3

System Basics

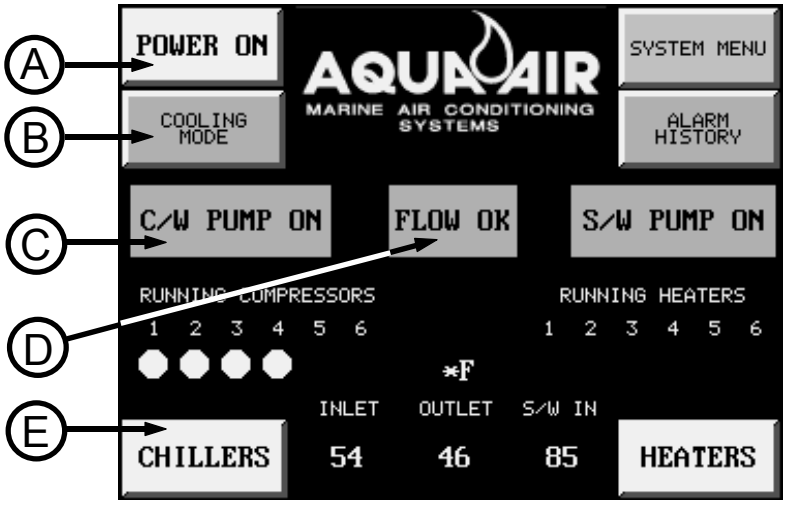
Starting the Chiller Unit in the Cooling Mode

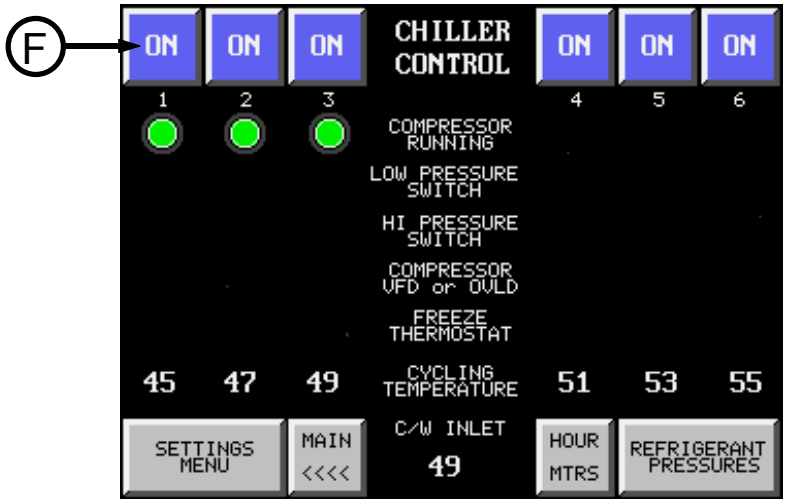
1. Verify that the seacock supplying water to the Seawater Pump(s) is on and that the sea strainer is clear of debris. If there are any isolation valves be sure that they are in the proper position for the Seawater Pump that will be run.

2. Turn on the Control Circuit circuit breaker (CCCB). The touchscreen will now display the Main screen.

3. Turn on the System Pump circuit breaker (SPCB)

4. Turn on the Seawater Pump circuit Breaker (SWPCB)





5. Turn on the Compressor circuit breakers (CCB#)

6. Press the POWER button (A) until it displays POWER ON.

7. Press the Mode Switch (B) until it displays COOLING MODE.

8. The Chillwater Pump light (C) should illuminate and then the Flow Switch light (D) should read FLOW OK.

9. Press the CHILLERS button (E) to go to the Chiller Unit Screen.

10. On the Chiller Unit Screen Press the Compressor Switches (F) until they read ON for the number of compressors that you want to run

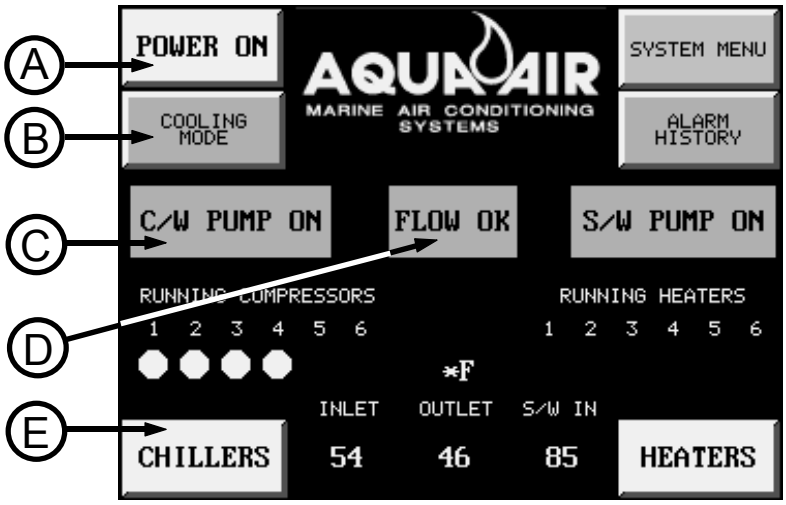
I:\wordpfct\chiller start cool mode.wpd

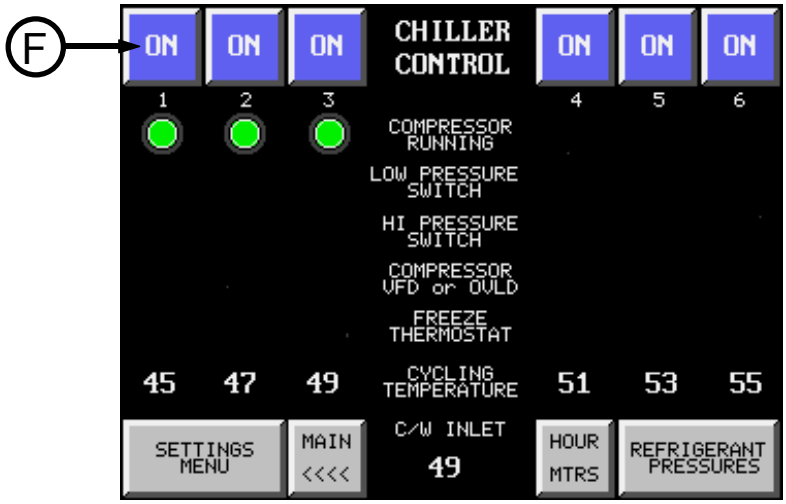
Starting the Chiller Unit in the Heating Mode
Reverse Cycle Units Only

1. Verify that the seacock supplying water to the Seawater Pump(s) is on and that the sea strainer is clear of debris. If there are any isolation valves be sure that they are in the proper position for the Seawater Pump that will be run.

