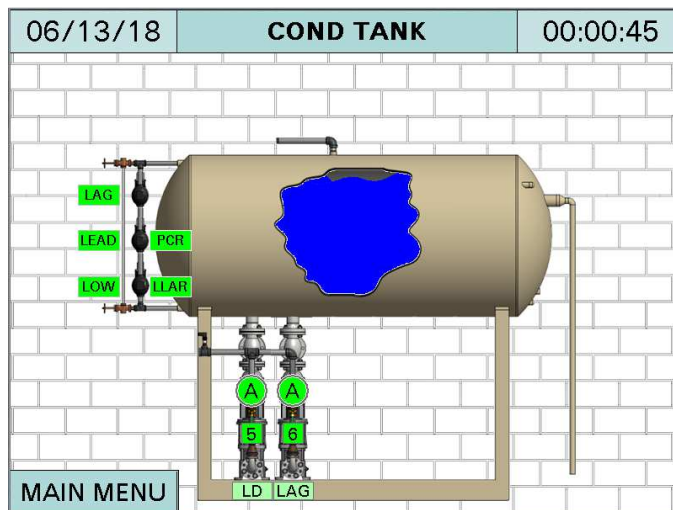
General Surge tank

Surge tank with water level controller (2 transfer pumps)



General Condensate tank: two transfer pumps

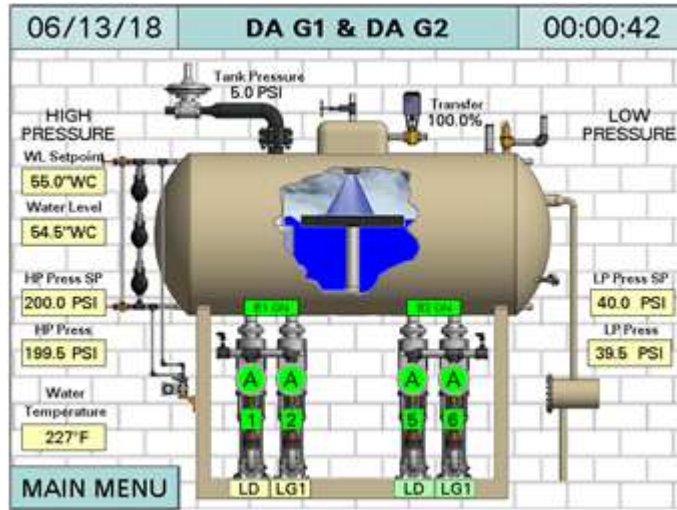
Condensate tank (2 transfer pumps)



Overview (continued)

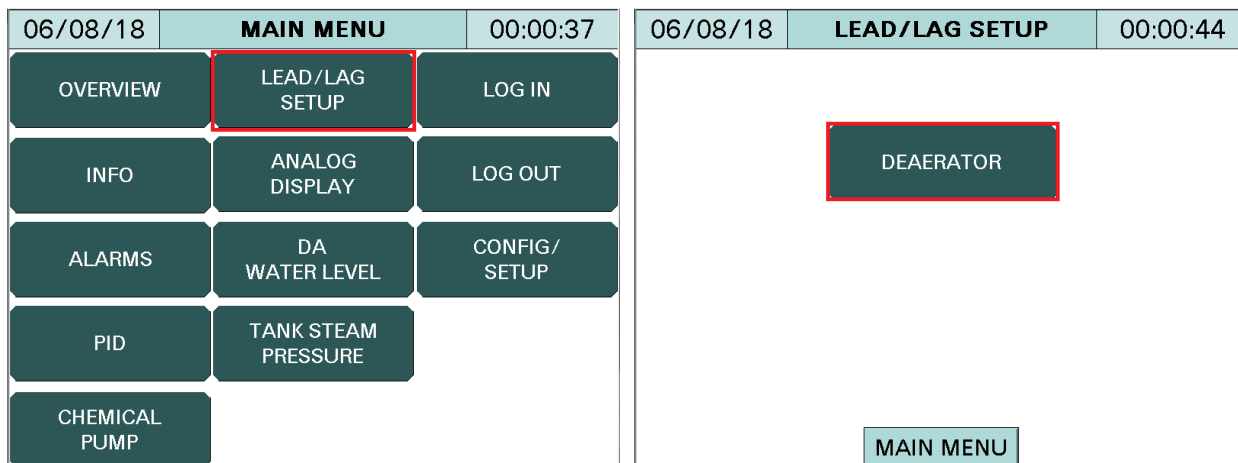
General Deaerator tank 2 groups

Deaerator tank 2 groups with water level controller (2 high pressure pumps in group 1 and 2 low pressure pumps in group 2)



DA Lead/Lag Setup

From MAIN MENU, press LEAD/LAG SETUP and then press DEAERATOR to setup the deaerator's lead/lag control.



Note: The MAIN MENU screen varies based on system requirements.

DA lead/lag setup, based on feedwater pressure with starter control

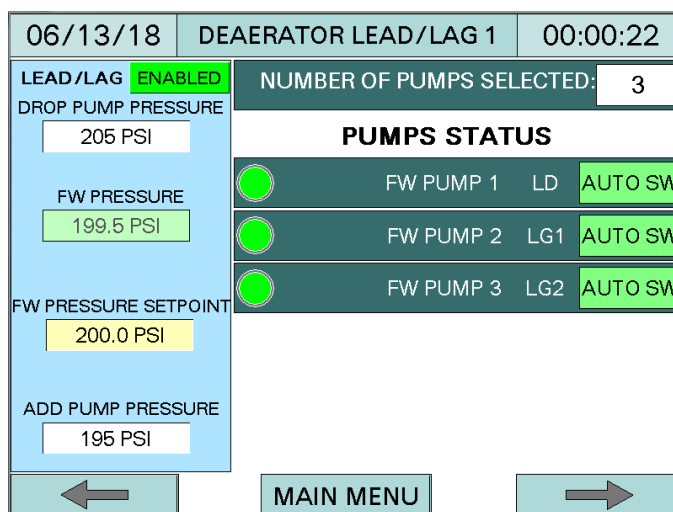


Image shown is configured for 3 feedwater pumps.

LEAD/LAG - Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

DROP PUMP PRESSURE - Sets the drop pump pressure. If the feedwater pressure rises above the DROP PUMP PRESSURE, with an adjustable stop time delay, the last lag pump will be stopped.

DA Lead/Lag Setup (continued)

FW PRESSURE - Feedwater pressure is displayed when Analog Input 1 is configured for the feedwater pressure transmitter.

FEEDWATER PRESSURE SETPOINT (FW PRSR SP) - Sets the feedwater pressure setpoint.

ADD PUMP PRESSURE - Sets the add pump pressure. If the feedwater pressure drops below the ADD PUMP PRESSURE, with an adjustable start time delay, the first lag pump will start.

NUMBER OF PUMPS SELECTED - Displays the total number of available pumps.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

DA lead/lag setup, based on feedwater pressure with VFD

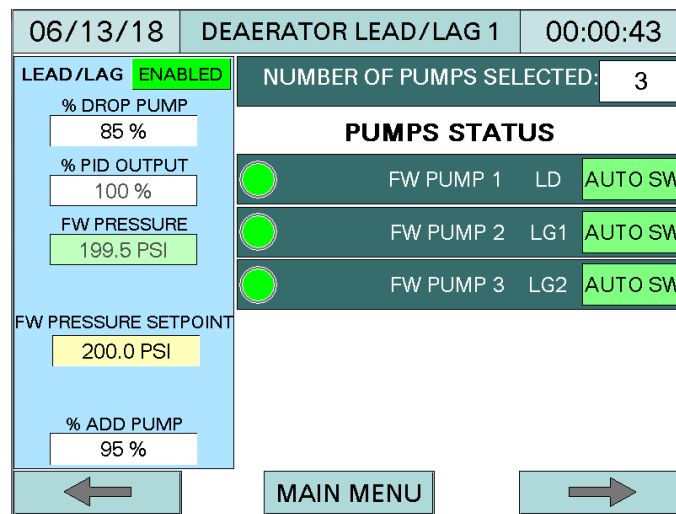


Image shown is configured for 3 feedwater pumps.

LEAD/LAG - Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

% DROP PUMP - Sets the percentage DROP PUMP. If the PID OUTPUT drops below the % DROP PUMP, with an adjustable stop time delay, the last lag pump will be stopped.

% PID OUTPUT - Displays the percentage PID output. The actual reading of PID output is displayed as a percentage, as a representation of a 4 to 20mA output signal; 0% = 4mA and 100% = 20mA.

DA Lead/Lag Setup (continued)

FW PRESSURE - Feedwater pressure is displayed when Analog Input 1 is configured for the feedwater pressure transmitter.

FEEWATER PRESSURE SETPOINT (FW PRSR SP) - Sets the feedwater pressure setpoint.

