Basic Chiller Control
Operations Manual
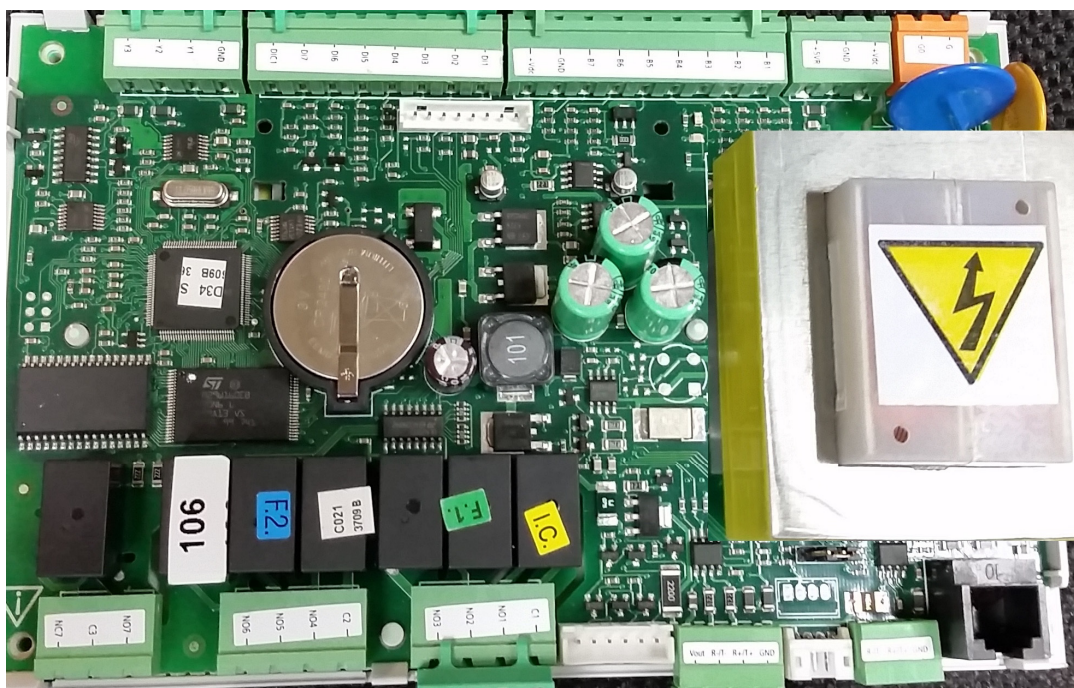
Dometic Group Marine Division
Rev. 20180709
L-3527 English
P/N 338238

Table of Contents

INTRODUCTION

The Dometic PLC controls is a microcontroller-based unit designed to control multiple chillers. This design allows the user flexibility in the application and improved controls and protection. The PLC Chiller uses temperature differential and hysteresis to manage the capacity of the chiller in single or multistage application.

This application supports the following:

- o Selection and sequencing of up to six chillers
- o Selection and sequencing of one chill water pump and one sea water pump
- o Selection and sequencing of up to 6 EH heaters
- o Sequencing of devices for runtime equalization
- o Alarms and interlocks
- o Troubleshooting help

The main interface supported will be the LCD display, referred to as the PGD1 display.

Figure 1: PGD1 Button Description

Alarm Indicator

Program Mode

Escape to Exit

Scroll Up

Enter

Scroll Down

PGD1 NAVIGATION

Enter Button

The PGD1 controller screen will automatically boot up to the Main screen. This screen allows you to enable or disable the chiller by pressing the Enter button. Pressing the Enter button will take you to the area of screen you wish to modify. Press enter multiple times if required to scroll down to the area you wish to select.

Scroll Up/Down Buttons

This button will be used to modify the value such as temperature setpoint or probe adjustment values. The Scroll Up or Scroll Down button will also navigate you from page to page of the controller. The flashing cursor must be in the upper left-hand corner for the page navigation. Pressing enter repeatedly will move it to that location.

Esc Button

The Esc button is used to exit your present screen and take you back one screen. Pressing it multiple times will take you back to the Main screen.

Prg Button

This button takes you to the system menus. Once at the menus, use the scroll buttons to scroll through the various options. Pressing enter will select that menu item.

Alarm Button

This button will flash red if there is an active alarm. Pressing this button will take you to the active alarm screen to display the alarm. Once in the alarm screen, use the up/down buttons to scroll through alarms. The Alarm screen captures a snapshot of the system parameters at the time of the fault. Press and hold the Alarm button for 3 seconds to clear the active alarm if the fault has been corrected.

GENERAL INFORMATION

The Dometic PLC controls is a microcontroller-based unit designed to control multiple chillers. This design allows the user flexibility in the application and improved controls and protection. The PLC Chiller uses temperature differential and hysteresis to manage the capacity of the chiller in single or multistage application.