2. Turn on the Control Circuit circuit breaker (CCCB). The touchscreen will now display the Main screen.

3. Turn on the System Pump circuit breaker (SPCB)





4. Turn on the Seawater Pump circuit Breaker (SWPCB)

5. Turn on the Compressor circuit breakers (CCB#)

6. Press the POWER button (A) until it displays POWER ON.

7. Press the Mode Switch (B) until it displays HEATING MODE.

8. The Chillwater Pump light (C) should illuminate and then the Flow Switch light (D) should read FLOW OK.

9. Press the CHILLERS button (E) to go to the Chiller Unit Screen.

10. On the Chiller Unit Screen Press the Compressor Switches (F) until they read ON for the number of compressors that you want to run

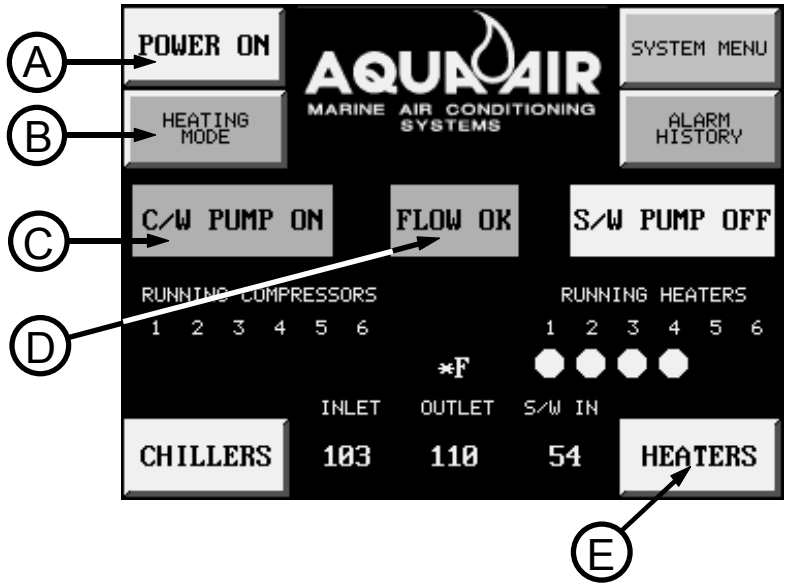
I:\wordpfct\chiller start rcheat mode.wpd

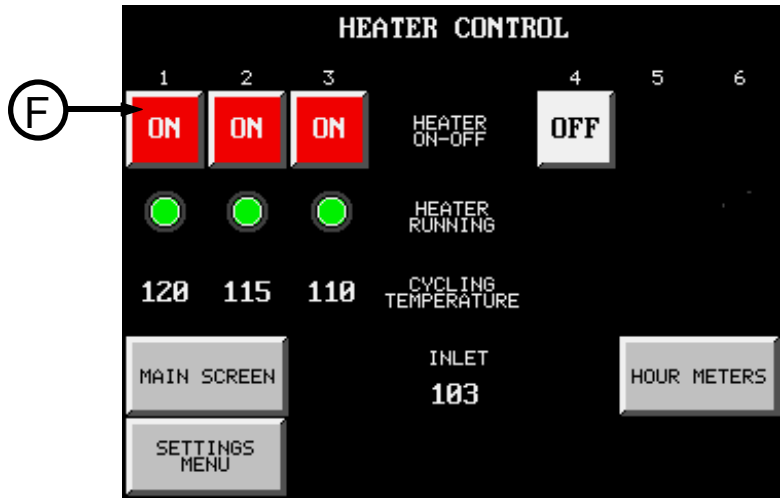
Starting the Chiller Unit in the Heating Mode
Immersion Heater Units Only

1. Turn on the Control Circuit circuit breaker (CCCB). The touchscreen will now display the Main screen.

2. Turn on the System Pump circuit breaker (SPCB)

3. Turn on the Immersion Heater circuit breakers (HECB#)





4. Press the POWER button (A) until it displays POWER ON.

5. Press the Mode Switch (B) until it displays HEATING MODE.

6. The Chillwater Pump light (C) should illuminate and then the Flow Switch light (D) should read FLOW OK.

7. Press the HEATERS button (E) to go to the Heater Control Screen.

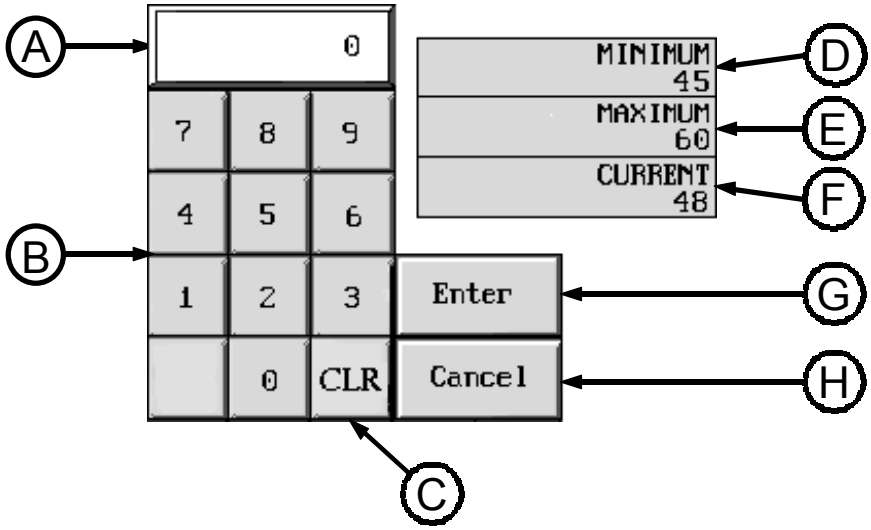
8. On the Heater Control Screen Press the Heater Switches (F) until they read ON for the number of heater elements that you want to run

I:\wordpfct\chiller start ihheat mode.wpd

Numeric Data Entry Screen

On many of the screens there are Numeric Entry Keys used to enter a numeric variable. An example of this is entering a stage temperature or the number of compressors on a unit.