% ADD PUMP - Sets the percentage ADD PUMP. If the % PID output reaches above % ADD PUMP, with an adjustable start time delay, the lag pump will be added.

NUMBER OF PUMPS SELECTED - Displays the total number of available pumps.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

DA lead/lag setup, based on header pressure and offset with starter control

06/13/18	DEAERATOR LEAD/LAG 1	00:00:47
LEAD/LAG ENABLED	NUMBER OF PUMPS SELECTED: 3	
DROP PUMP PRESSURE 205 PSI	PUMPS STATUS	
FW PRESSURE 199.5 PSI	<input checked="" type="radio"/>	FW PUMP 1 LD AUTO SW
HEADER SETPOINT PRESSURE OFFSET 170.0 PSI 30.0 PSI	<input checked="" type="radio"/>	FW PUMP 2 LG1 AUTO SW
FW PRESSURE SETPOINT 200.0 PSI	<input checked="" type="radio"/>	FW PUMP 3 LG2 AUTO SW
ADD PUMP PRESSURE 195 PSI		
	MAIN MENU	

Image shown is configured for 3 feedwater pumps.

LEAD/LAG - Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

DROP PUMP PRESSURE - Sets the drop pump pressure. If the feedwater pressure rises above the DROP PUMP PRESSURE, with an adjustable stop time delay, the last lag pump will be stopped.

FW PRESSURE - Feedwater pressure is displayed when Analog Input 1 is configured for the feedwater pressure transmitter.

DA Lead/Lag Setup (continued)

HEADER PRESSURE - Header pressure is displayed when Analog Input 4 is configured for boiler steam header pressure.

SETPOINT OFFSET - Sets the setpoint offset. The value of an offset is a number to keep feedwater pressure setpoint above the actual boiler header pressure.

FW PRESSURE SETPOINT - Displays feedwater pressure setpoint. The feedwater pressure setpoint is a dynamic setpoint automatically calculated based on the boiler's actual steam HEADER PRESSURE and SETPOINT OFFSET.

ADD PUMP PRESSURE - Sets the add pump pressure. If the feedwater pressure drops below the ADD PUMP PRESSURE, with an adjustable start time delay, the first lag pump will be added.

NUMBER OF PUMPS SELECTED - Displays the total number of available pumps.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

DA lead/lag setup, based on header pressure and offset with VFD

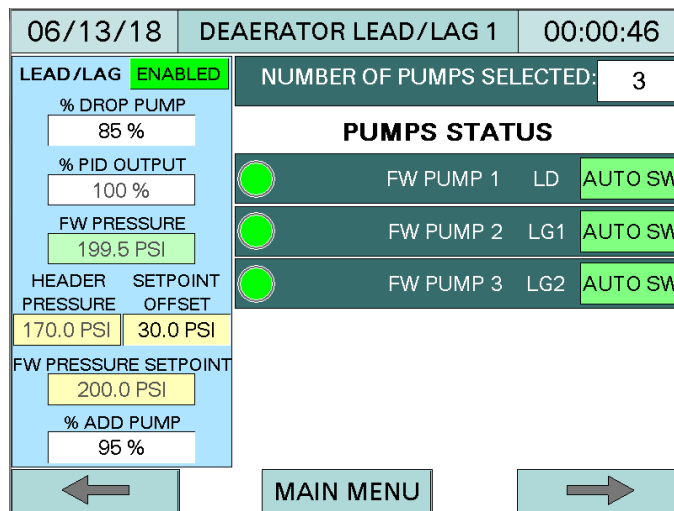


Image shown is configured for 3 feedwater pumps.

DA Lead/Lag Setup (continued)

LEAD/LAG - Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

% DROP PUMP - Sets the percentage DROP PUMP. If the % PID OUTPUT drops below the % DROP PUMP, with an adjustable stop time delay, the last lag pump will be stopped.

% PID OUTPUT - Displays the percentage PID output. The actual reading of PID output is displayed as a percentage, as a representation of a 4 to 20mA output signal; 0% = 4mA and 100% = 20mA.

FW PRESSURE - Feedwater pressure is displayed when Analog Input 1 is configured for the feedwater pressure transmitter.

HEADER PRESSURE - Header pressure is displayed when Analog Input 4 is configured for boiler steam header pressure.

SETPOINT OFFSET - Sets the setpoint offset. The offset is a number to keep feedwater pressure setpoint above the boiler's actual header pressure.

FW PRESSURE SETPOINT - Displays feedwater pressure setpoint. The feedwater pressure setpoint is a dynamic setpoint automatically calculated based on the boiler's actual steam HEADER PRESSURE and SETPOINT OFFSET.

% ADD PUMP - Sets the percentage ADD PUMP. If the % PID output reaches above the % ADD PUMP, with an adjustable start time delay, the lag pump will be added.

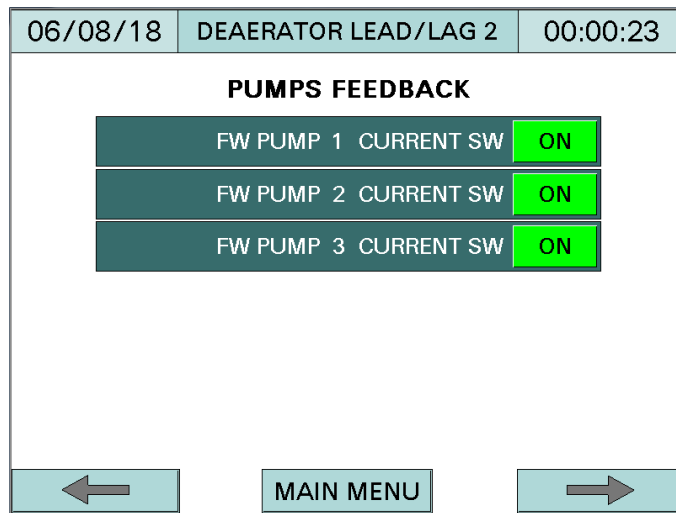
NUMBER OF PUMPS SELECTED - Displays the total number of pumps selected.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

Press NEXT button  to display DEAERATOR LEAD/LAG 2 screen.

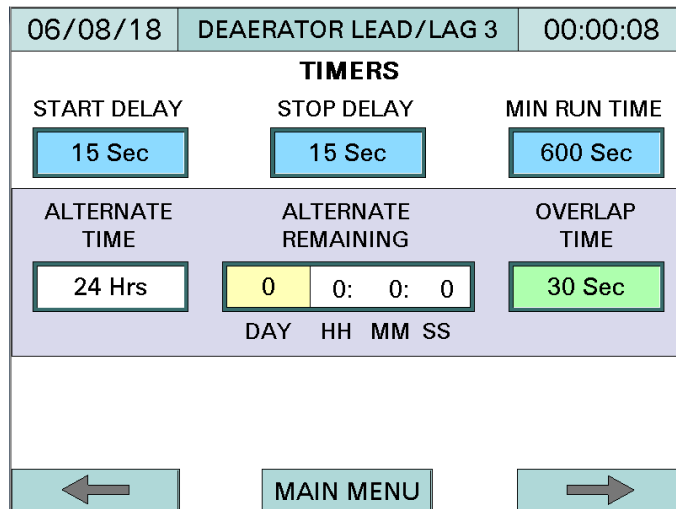
DA Lead/Lag Setup (continued)



Picture shown is configured for 3 feedwater pumps.

PUMPS FEEDBACK - Pump current switches or VFD dry contacts status.

Press NEXT button  to display DEAERATOR LEAD/LAG 3 screen.



START DELAY - The adjustable time delay, 1 to 1800 seconds, for the pump to start after each run command.

STOP DELAY - The adjustable time delay, 1 to 1800 seconds, for the pump to stop after each stop command.

DA Lead/Lag Setup (continued)

MINIMUM RUN TIME - The adjustable minimum pump run time, 1 to 1800 seconds, before system commands the pump to be stopped.




ALTERNATE TIME - The adjustable time, 1 to 720 hours, to alternate the lead pump.

ALTERNATE REMAINING - The time remaining until automatic alternation occurs.

OVERLAP TIME - Following a lead pump change, the former lead pump will still be enabled for this duration of time.

Press NEXT button  to display DEAERATOR LEAD/LAG 4 screen.

06/08/18	DEAERATOR LEAD/LAG 4	00:00:46
PUMPS RUN TIME	HH MM SS	DAYS
FW PUMP 1	0: 0: 0	0
FW PUMP 2	0: 0: 0	0
FW PUMP 3	0: 0: 0	0

All PUMPS RUN TIME are displayed in hours, minutes, seconds, and accumulated into days.

DA Lead/Lag Setup (continued)

Press NEXT button  to display DEAERATOR LEAD/LAG 5 screen.

06/13/18	DEAERATOR LEAD/LAG 5	00:00:19
LOW FW Press ALARM		HIGH FW Press ALARM
ALARM RESET	MANUAL	ALARM RESET
FW Press	199.5 PSI	FW Press
SETPOINT	195.0 PSI	SETPOINT
TIME DELAY	5 S	TIME DELAY
←		MAIN MENU

This screen is only displayed when the low and high feedwater pressure alarms are enabled on the DA configuration screen.

ALARM RESET: Select MANUAL reset if low or high feedwater pressure manual restarts are requested, or AUTO reset if low or high feedwater pressure will restart automatically with a clear condition.

FW Press: Displays the actual feedwater pressure.

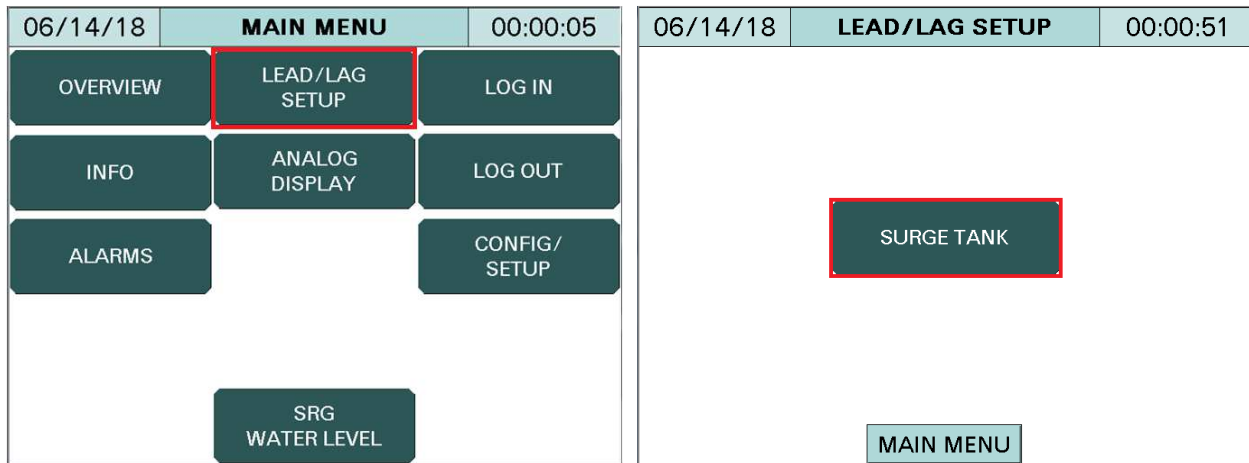
SETPOINT: Set low and high feedwater pressure setpoints.

TIME DELAY: The adjustable time delay, 0 to 300 seconds, for the feedwater pressure alarm to turn on.

The low feedwater pressure alarm will turn on after time delay if feedwater pressure is at or below the low setpoint. The high feedwater pressure alarm will turn on after time delay if feedwater pressure is at or above the high setpoint.

Surge Tank Lead/Lag Setup

Press LEAD/LAG SETUP and then press SURGE TANK to set surge tank's lead/lag control.



SRG lead/lag setup, based on transfer pressure with starter control

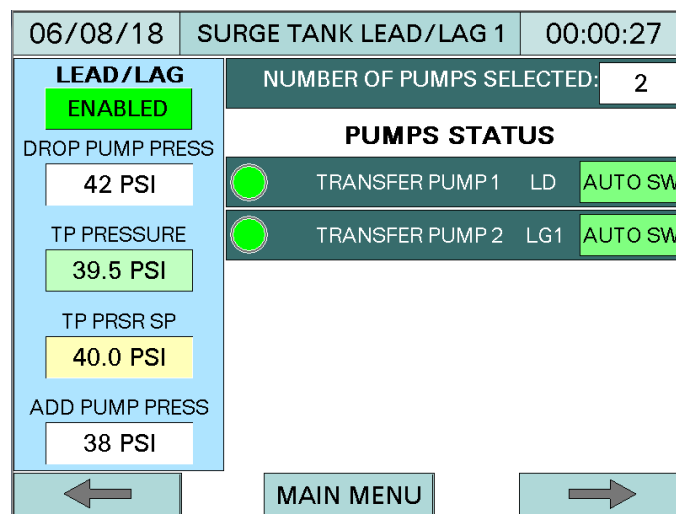


Image shown is configured for 2 transfer pumps.

LEAD/LAG: Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

DROP PUMP PRESSURE: Sets the drop pump pressure. If the transfer pump pressure rises above the DROP PUMP PRESSURE, with an adjustable stop time delay, the last lag pump will be stopped.

TP PRESSURE: Transfer pump pressure is displayed when Analog Input 2 is configured.

Surge Tank Lead/Lag Setup (continued)

TP PRSR SP (Transfer Pump Pressure Setpoint): Sets transfer pump pressure setpoint.

ADD PUMP PRESSURE: Sets the add pump pressure. If transfer pump pressure drops below the ADD PUMP PRESSURE, with an adjustable start time delay, the first lag pump will be started.

NUMBER OF PUMPS SELECTED: Displays the total number of pumps available.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

SRG lead/lag setup, based on transfer pressure with VFD

06/08/18	SURGE TANK LEAD/LAG 1	00:00:09
LEAD/LAG		NUMBER OF PUMPS SELECTED: 2
ENABLED		PUMPS STATUS <input checked="" type="radio"/> TRANSFER PUMP 1 LD AUTO SW <input checked="" type="radio"/> TRANSFER PUMP 2 LG1 AUTO SW
% DROP PUMP		
85 %		
% PID OUTPUT		
100 %		
TP PRESSURE		
39.5 PSI		<input type="button" value="←"/> <input type="button" value="MAIN MENU"/> <input type="button" value="→"/>
TP PRSR SP		
40.0 PSI		
% ADD PUMP		
95 %		

Image shown is configured for 2 transfer pumps.

LEAD/LAG: Displays ENABLED when the PUMPS CONTROL selector switch on the front of the control panel is switched to ON.

% DROP PUMP: Sets the percentage DROP PUMP. If the PID OUTPUT drops below the % DROP PUMP, with an adjustable stop time delay, the last lag pump will be stopped.

% PID OUTPUT - Displays the percentage PID output. The actual reading of PID output is displayed as a percentage, as a representation of 4 to 20mA output signal; 0% = 4mA and 100% = 20mA.

TP PRESSURE: Transfer pump pressure is displayed after Analog Input 2 is configured.

Surge Tank Lead/Lag Setup (continued)

TP PRSR SP (Transfer Pump Pressure Setpoint): Sets transfer pump pressure setpoint.

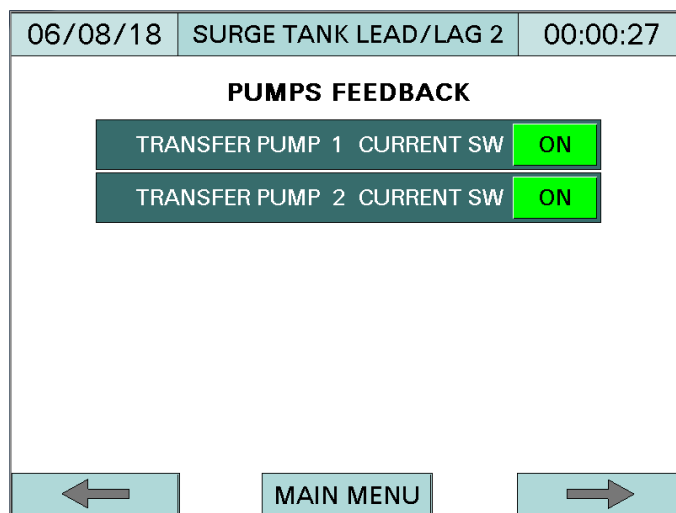
% ADD PUMP: Sets the percentage ADD PUMP. If the PID output reaches above the % ADD PUMP, with an adjustable start time delay, the lag pump will be added.

NUMBER OF PUMPS SELECTED: Displays the total number of pumps available.

HAND-OFF-AUTO selector switch status:

- **HAND:** pump continuously running with LWCO satisfied
- **OFF:** pump off
- **AUTO SW:** pump in auto lead/lag mode

Press NEXT button  to display SURGE TANK LEAD/LAG 2 screen.



PUMPS FEEDBACK - Pumps current switches or VFD dry contacts status.

Press NEXT button  to display SURGE TANK LEAD/LAG 3 screen.

Surge Tank Lead/Lag Setup (continued)

06/08/18	SURGE TANK LEAD/LAG 3	00:00:08
TIMERS		
START DELAY	STOP DELAY	MIN RUN TIME
15 Sec	15 Sec	600 Sec
ALTERNATE TIME	ALTERNATE REMAINING	OVERLAP TIME
24 Hrs	0 0: 0: 0	30 Sec
	DAY HH MM SS	
←	MAIN MENU	→

START DELAY - The adjustable time delay, 1 to 1800 seconds, for the pump to start after each run command.

STOP DELAY - The adjustable time delay, 1 to 1800 seconds, for the pump to stop after each stop command.