When you press the key to enter a numeric variable the keypad shown below appears:



On the right side of the screen the **MINIMUM** setting (D), **MAXIMUM** setting (E) and **CURRENT** setting (F) appear.

To change the current setting enter the new number directly from the keypad (B). The new number will appear in the window (A) at the top.

If you enter an incorrect number you can clear the entry by pressing the **CLR** key (C). You can then enter the correct number.

After entering the correct number press the **Enter** key (G).

If you do not want to make any changes to the current setting press the **Cancel** key (H)

I:\wordpfct\numeric data entry screen.wpd

Alarm History and Alarm Count

The first screen that appears (shown below) will show you the total alarms logged, the order in which they were logged, and the associated message. Press one of the buttons at the bottom of the screen to view more entries. Press **LINE UP** or **LINE DOWN** to select a particular alarm entry. Once an entry is highlighted, you may then press the **DTLS** button for more information about that entry (see below). Press the **ALARM COUNT** button to go to that screen (see below)
Press **CLEAR ALL** to clear the history. Press **EXIT** to quit.

ALARM HISTORY **TOTAL OF 04 ALARMS**

ENTRY	MESSAGE
01	LOW REFRIGERANT PRESSURE CHILLER 1
02	FLOW SWITCH FAULT
03	INVERTER FAULT 5
04	FREEZE THERMOSTAT FAULT 4

ALARM COUNT	PAGE UP	PAGE DOWN	LINE UP	LINE DOWN	DTLS	CLEAR ALL	EXIT

The ALARM HISTORY DETAILS screen, shown below, provides information about the triggered alarm. Details include; when the alarm was triggered (ACTIVATED), the tag value that triggered the alarm (ACTUAL VALUE), and the set points (LOW LIMIT, HIGH LIMIT). The buttons allow you to **EXIT**, or switch to the previous (**PREV**) or **NEXT** entry.

ALARM HISTORY DETAILS

ENTRY NO. : 01

LOW REFRIGERANT PRESSURE CHILLER 1

ACTIVATED: 1:03:56 7-02-01

CLEARED:

ACTUAL VALUE: 40

HIGH/LOW/DIS LOW

LOW LIMIT: 40

HIGH LIMIT: 80

EXIT	PREV	NEXT

The Alarm Count screen, shown below, shows you the number of times a particular alarm has been triggered (activated). From this screen you can clear a particular alarm count or you can clear them all. Use the buttons at the bottom of the screen, to move through the list, exit, clear alarms, or return to alarm history.

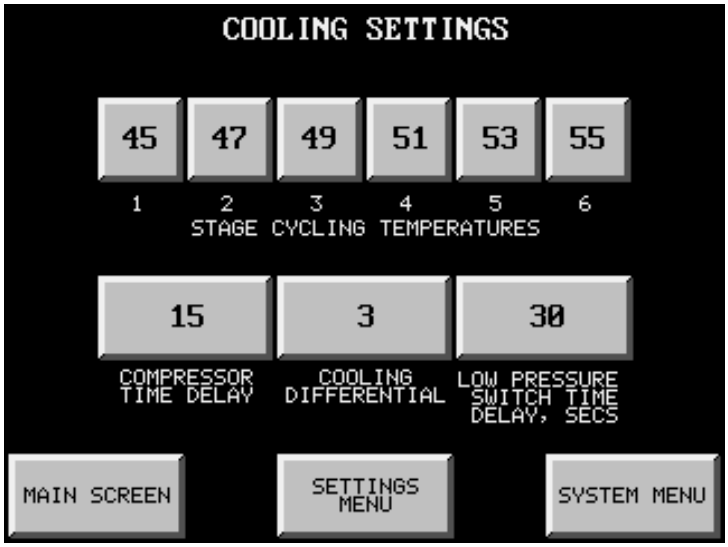
ALARM COUNT

ENTRY	COUNT	MESSAGE
01	00001	LOW REFRIGERANT PRESSURE CHILLER 1
02	00001	FLOW SWITCH FAULT
03	00001	INVERTER FAULT 5
04	00001	FREEZE THERMOSTAT FAULT 4

ALARM HISTORY	PAGE UP	PAGE DOWN	LINE UP	LINE DOWN	CLEAR	CLEAR ALL	EXIT

I:\wordpfct\alarm history and count.wpd

Cooling Settings



Setting the Stage Cycling Temperatures

The Stage Cycling Temperature is the temperature at which the compressor that is operating on that particular stage will cycle off. Press the STAGE CYCLING TEMPERATURES button. A numeric keypad will appear. Enter the stage temperature desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Setting the Cooling Differential

The Cooling Differential is the number of degrees that the chillwater must warm up, after cycling off on the stage cycling temperature, before the compressor will restart. Press the COOLING DIFFERENTIAL button. A numeric keypad will appear. Enter the cooling differential desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Setting the Compressor Time Delay

The Compressor Time Delay value is the delay, in seconds, between when a compressor is switched on (or after a power outage) and the compressor actually starts. The value entered is multiplied by the number of each stage to get the time delay for that stage. An example is if the time delay value is set for 15 seconds. Compressor 1 will start after 15 seconds, compressor 2 after 30, compressor 3 after 45 seconds, etc. Press the COMPRESSOR TIME DELAY button. A numeric keypad will appear. Enter the time delay value desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Setting the Low Pressure Switch Time Delay

The Low Pressure Switch Time Delay value is the delay, in seconds, between when the PLC detects a low refrigerant pressure condition and when the compressor is shut down because of the low refrigerant pressure condition. Press the LOW REFRIGERANT PRESSURE TIME DELAY button. A numeric keypad will appear. Enter the time delay value desired, within the allowable range (see Programmable Parameters sheet), and press ENTER.