MINIMUM RUN TIME - The adjustable minimum pump run time, 1 to 1800 seconds, before the system commands the pump to be stopped.

ALTERNATE TIME - The adjustable time, 1 to 720 hours, to alternate the lead pump.

ALTERNATE REMAINING - The time remaining until automatic alternation occurs.

OVERLAP TIME - Following a lead pump change, the former lead pump will still be enabled for this duration of time.

Press NEXT button  to display SURGE TANK LEAD/LAG 4 screen.

Surge Tank Lead/Lag Setup (continued)

06/08/18		SURGE TANK LEAD/LAG 4		00:00:11	
PUMPS RUN TIME		HH	MM	SS	DAYS
TRANSFER PUMP 1		0:	0:	0	0
TRANSFER PUMP 2		0:	0:	0	0

←
MAIN MENU
→

All PUMPS RUN TIME are displayed in hours, minutes, seconds, and accumulated into days.

Press NEXT button  to display SURGE TANK LEAD/LAG 5 screen.

06/08/18		SURGE TANK LEAD/LAG 5		00:00:50	
LOW TP Press ALARM			HIGH TP Press ALARM		
ALARM RESET	MANUAL		ALARM RESET	MANUAL	
TP Press	39.5 PSI		TP Press	39.5 PSI	
SETPOINT	35.0 PSI		SETPOINT	45.0 PSI	
TIME DELAY	5 S		TIME DELAY	5 S	

←
MAIN MENU

This screen is only displayed when the low and high transfer pump pressure alarms are enabled in the SRG configuration screen.

ALARM RESET - Select MANUAL reset if low or high transfer pump pressure manual restarts are requested, or AUTO reset if low or high transfer pump pressure will restart automatically with a clear condition.

TP Press - Displays the actual transfer pump pressure.

Surge Tank Lead/Lag Setup (continued)

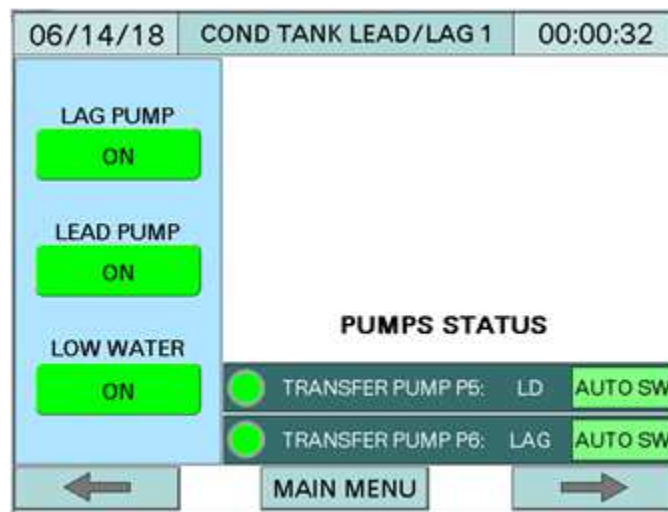
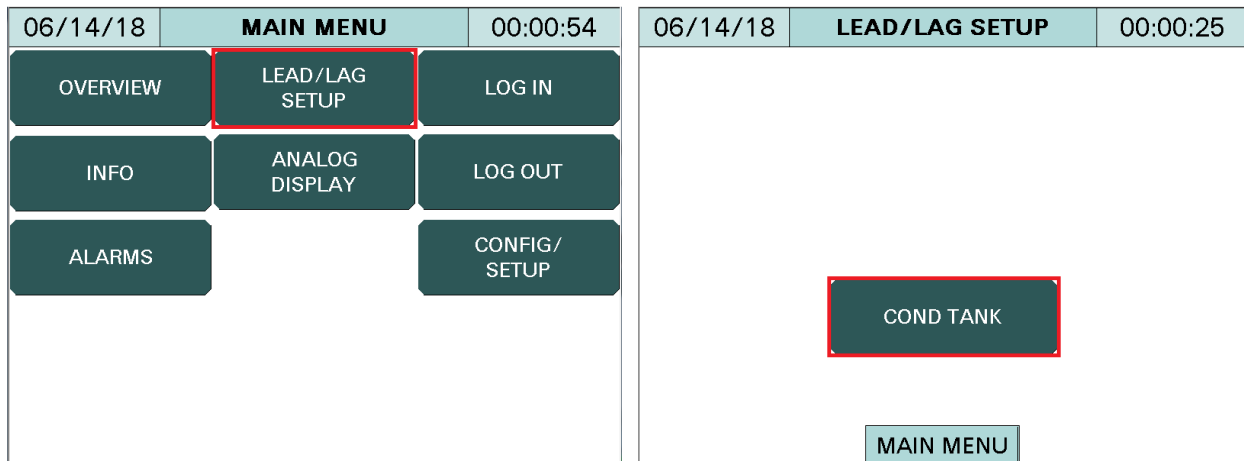
SETPOINT - Set low and high transfer pump pressure setpoints.

TIME DELAY - The adjustable time delay, 0 to 300 seconds, for the transfer pump pressure alarm to turn on.

The low transfer pump pressure alarm will turn on after time delay if transfer pump pressure is at or below the low setpoint. The high transfer pump pressure alarm will turn on after time delay if transfer pump pressure is at or above the high setpoint.

Condensate Tank Lead/Lag

Press LEAD/LAG SETUP and then press COND TANK to display the condensate tank's lead/lag control.



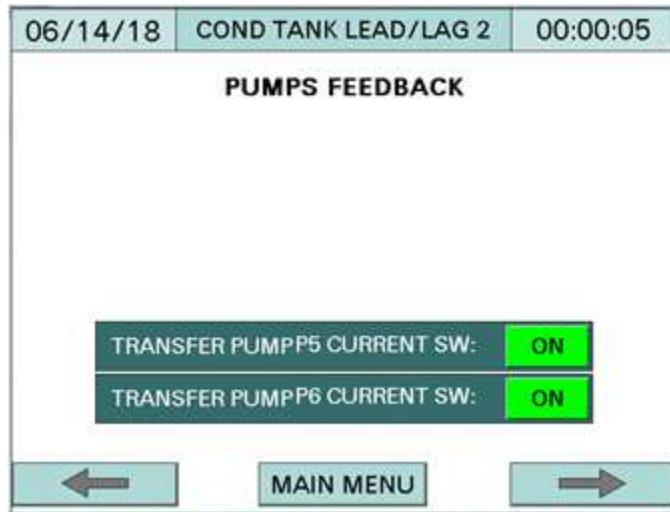
LAG PUMP - Displays ON when transfer water reaches the high water level switch, or when time based lag pump start expires.

LEAD PUMP - Displays ON when transfer water level reaches the low water level switch, or when time based lead pump start expires.

LOW WATER - Displays ON when water level rises above the low/low water level switch. Displays OFF when both lead and lag pumps are off.

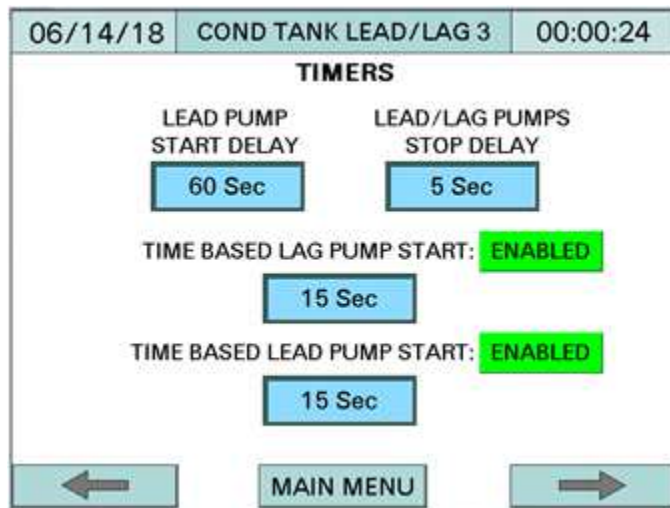
Press NEXT button  to display COND TANK LEAD/LAG 2 screen.

Condensate Tank Lead/Lag Setup (continued)



PUMPS FEEDBACK - Pump current switches or VFD dry contacts status.

Press NEXT button  to display COND TANK LEAD/LAG 3 screen.



LEAD PUMP START DELAY - The adjustable time delay, 1 to 1800 seconds, for the lead pump to start after each run command.


LEAD/LAG STOP DELAY - The adjustable time delay, 1 to 1800 seconds, for the lead/lag pumps to stop after each stop command.

Condensate Tank Lead/Lag Setup (continued)

TIME BASED LAG PUMP START - Press DISABLED/ENABLED button to ENABLED only when the lag pump is started based on the timer.

TIME BASED LEAD PUMP START - Press DISABLED/ENABLED button to ENABLED only when the lead pump is started based on the timer.

Press NEXT button  to display COND TANK LEAD/LAG 4 screen.

06/14/18	COND TANK LEAD/LAG 4	00:00:14
PUMPS RUN TIME		
	HH MM SS	DAYS
TRANSFER PUMP P5:	0: 0: 0	0
TRANSFER PUMP P6:	0: 0: 0	0
	MAIN MENU	

All PUMPS RUN TIME are displayed in hours, minutes, seconds, and accumulated into days.

Analog Display


The MAIN MENU and ANALOG DISPLAY may vary based on your system configuration. From MAIN MENU, press ANALOG DISPLAY, and then press ANALOG INPUTS. All analog inputs are displayed on this screen.

06/08/18	MAIN MENU	00:00:37	06/15/18	ANALOG DISPLAY	00:00:01
OVERVIEW	LEAD/LAG SETUP	LOG IN	<div style="border: 1px solid red; padding: 5px; margin-bottom: 5px;">ANALOG INPUTS</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">ANALOG OUTPUTS</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">RTD INPUTS</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">MANUAL VFD OUTPUT</div> <div style="border: 1px solid black; padding: 5px; margin-top: 20px; width: fit-content; margin-left: auto;">MAIN MENU</div>		
INFO	ANALOG DISPLAY	LOG OUT			
ALARMS	DA WATER LEVEL	CONFIG/SETUP			
PID	TANK STEAM PRESSURE				
CHEMICAL PUMP					


06/21/18	ANALOG INPUTS	00:00:09
FW Press	199.5	PSI
TP Press	39.5	PSI
DA Tank Press	5.0	PSI
Header Pressure	0.0	PSI
PUMP 1	10.0	GPM
PUMP 2	5.0	GPM
PUMP 3	10.0	GPM
PUMP 4	5.0	GPM
←		MAIN MENU

Analog Display (continued)

From MAIN MENU, press ANALOG DISPLAY, and then press RTD INPUTS.
All RTD inputs are displayed on this screen.

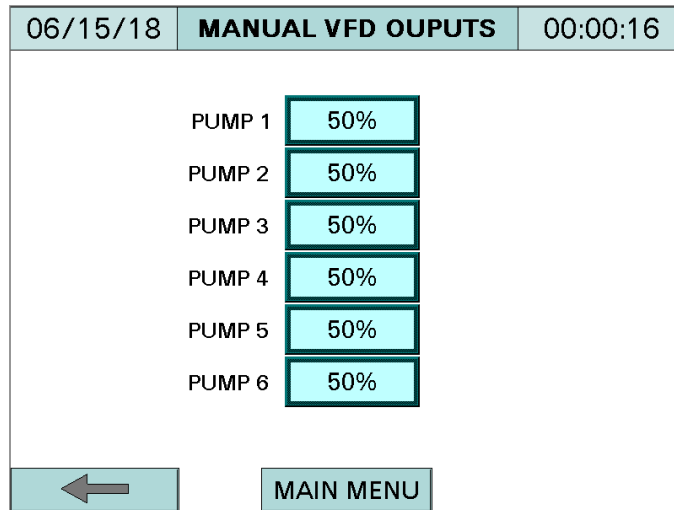
06/15/18	RTD INPUTS	00:00:57
DA WATER TEMP <input type="text" value="227"/> °F		
SRG WATER TEMP <input type="text" value="165"/> °F		
CON WATER TEMP <input type="text" value="0"/> °F		
RTD CH4 <input type="text" value="0"/> °F		
 <input type="button" value="MAIN MENU"/>		

From MAIN MENU, press ANALOG DISPLAY, and then press ANALOG OUTPUT.
All analog outputs are displayed on this screen.

06/15/18	ANALOG OUTPUTS	00:00:20
AO CARD #1 CH1 <input type="text" value="0%"/>		
AO CARD #1 CH2 <input type="text" value="0%"/>		
AO CARD #1 CH3 <input type="text" value="0%"/>		
AO CARD #1 CH4 <input type="text" value="0%"/>		
AO CARD #2 CH1 <input type="text" value="0%"/>		
AO CARD #2 CH2 <input type="text" value="0%"/>		
AO CARD #2 CH3 <input type="text" value="0%"/>		
AO CARD #2 CH4 <input type="text" value="0%"/>		
 <input type="button" value="MAIN MENU"/>		

Analog Display (continued)

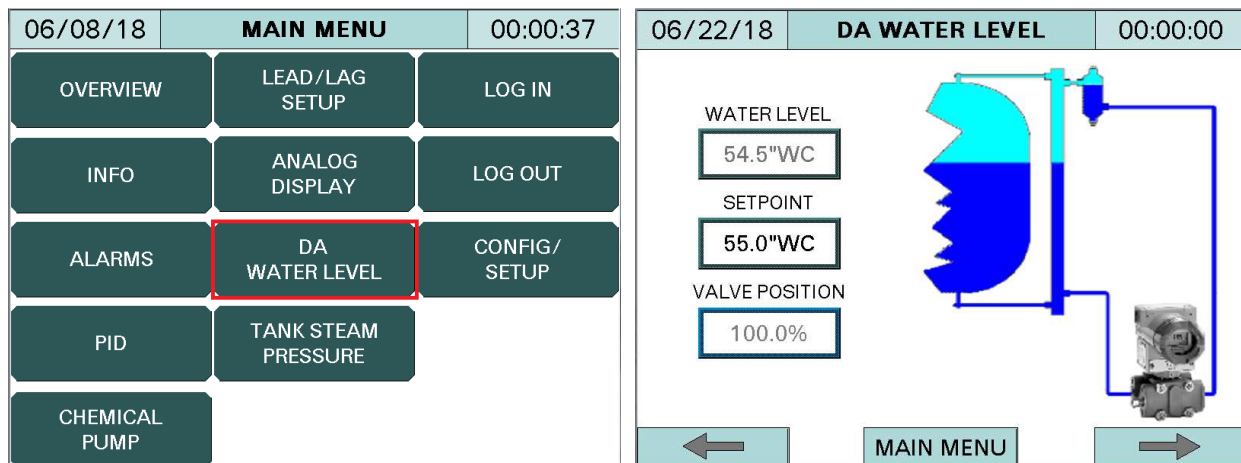
From MAIN MENU, press ANALOG DISPLAY, and then press MANUAL VFD OUTPUT.



Manual VFD Output - Sets the manual VFD output. When HAND-OFF-AUTO SW is set to HAND, the manual VFD output percentage will be the variable frequency drive manual setpoint.

DA Water Level

From MAIN MENU, press DA WATER LEVEL.

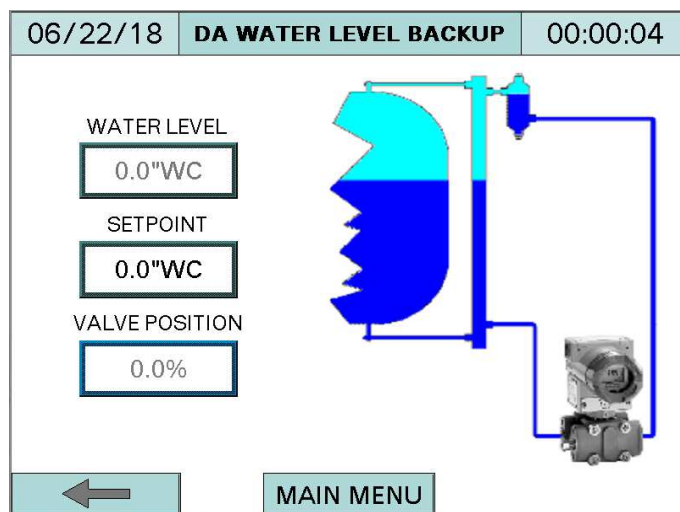


WATER LEVEL - Displays the actual water level.

SETPOINT - Sets the water level setpoint.

VALVE POSITION - Displays the actual makeup water valve position.

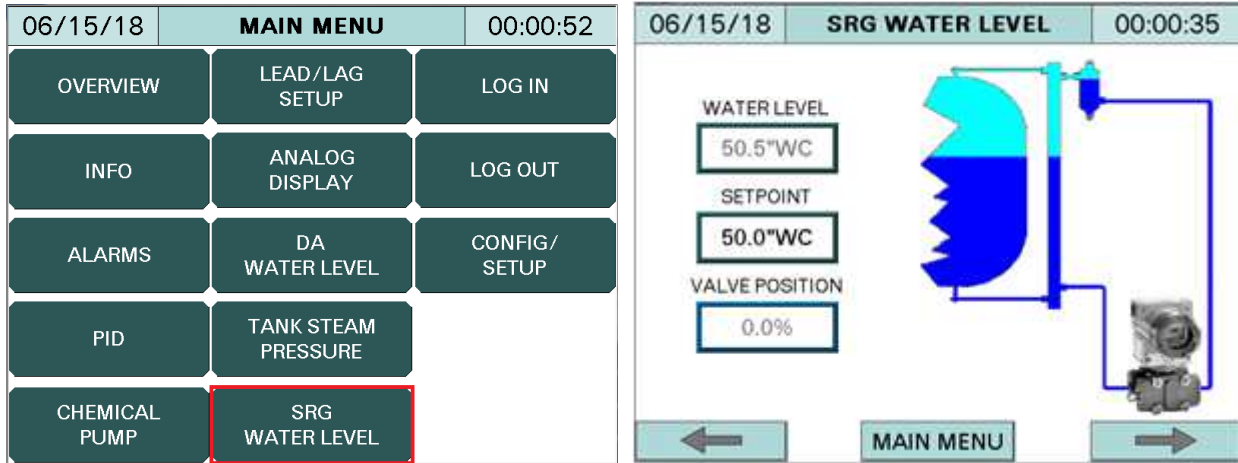
Press NEXT button  to display DA WATER LEVEL BACKUP screen.