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the Settings Menu

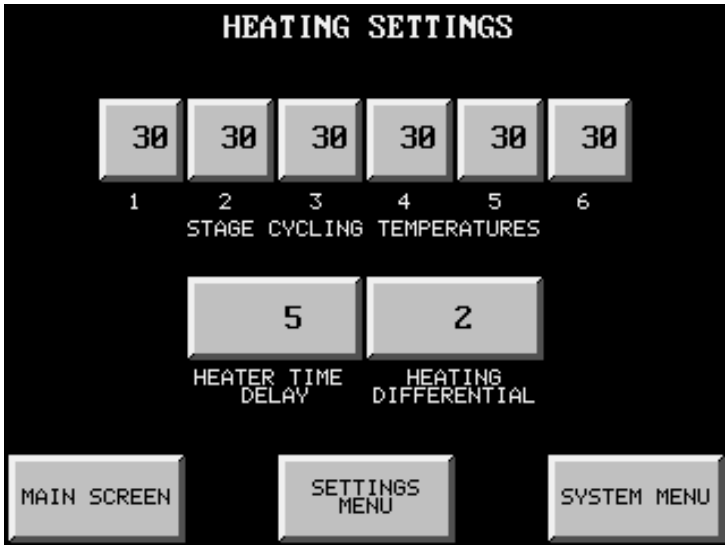
Press the SETTINGS MENU button to go to the Settings Menu.

Transfer to the System Menu

Press the SYSTEM MENU button to go to the System Menu.

I:\wordpfct\plc\coolingsettings7.wpd

Heating Settings



Setting the Stage Cycling Temperatures

The Stage Cycling Temperature is the temperature at which the compressor (for reverse cycle units or immersion heater) that is operating on that particular stage will cycle off. Press the STAGE CYCLING TEMPERATURES button. A numeric keypad will appear. Enter the stage temperature desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Setting the Heating Differential

The Heating Differential is the number of degrees that the chillwater must cool down, after cycling off on the stage cycling temperature, before the compressor (or immersion heater) will restart. Press the HEATING DIFFERENTIAL button. A numeric keypad will appear. Enter the heating differential desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Setting the Heater Time Delay

The Heater Time Delay value is the delay, in seconds, between when an immersion heater element is switched on (or after a power outage) and the immersion heater element is actually energized. The value entered is multiplied by the number of each stage to get the time delay for that stage. An example is if the time delay value is set for 15 seconds. Immersion heater 1 will start after 15 seconds, immersion heater element 2 after 30, immersion heater element 3 after 45 seconds, etc. Press the HEATER TIME DELAY button. A numeric keypad will appear. Enter the time delay value desired within the allowable range (see Programmable Parameters sheet) and press ENTER.

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the Settings Menu

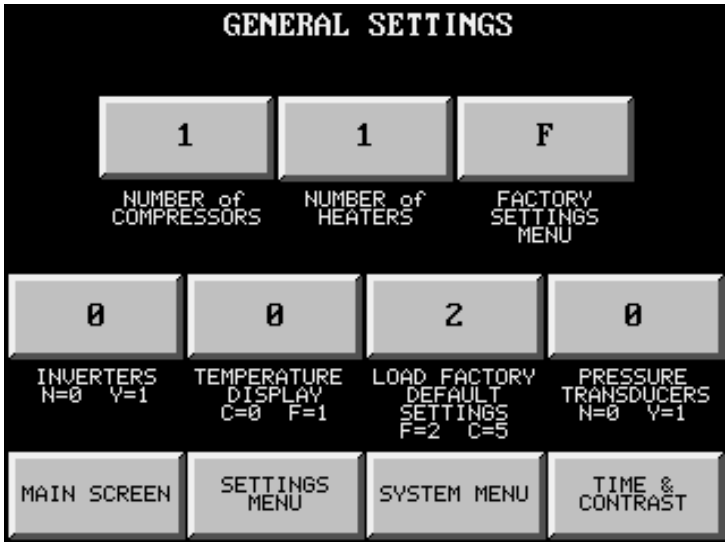
Press the SETTINGS MENU button to go to the Settings Menu.

Transfer to the System Menu

Press the SYSTEM MENU button to go to the System Menu.

I:\wordpfct\plc\heatingsettings8.wpd

General Settings



Setting the Number of Compressors

Press the NUMBER OF COMPRESSORS button. A numeric keypad will appear. Enter a number 1-6 (equal to the number of compressors on the unit) and press ENTER.

Setting the Number of Heaters

Press the NUMBER OF HEATERS button. A numeric keypad will appear. Enter a number 1-6 (equal to the number of heaters on the unit) and press ENTER. The number of heaters refers to the number of heating stages that are located in the heater.

Transfer to the Factory Settings Menu

Press the F button to go to the Factory Settings menu. A numeric keypad will appear. Enter the pass code number and you will be transferred to the Factory Settings Menu.

Enabling the Inverter Option

Setting this option equal to 1 tells the PLC that the system is equipped with inverters on the compressors. Press the INVERTERS button. A numeric keypad will appear. Enter a 1 to enable the option, 0 for standard across-the-line starters and then press ENTER.

Setting the Temperature Display Type

All of the temperature display inputs and outputs can be set to display in either Fahrenheit or Centigrade. Press the TEMPERATURE DISPLAY button. A numeric keypad will appear. Enter a 1 for Fahrenheit, 0 for Centigrade and press ENTER. If you are changing the system after it has been commissioned by the factory, you will need to go back and change all of the temperature input values to the new unit of measure. For example, if the system was originally set for Fahrenheit, you will have to change temperature inputs, such as the cycling temperatures, to the new Centigrade values. It is recommended, in this situation, that you use the Load Factory Default Settings to input the new values.

Loading Factory Default Settings

At any time during the life of the system you can reload the factory default settings in either Fahrenheit or Centigrade format. Values will be loaded in according to the Programmable Parameter factory default setting listing. Press the Load Factory Default Settings button. A numeric keypad will appear. Enter a 2 for a Fahrenheit system, 5 for a Centigrade system. Press ENTER to save the settings. All of the programmable parameters will now be updated. Cycle the Control Circuit circuit breaker once to save all of the settings.

Enabling the Pressure Transducer Option

Setting this option equal to 1 tells the PLC that the system is equipped with refrigerant pressure transducers on the compressors. Press the PRESSURE TRANSDUCERS button. A numeric keypad will appear. Enter a 1 to enable the option, 0 for none and then press ENTER. With this option enabled the refrigerant suction and discharge pressures will be displayed on the Refrigerant pressures screen (14).

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the Settings Menu

Press the SETTINGS MENU button to go to the Settings Menu.