This screen only displays when the DA water level backup RWF55 controller is connected and configured in the DA configuration screen.

Surge Tank Water Level

From MAIN MENU, press SRG WATER LEVEL.

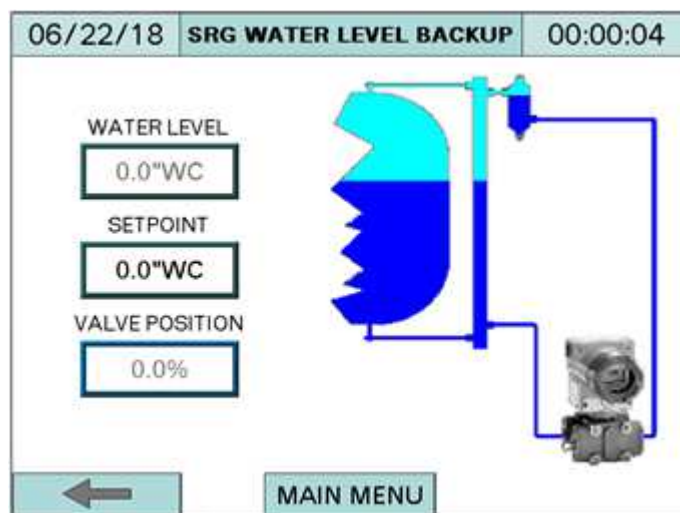


WATER LEVEL - Displays the actual water level.

SETPOINT - Sets the water level setpoint.

VALVE POSITION - Displays the actual makeup water valve position.

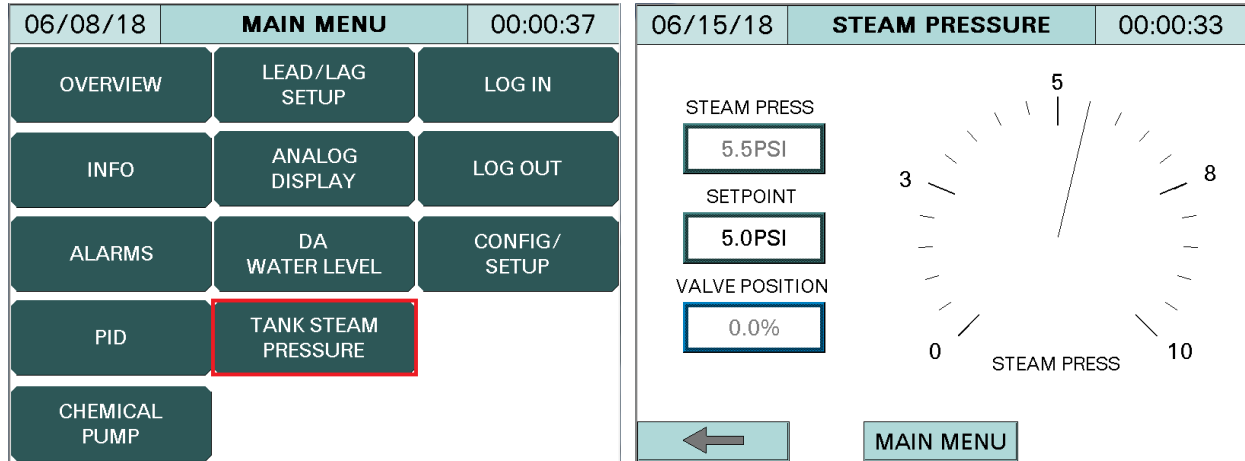
Press NEXT button  to display DA WATER LEVEL BACKUP screen.



This screen only displays when the SRG water level backup RWF55 controller is connected and configured in the SRG configuration screen.

DA Tank Steam Pressure

From MAIN MENU, press TANK STEAM PRESSURE.



STEAM PRESS - Displays actual steam pressure.

SETPOINT - Sets the steam pressure setpoint.

VALVE POSITION - Displays the actual steam valve position.

PID

From MAIN MENU, press PID.

06/08/18	MAIN MENU	00:00:37	06/15/18	PID	00:00:55																		
OVERVIEW	LEAD/LAG SETUP	LOG IN	<table border="1"> <thead> <tr> <th></th> <th>FW PUMP</th> <th>TRANSFER PUMP</th> </tr> </thead> <tbody> <tr> <td>SETPOINT</td> <td>200.0</td> <td>40.0</td> </tr> <tr> <td>PV</td> <td>199.5</td> <td>39.5</td> </tr> <tr> <td>PROPORTIONAL</td> <td>0%</td> <td>0%</td> </tr> <tr> <td>INTEGRAL</td> <td>0</td> <td>0</td> </tr> <tr> <td>DERIVATIVE</td> <td>1</td> <td>1</td> </tr> </tbody> </table>				FW PUMP	TRANSFER PUMP	SETPOINT	200.0	40.0	PV	199.5	39.5	PROPORTIONAL	0%	0%	INTEGRAL	0	0	DERIVATIVE	1	1
	FW PUMP	TRANSFER PUMP																					
SETPOINT	200.0	40.0																					
PV	199.5	39.5																					
PROPORTIONAL	0%	0%																					
INTEGRAL	0	0																					
DERIVATIVE	1	1																					
INFO	ANALOG DISPLAY	LOG OUT	←																				
ALARMS	DA WATER LEVEL	CONFIG/ SETUP	MAIN MENU																				
PID	TANK STEAM PRESSURE																						
CHEMICAL PUMP																							

Based on the VFD option from the configuration menu, the PID screen displays either feedwater pumps, transfer pumps, or both. The PID screen above displays both feedwater and transfer pumps.

Chemical Pump

From MAIN MENU, press CHEMICAL PUMP.

06/14/18	MAIN MENU	00:00:16
OVERVIEW	LEAD/LAG SETUP	LOG IN
INFO	ANALOG DISPLAY	LOG OUT
ALARMS	DA WATER LEVEL	CONFIG/ SETUP
PID	TANK STEAM PRESSURE	
CHEMICAL PUMP	SRG WATER LEVEL	

The CHEMICAL PUMP button is displayed only when the chemical pump option is enabled in the DA configuration screen.

06/14/18	CHEMICAL PUMP	00:00:51	06/14/18	CHEMICAL PUMP	00:00:47
<p>CHEMICAL PUMP ON</p> <p>PUMP MODE CYCLIC</p> <p>START DELAY 1 Sec</p> <p>CYCLE START DELAY 1 Sec</p> <p>PUMP RUN TIME 600 Sec</p>			<p>CHEMICAL PUMP ON</p> <p>PUMP MODE CONTINUOUS</p> <p>START DELAY 1 Sec</p> <p>STOP DELAY 1 Sec</p>		
<p>← MAIN MENU</p>			<p>← MAIN MENU</p>		

The chemical pump screen on the left is when the pump is in cyclic mode, and the screen on the right is when the pump is in continuous mode.

CHEMICAL PUMP - Chemical pump status ON/OFF

- **ON:** Chemical pump will be on when lead pump is on with start time delay.
- **OFF:** Chemical pump will be off when lead pump is off with stop time delay.

PUMP MODE - Select cyclic or continuous.

Chemical Pump (continued)

- **CYCLIC:** Chemical pump starts to run after start time delay and stop after PUMP RUN TIME expires. It will start to run again after the cycle start time delay and keep running in cycle repeatedly.
- **CONTINUOUS:** Chemical pump starts to run continuously after start time delay and stop with stop time delay.

START DELAY - The adjustable time delay, 1 to 1800 seconds, for the chemical pump to start.

STOP DELAY - The adjustable time delay, 1 to 1800 seconds, for the chemical pump to stop.

CYCLE START DELAY - The adjustable time delay, 1 to 1800 second, for the chemical pump to start in cyclic mode only.

PUMP RUN TIME - The adjustable pump run time, 1 to 1800 seconds, for the chemical pump run in cyclic mode only.

Flow Totalization

From MAIN MENU, press FLOW TOTALIZATION.