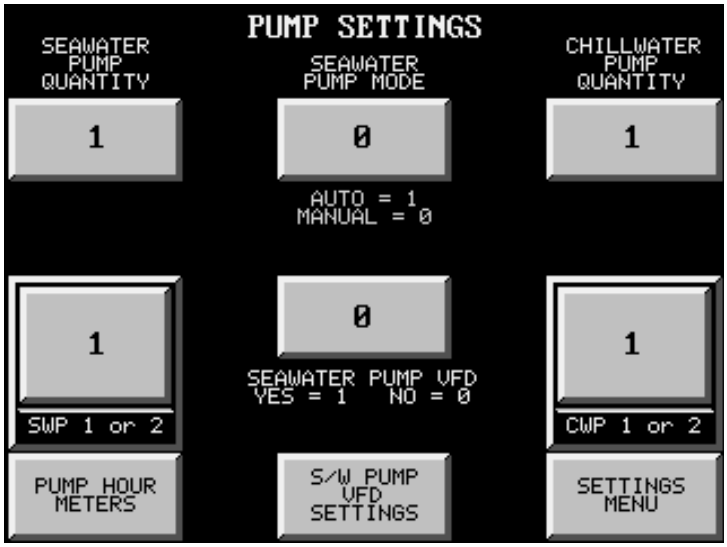
Transfer to the System Menu

Press the SYSTEM MENU button to go to the System Menu.

Transfer to the Time and Contrast Menu

Press the TIME & CONTRAST button to go to the Time & Contrast Menu.

Pump Settings



Setting the Number of Seawater Pumps

Press the SEAWATER PUMP QUANTITY button. A numeric keypad will appear. Enter 1 or 2 and press ENTER.

Selecting Seawater Pump 1 or 2

The SWP 1 or 2 button, used to select either Seawater Pump 1 or 2, will only appear if the Seawater Pump quantity is set for 2. Press the SWP 1 or 2 button. A numeric keypad will appear. Enter a 1 or 2 and press ENTER.

Setting the Number of Chillwater Pumps

Press the CHILLWATER PUMP QUANTITY button. A numeric keypad will appear. Enter 1 or 2 and press ENTER.

Selecting Chillwater Pump 1 or 2

The CWP 1 or 2 button, used to select either Chillwater Pump 1 or 2, will only appear if the Chillwater Pump quantity is set for 2. Press the CWP 1 or 2 button. A numeric keypad will appear. Enter a 1 or 2 and press ENTER.

Setting the Seawater Pump Mode

The seawater pump can be set to run constantly (MANUAL = 0) or to cycle with the compressors (AUTO = 1). Press the SEAWATER PUMP MODE button. A numeric keypad will appear. Enter a 1 for AUTO or 0 for MANUAL and press ENTER.

Enable Seawater Pump VFD (Variable Frequency Drive) option

If the system is equipped with a seawater pump VFD this option must be set. Press the SEAWATER PUMP VFD button. A numeric keypad will appear. Select 1 to enable this feature, 0 to disable this feature.

Transfer to the Seawater Pump VFD Settings Screen

Press the S/W PUMP VFD SETTINGS button

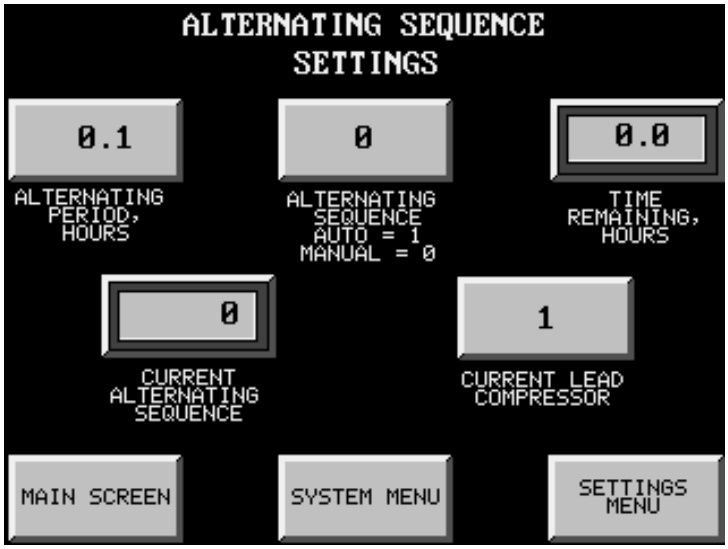
Transfer to the Pump Hour Meter Screen

Press the PUMP HOUR METER button

Transfer to the Settings Menu Screen

Press the SETTINGS MENU button

Alternating Sequence Settings



The purpose of the Alternating Sequence Setting Screen is to display current settings and to allow you to modify certain sequence parameters. The alternating sequences are all based upon the running time of the system. The system will rotate the sequence one position after the alternating period has elapsed. The amount of time remaining is always displayed in the TIME REMAINING, HOURS display. When the sequence changes it always moves ahead by one position. An example of this is a four compressor unit:

Lead Compressor	Running Order
1	1 - 2 - 3 - 4
2	2 - 3 - 4 - 1
3	3 - 4 - 1 - 2
4	4 - 1 - 2 - 3

The current alternating sequence is displayed in the CURRENT ALTERNATING SEQUENCE window.

Changing the Alternating Sequence Mode

The system can be set to automatically rotate the cycling sequence of the compressors according to the time period set in the Alternating Period (Auto) or it can be held in one sequence (Manual). Press the ALTERNATING SEQUENCE button. A numeric keypad will appear. Enter a 1 for Auto rotation or a 0 for manual rotation. Press ENTER to save.

Changing the Alternating Period, Hours

This setting determines how often the system rotates the compressor sequence. Press the ALTERNATING PERIOD, HOURS button. A numeric keypad will appear. Enter the time, in hours and tenth's of an hour, that you want the system to change. If you wanted it to rotate every 24 hours enter 24.0 using the numeric keypad. Press ENTER to save.

Changing the Current Lead Compressor

You can, at any time, change the lead compressor. Press the CURRENT LEAD COMPRESSOR button. A numerical keypad will appear. Enter the number of the compressor you want to be on stage one and press ENTER to save.