06/21/18	MAIN MENU		00:00:05	06/21/18	FLOW TOTALIZATION		00:00:26
OVERVIEW	LEAD/LAG SETUP	LOG IN		PUMP 1+2	1500	TOT. UNIT	GPM
INFO	ANALOG DISPLAY	LOG OUT		PUMP 1	1000	ON	PUMP 1
ALARMS	DA WATER LEVEL	CONFIG/ SETUP		PUMP 2	500	ON	PUMP 2
PID	TANK STEAM PRESSURE	FLOW TOTALIZATION		PUMP 3+4	1500	TOT. UNIT	GPM
	SRG WATER LEVEL			PUMP 3	1000	ON	PUMP 3
				PUMP 4	500	ON	PUMP 4
				GRAND TOTAL	3000	ON	
				←			MAIN MENU

Note: Units can be selected when all totalizations are in OFF mode.

PUMP 1+2: Displays the totalization of PUMP 1 and PUMP 2.

TOT. UNIT: Select unit for group 1. Group 1 includes PUMP 1 and PUMP 2.

PUMP 1: Displays the totalization of PUMP 1. Press PUMP 1 button to go to TOTAL PUMP 1 screen for detailed information. The TOTAL PUMP 1 screen will be examined on page 111.

PUMP 2: Displays the totalization of PUMP 2. Press PUMP 2 button to go to TOTAL PUMP 2 screen for detailed information.

PUMP 3+4: Displays the totalization of PUMP 3 and PUMP 4.

TOT.UNIT: Select unit for group 2. Group 2 includes PUMP 3 and PUMP 4.

PUMP 3: Displays the totalization of PUMP 3. Press PUMP 3 button to go to TOTAL PUMP 3 screen for detailed information.

PUMP 4: Displays the totalization of PUMP 4. Press PUMP 4 button to go to TOTAL PUMP 4 screen for detailed information.

Flow Totalization (continued)

GRAND TOTAL: Displays the totalization of PUMP 1, PUMP 2, PUMP 3, and PUMP 4 if the TOTAL UNIT of group 1 and group 2 are the same.

06/21/18	TOTAL PUMP 1		00:00:13
TOTALIZATION		OFF	
UNIT		GPM	
ACTUAL FLOW			
10.0		GPM	
TOTAL PUMP 1			
100		Gal	RESET
GRAND TOTAL PUMP 1			
1000		Gal	
←		MAIN MENU	

TOTALIZATION:

- **ON:** Activate the flow totalization.
- **OFF:** Deactivate the flow totalization.

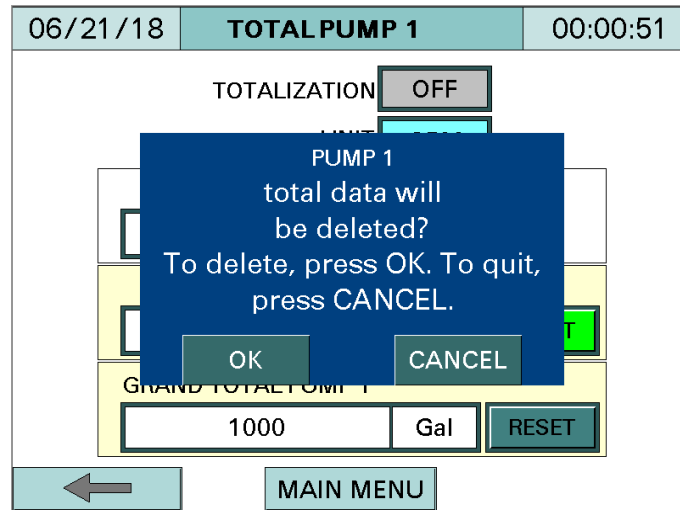
UNIT - Selects unit. The button will turn to green and back to cyan color when the units are interchanged between each other. Note that totalization is OFF to select units.

- **PSI:** Not applicable
- **A:** Not applicable
- **GPS:** Gallon per second
- **GPM:** Gallon per minute
- **GPH:** Gallon per hour
- **LbPS:** Pound per second
- **LbPM:** Pound per minute
- **LbPH:** Pound per hour
- **LPM:** Litter per minute
- **“WC:** Not applicable
- **°F:** Not applicable
- **°C:** Not applicable

ACTUAL FLOW - Displays the actual flow.

Flow Totalization (continued)

TOTAL PUMP 1 - Displays the total pump 1 flow. The total pump 1 flow could be reset to 0 (zero) by pressing the RESET button. A pop up window will be displayed, as seen below.



To acknowledge the changes, press the 'OK' button, otherwise press 'CANCEL'.

GRAND TOTAL PUMP 1 - Displays the grand total pump 1 flow.

Similar flow totalizations apply for PUMP 2, PUMP 3, or TOTAL P4.

Alarms (continued)

The icons at the top of the screen may be used to navigate through the list of alarms:



Acknowledge the selected alarm.



Acknowledge all alarms.



Move up one alarm on the list.



Move down one alarm on the list.



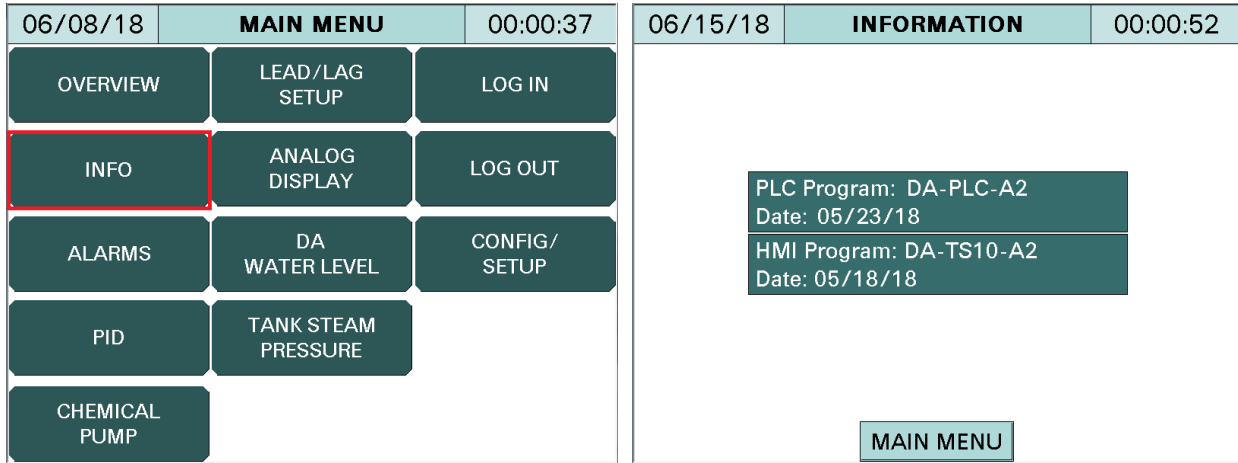
Navigate up one page on the list.



Navigate down one page on the list.

Program Information

From MAIN MENU, press INFO.



Displays program name and revision.

Gateway/BMS Modbus TCP/IP Standard Interface

The standard BMS interface offered is via Modbus TCP/IP. The standard port 502 is used for this connection. The connection to the BMS is via the Ethernet port on the HMI. **This connection is not available when connected to the Lead/Lag Master.**

ADDRESS	ACCESS	DESCRIPTION	FORMAT	NOTE
40001	Read	Pump 1 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40002	Read	Pump 2 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40003	Read	Pump 3 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40004	Read	Pump 4 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40005	Read	Pump 5 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40006	Read	Pump 6 Hand-Off-Auto	Unsigned Int 16	2 = hand; 4 = off; 8 = auto
40007	Read	DA RWF water level (E1)	Unsigned Int 16	x10
40008	Read	DA RWF water level (E2)	Unsigned Int 16	x10
40009	Read	DA RWF water level current setpoint	Unsigned Int 16	x10
40010	Read	DA RWF water level valve position	Unsigned Int 16	x10
40011	Read	SRG RWF water level (E1)	Unsigned Int 16	x10
40012	Read	SRG RWF water level (E2)	Unsigned Int 16	x10
40013	Read	SRG RWF water level current setpoint	Unsigned Int 16	x10
40014	Read	SRG RWF water level valve position	Unsigned Int 16	x10
40015	Read	Steam RWF pressure control (E1)	Unsigned Int 16	x10
40016	Read	Steam RWF pressure control (E2)	Unsigned Int 16	x10
40017	Read	Steam RWF pressure control current SP	Unsigned Int 16	x10
40018	Read	Steam RWF pressure control valve position	Unsigned Int 16	x10
40019	Read	Backup DA RWF water level (E1)	Unsigned Int 16	x10
40020	Read	Backup DA RWF water level (E2)	Unsigned Int 16	x10
40021	Read	Backup DA RWF water level current setpoint	Unsigned Int 16	x10
40022	Read	Backup DA RWF water level valve position	Unsigned Int 16	x10
40023	Read	Backup SRG RWF water level (E1)	Unsigned Int 16	x10
40024	Read	Backup SRG RWF water level (E2)	Unsigned Int 16	x10
40025	Read	Backup SRG RWF WL current setpoint	Unsigned Int 16	x10
40026	Read	Backup SRG RWF water level valve position	Unsigned Int 16	x10
40027	Read	Pump 1 run time in hours	Unsigned Int 32	
40029	Read	Pump 2 run time in hours	Unsigned Int 32	
40031	Read	Pump 3 run time in hours	Unsigned Int 32	
40033	Read	Pump 4 run time in hours	Unsigned Int 32	
40035	Read	Pump 5 run time in hours	Unsigned Int 32	
40037	Read	Pump 6 run time in hours	Unsigned Int 32	
40039	Read	RTD 1 (DA water temperature)	Unsigned Int 16	
40040	Read	RTD 2 (SRG water temperature)	Unsigned Int 16	
40041	Read	RTD 3 (Condensate water temperature)	Unsigned Int 16	
40042	Read	RTD 4	Unsigned Int 16	
40043	Read	Analog input 1 (feedwater pressure)	Unsigned Int 16	x10
40044	Read	Analog input 2 (transfer water pressure)	Unsigned Int 16	x10
40045	Read	Analog input 3	Unsigned Int 16	x10
40046	Read	Analog input 4	Unsigned Int 16	x10