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the System Menu

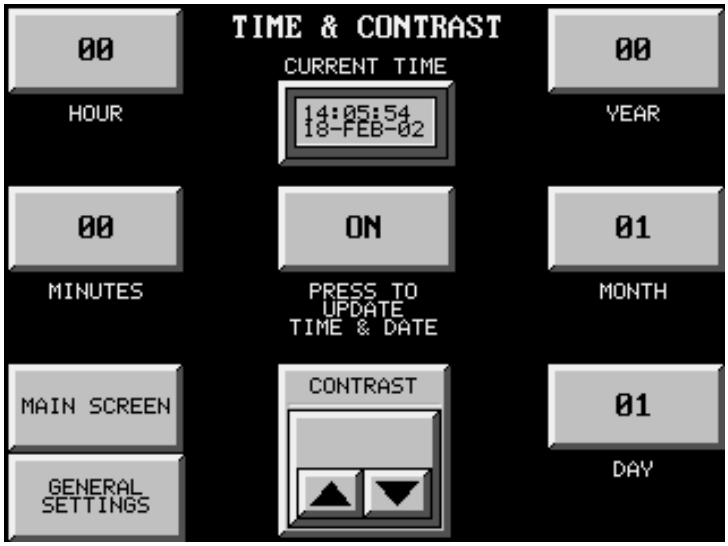
Press the SYSTEM MENU button to go to the System Menu.

Transfer to the Settings Menu

Press the SETTINGS MENU button to go to the Settings Menu.

I:\wordpfct\plc\altsequencescreen15.wpd

System Time, Date and Screen Contrast Settings



The purpose of this screen is to allow you to change the system time and date as necessary. Correct time and date settings are necessary as they are used to log faults in the alarm window. The time is stored in military format (2:30 in the afternoon is displayed as 14:30 hours). All settings for the time (hours and minutes) and date (day, month and year) must be updated **all at once**. Therefore, correct entries must be made in all five windows before the PRESS TO UPDATE TIME & DATE button is pushed. Once this button is pushed the current time and date will appear in the CURRENT TIME window.

The contrast setting changes the appearance of the LCD screen in different light conditions.

Changing the Hour Setting

Press the HOUR button. A numeric keypad appears. Enter the correct hour(0-23) and press ENTER to save.

Changing the Minutes Setting

Press the MINUTES button. A numeric keypad appears. Enter the correct minutes (0-59) and press ENTER to save.

Changing the Day Setting

Press the DAY button. A numeric keypad appears. Enter the correct day (0-31) and press ENTER to save.

Changing the Month Setting

Press the MONTH button. A numeric keypad appears. Enter the correct month (1-12) and press ENTER to save.

Changing the Year Setting

Press the YEAR button. A numeric keypad appears. Enter the correct year (last two digits only-for example 2002 would be entered as 02) and press ENTER to save.

Changing the Contrast

Press the CONTRAST up arrow to increase the contrast or the down arrow to decrease the contrast

Transfer to the Main Screen

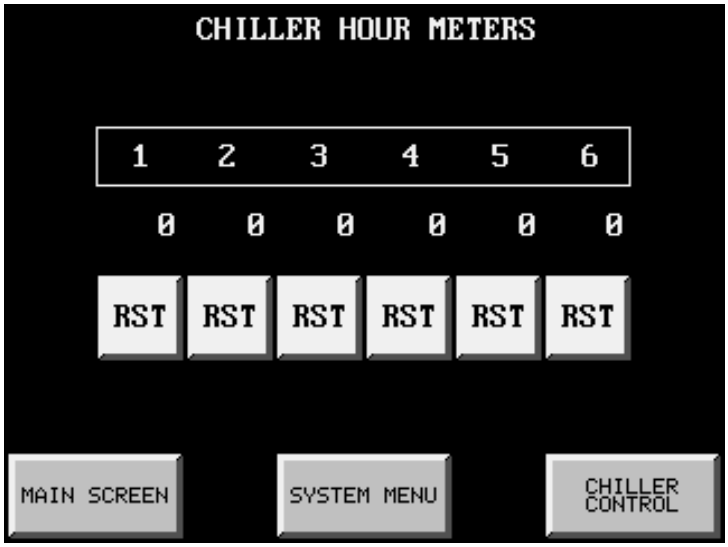
Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the General Settings Menu

Press the GENERAL SETTINGS button to go to the General Settings Menu.

I:\wordpfct\plc\timedatecontrastscreen16.wpd

Chiller, Heater and Pump Hour Meter Display & Reset

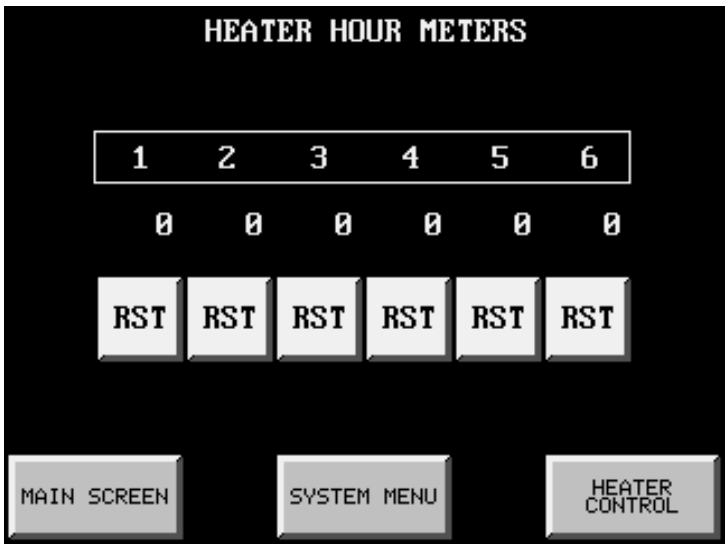


Resetting the Hour Meters

To zero out the hour meter indicator, press the RST button below the indicator. The value will now go to zero.

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.