Gateway/BMS Modbus TCP/IP Standard Interface (continued)

ADDRESS	ACCESS	DESCRIPTION	FORMAT	NOTE
40047	Read	Analog input 5	Unsigned Int 16	x10
40048	Read	Analog input 6	Unsigned Int 16	x10
40049	Read	Analog input 7	Unsigned Int 16	x10
40050	Read	Analog input 8	Unsigned Int 16	x10
40051	Read	Analog output 1	Unsigned Int 16	Pump 1 VFD modulation signal
40052	Read	Analog output 2	Unsigned Int 16	Pump 2 VFD modulation signal
40053	Read	Analog output 3	Unsigned Int 16	Pump 3 VFD modulation signal
40054	Read	Analog output 4	Unsigned Int 16	Pump 4 VFD modulation signal
40055	Read	Analog output 5	Unsigned Int 16	Pump 5 VFD modulation signal
40056	Read	Analog output 6	Unsigned Int 16	Pump 6 VFD modulation signal
40057	Read	Analog output 7	Unsigned Int 16	
40058	Read	Analog output 8	Unsigned Int 16	
40059	Read	DA setpoint with motor starter	Unsigned Int 16	
40060	Read	DA FW pressure	Unsigned Int 16	
40061	Read	DA drop pump pressure with motor starter	Unsigned Int 16	
40062	Read	DA add pump pressure with motor starter	Unsigned Int 16	
40063	Read	DA setpoint with VFD	Unsigned Int 16	x10
40064	Read	DA header pressure (analog input 4)	Unsigned Int 16	x10
40065	Read	DA header pressure offset	Unsigned Int 16	x10
40066	Read	DA % drop pump with VFD	Unsigned Int 16	x10
40067	Read	DA % add pump with VFD	Unsigned Int 16	x10
40068	Read	DA pump start delay	Unsigned Int 16	
40069	Read	DA pump stop delay	Unsigned Int 16	
40070	Read	DA pump minimum run time	Unsigned Int 16	
40071	Read	DA pump overlap time	Unsigned Int 16	
40072	Read	DA pump alternation time	Unsigned Int 16	
40073	Read	SRG setpoint with motor starter	Unsigned Int 16	
40074	Read	SRG FW pressure	Unsigned Int 16	
40075	Read	SRG drop pump pressure with motor starter	Unsigned Int 16	
40076	Read	SRG add pump pressure with motor starter	Unsigned Int 16	
40077	Read	SRG setpoint with VFD	Unsigned Int 16	x10
40078	Read	SRG header pressure (N/A)	Unsigned Int 16	x10
40079	Read	SRG header pressure offset (N/A)	Unsigned Int 16	x10
40080	Read	SRG % drop pump with VFD	Unsigned Int 16	x10
40081	Read	SRG % add pump with VFD	Unsigned Int 16	x10
40082	Read	SRG pump start delay	Unsigned Int 16	
40083	Read	SRG pump stop delay	Unsigned Int 16	
40084	Read	SRG pump minimum run time	Unsigned Int 16	
40085	Read	SRG pump overlap time	Unsigned Int 16	
40086	Read	SRG pump alternation time	Unsigned Int 16	
40087	Read	Manual VFD % output pump 1	Unsigned Int 16	
40088	Read	Manual VFD % output pump 2	Unsigned Int 16	
40089	Read	Manual VFD % output pump 3	Unsigned Int 16	
40090	Read	Manual VFD % output pump 4	Unsigned Int 16	

Gateway/BMS Modbus TCP/IP Standard Interface (continued)

ADDRESS	ACCESS	DESCRIPTION	FORMAT	NOTE
40091	Read	Manual VFD % output pump 5	Unsigned Int 16	
40092	Read	Manual VFD % output pump 6	Unsigned Int 16	
40093	Read	Condensate lead pump start delay	Unsigned Int 16	
40094	Read	Condensate lead/lag pump stop delay	Unsigned Int 16	
40095	Read	Condensate time based lead pump start	Unsigned Int 16	
40096	Read	Condensate time based lag pump start	Unsigned Int 16	
40097	Read	Status word 1	Unsigned Int 16	
40097.0	Read	Lead/lag mode	Boolean	0 = disabled; 1 = enabled
40097.1	Read	DA high water	Boolean	0 = warning; 1 = normal
40097.2	Read	DA low water	Boolean	0 = warning; 1 = normal
40097.3	Read	DA low low water	Boolean	0 = alarm; 1 = normal
40097.4	Read	SRG high water	Boolean	0 = warning; 1 = normal
40097.5	Read	SRG low water	Boolean	0 = warning; 1 = normal
40097.6	Read	SRG low low water	Boolean	0 = alarm; 1 = normal
40097.7	Read	Condensate lag pump start	Boolean	0 = off; 1 = on
40097.8	Read	Condensate lead pump start	Boolean	0 = off; 1 = on
40097.9	Read	Condensate lead/lag pumps stop	Boolean	0 = off; 1 = on
40097.10	Read	Pump 1 proven	Boolean	0 = off; 1 = on
40097.11	Read	Pump 2 proven	Boolean	0 = off; 1 = on
40097.12	Read	Pump 3 proven	Boolean	0 = off; 1 = on
40097.13	Read	Pump 4 proven	Boolean	0 = off; 1 = on
40097.14	Read	Pump 5 proven	Boolean	0 = off; 1 = on
40097.15	Read	Pump 6 proven	Boolean	0 = off; 1 = on
40098	Read	Status word 2	Unsigned Int 16	
40098.0	Read	Pump 1 fail	Boolean	0 = normal; 1 = alarm
40098.1	Read	Pump 2 fail	Boolean	0 = normal; 1 = alarm
40098.2	Read	Pump 3 fail	Boolean	0 = normal; 1 = alarm
40098.3	Read	Pump 4 fail	Boolean	0 = normal; 1 = alarm
40098.4	Read	Pump 5 fail	Boolean	0 = normal; 1 = alarm
40098.5	Read	Pump 6 fail	Boolean	0 = normal; 1 = alarm
40098.6	Read	Condensate time based lead pump start	Boolean	0 = off; 1 = on
40098.7	Read	Condensate time based lag pump start	Boolean	0 = off; 1 = on

Appendix - RWF55 configuration for Modbus

The RWF55 must be properly configured for Modbus operation.

Use the up and down arrow buttons to navigate through the menus, and the Enter button to select the desired menu. Use Esc to go back to the previous menu. When a parameter needs to be changed, the up and down arrow buttons allow values to be changed, and the Enter button confirms the changes. The parameter name will flash on the green display when parameter entry mode is entered. Press the Esc button to return after the change is made.

To enter the parameters:

1. Press **Enter** to go into the menu list. The green display should read 'OPr'.
2. **ConF >>> IntF >>> r485 >>> bdr >>> 2** (19200 baud rate)
3. **ConF >>> IntF >>> r485 >>> dt >>> 30** (timeout)
4. **ConF >>> IntF >>> r485 >>> ADR >>> 2** (address for feedwater level controller, if applicable)
ConF >>> IntF >>> r485 >>> ADR >>> 3 (address for DA tank pressure controller, if applicable)
ConF >>> IntF >>> r485 >>> ADR >>> 4 (address for transfer water level controller, if applicable)
ConF >>> IntF >>> r485 >>> ADR >>> 5 (address for backup DA water level controller, if applicable)
ConF >>> IntF >>> r485 >>> ADR >>> 6 (address for backup SRG water level controller, if applicable)
5. Press **Esc** in four successions, or until the parameter menus are completely exited. The changes are effective immediately. No reboot is required.

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. Product or company names mentioned herein may be the trademarks of their respective owners. © 2018 SCC Inc.