Transfer to the System Menu

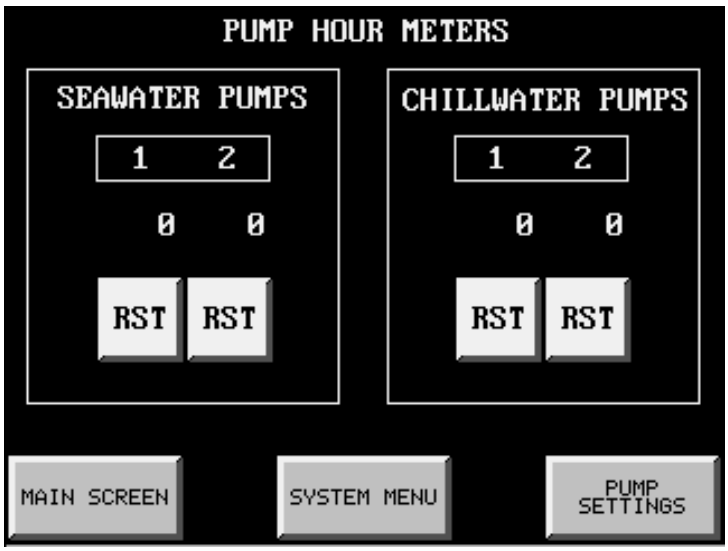
Press the SYSTEM MENU button to go to the System Menu.

Transfer to the Chiller Control Screen

Press the “CHILLER CONTROL” button

Transfer to the Heater Control Screen

Press the “HEATER CONTROL” button

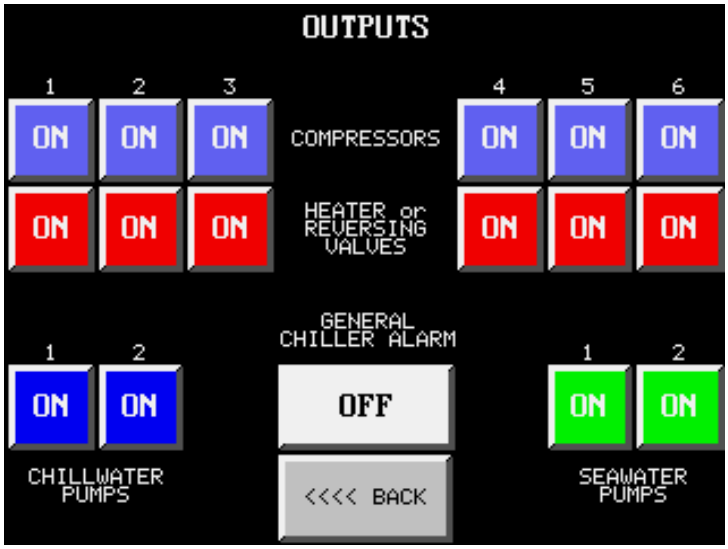


Transfer to the Pump Settings Screen

Press the “PUMP SETTINGS” button

I:\wordpfct\plc\hourmeterreset10-12-13.wpd

PLC Outputs Screen

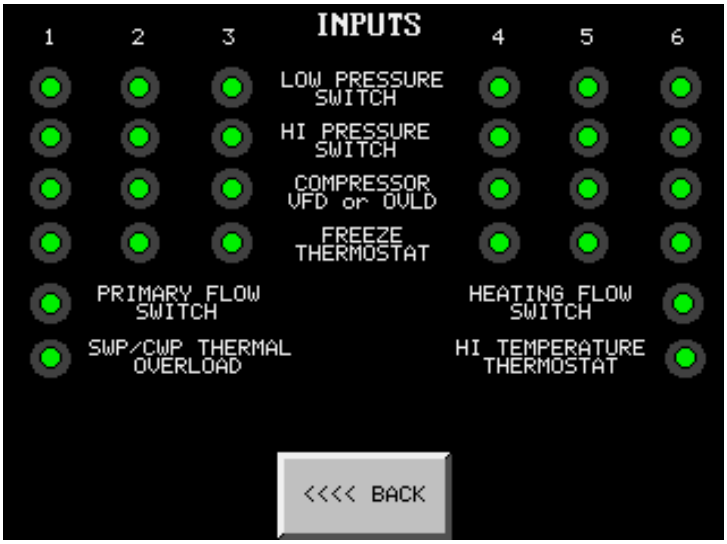


The purpose of this screen is to allow you to manually energize any of the PLC outputs. These can be used at any time during the operation of the unit. The switch is a momentary contact. This means that the output will only stay energized as long as you are pressing the button.

Returning to the Factory Settings Menu

Press the <<<<BACK button.

PLC Inputs Screen



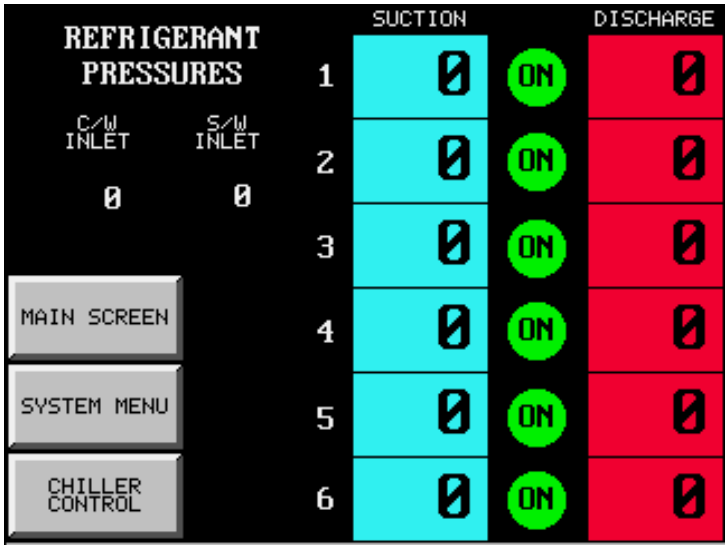
The purpose of this screen is to display the status of all of the PLC inputs. If the indicator is green the input is receiving a signal.

Returning to the Factory Settings Menu

Press the <<<<BACK button.

I:\wordpfct\plc\plcoutputsinputs26-27.wpd

Refrigerant Pressures Screen



The purpose of the Refrigerant Display screen is to display the refrigerant suction and discharge pressures for each compressor. This display is an option and will only be visible if the Refrigerant Pressure Transducer option has been selected.

Suction pressures are displayed on the left, discharge pressures are on the right. The light in the center indicates whether or not the pressures are being actively read by the PLC.

Incoming Seawater and Chillwater temperatures are displayed for troubleshooting purposes.

Transfer to the Main Screen

Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the System Menu

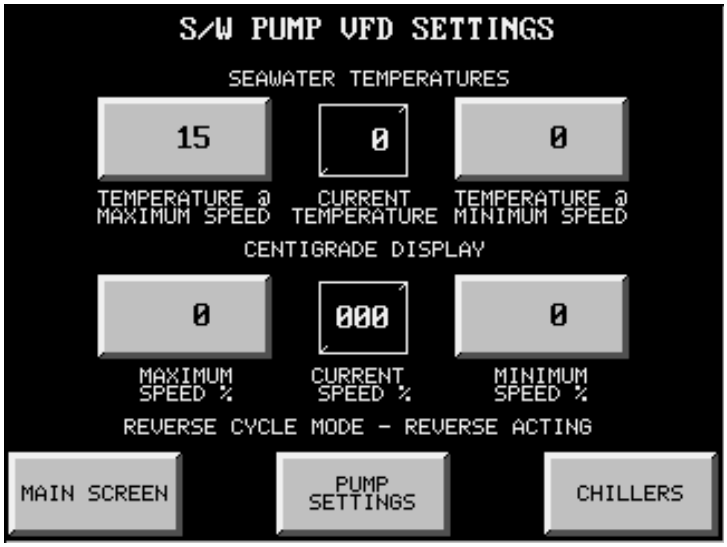
Press the SYSTEM MENU button to go to the System Menu.

Transfer to the Chiller Control Screen

Press the CHILLER CONTROL button to go to the Chiller Control Screen.

I:\wordpfct\plc\refrigerant pressures screen14.wpd

Seawater Pump VFD Settings



This screen controls the voltage/frequency output of the seawater pump VFD. This screen is only visible if the unit is equipped with the optional seawater pump VFD.

Setting the Maximum Speed Temperature

This is the temperature that the seawater pump will begin to run at maximum speed in the cooling mode (the opposite will occur in the reverse cycle mode). To set the temperature press the TEMPERATURE @ MAXIMUM SPEED button. A numeric keypad will appear. Enter the temperature and press ENTER.

Setting the Maximum Speed %

This is maximum speed (as a percentage of total overall speed) that the pump will be running at when the water temperature reaches the Maximum Speed Temperature. Press the MAXIMUM SPEED % button. A numeric keypad will appear. Enter the speed percentage and press ENTER.

Setting the Minimum Speed Temperature

This is the temperature that the seawater pump will begin to run at minimum speed in the cooling mode (the opposite will occur in the reverse cycle mode). To set the temperature press the TEMPERATURE @ MINIMUM SPEED button. A numeric keypad will appear. Enter the temperature and press ENTER.

Setting the Minimum Speed %

This is minimum speed (as a percentage of total overall speed) that the pump will be running at when the water temperature reaches the Minimum Speed Temperature. Press the MINIMUM SPEED % button. A numeric keypad will appear. Enter the speed percentage and press ENTER.

Transfer to the Main Screen

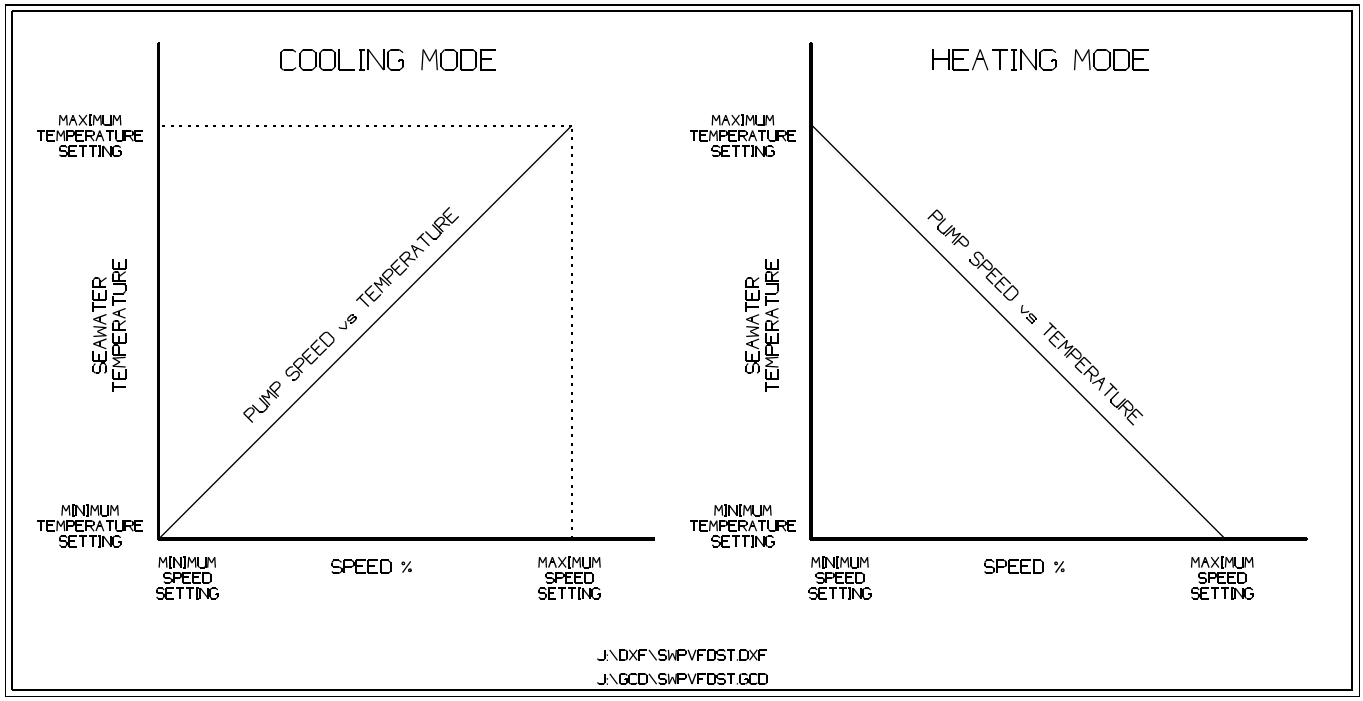
Press the MAIN SCREEN button to go to the Main Screen.

Transfer to the Pump Settings Screen

Press the PUMP SETTINGS button.

Transfer to the Chiller Control Screen

Press the CHILLERS button.



Operation of Seawater Pump VFD in Cooling and Heating (Reverse Cycle) Mode