The chiller system will come programmed from the factory with the options enabled for that system. Although the system offers flexibility, these options can only be enabled by a factory representative.

The user will be able to select between Cool, Heat or Electric Heat mode operation in single stage configuration or In a multistage configuration.

The PLC controller is internally grounded with isolation between inputs and outputs. Additionally, the output relays offer double isolation so that different voltages can be used for groups of relays.

The system will utilize various sensor types for measuring analog temperatures and pressures. For temperature measurements, the system will use NTC type 10K@77° thermistors. Pressure transducers are ratiometric 0-650 PSI (45 bar) range for both suction and discharge monitoring.

Available Options:

1. **Compressor Current Monitoring**
2. **Pump Current Monitoring (SW and CW)**
3. **Condenser Freeze Protection**
4. **Electric Heat**
5. **EEV Control**
6. **Pressure Transducers**
7. **Load Shedding Input Signal**
8. **Low Current Alarm to indicate if system is not actually running when enabled. (Pumps and Compressor)**
9. **Return or Supply Water Control**

DIGITAL INPUTS

Digital inputs are used to monitor the status of the protection circuits for the system.

SAFETY INPUTS

All discrete inputs will be checked before the system will be enabled. Any faults detected on start-up must be verified and cleared via the PLC before system will start normal operation.

FS – CHILLED WATER FLOW SWITCH

With the system in either heating or cooling mode the Flow switch must be closed prior to system starting or a stage being enabled. In operation if Flow is lost for more than 10 consecutive seconds, the compressor or heat relay will be disabled. A flow switch fault will be recorded and displayed.

A CW Flow fault will be recorded and system will be in lockout and a manual restart will be required. The PLC will not allow the compressor or electric heat relay to be energized for the stage that has lost flow or the whole system if a common flow switch is being used.

Fault must be manually acknowledged via the PLC and cleared prior to re-enabling the system or stage.

REFRIGERANT HI – HIGH SIDE PRESSURE LIMIT

The PLC will immediately acknowledge an open circuit if the HI pressure switch is tripped and de-energize the compressor. It will record and display high pressure fault on the alarm screen. If the PLC detects a high pressure fault during operation, a HP fault will be displayed and recorded. The PLC will not allow the compressor relay to be re-energized, until switch is in the closed position.

The fault must be manually acknowledged via the PLC and cleared prior to re-enabling the system or stage.

REFRIGERANT LOW – LOW SIDE PRESSURE LIMIT (Optional)

The PLC will immediately acknowledge an open circuit if the low pressure switch is tripped and de-energize the compressor. It will record and display low pressure fault on the alarm screen. If the PLC detects a low pressure fault during operation, a LP fault will be displayed and recorded. The PLC will not allow the compressor relay to be re-energized, until switch is in the closed position.

The fault must be manually acknowledged via the PLC and cleared prior to re-enabling the system or stage.

ANALOG INPUTS

HIGH LIMIT TEMPERATURE SETPOINT

The high limit temperature sensor is continuously monitored whether in Cooling, Reverse Cycle or Electric Heat mode.

This sensor is used to detect a high temperature condition in the supply water from the chiller. If the chilled water temperature is sensed to be greater or equal to 125°F (51.7°C), all enabled compressor relays will be de-energized, turning off the compressor(s) if operating in reverse cycle mode. If electric heat is being used, all enabled heater relays will be de-energized, turning off the heating element(s). As the temperature falls, the compressor or electric heat relay will re-energize when the temperature reaches 110°F (43.3°C).

A high temperature fault will be recorded and displayed if the system exceeds the alarm set point. In a high temperature situation, PLC will not allow the compressor or electric heat relay to be energized. The fault must be manually acknowledged on the active alarm screen and cleared prior to re-enabling the system or stage.

If a temperature sensor is bad or not connected, the PLC will display an alarm for that sensor.

FREEZE TEMPERATURE SETPOINT

The low limit temperature sensor is continuously monitored whether in Cooling, Reverse Cycle or Electric Heat mode.

This sensor is used to detect a freeze condition in the supply water of the chiller. If the chilled water temperature is sensed to be equal to or less than 38°F (3.3°C), then the compressor relay will be de-energized, shutting off the compressor. As the temperature rises, the compressor relay will re-energize when the temperature reaches 42°F (5.6°C).

A low temperature fault will be recorded and displayed if the system falls below the alarm set point. In a low temperature situation, PLC will not allow the compressor or electric heat relay to be energized. The fault must be manually acknowledged on the active alarm screen and cleared prior to re-enabling the system or stage.

If a temperature sensor is bad or not connected, the PLC will display an alarm for that sensor.

Condenser Freeze Protection (Optional)

The system is equipped with a temperature sensor mounted to the condenser coil. This sensor is there to sense the coil temperature. In heat mode if the coil temperature drops below 40 °F, the PLC controls will automatically lower the speed of the compressor to half the speed that it was currently running. The display will indicate "Freeze Defrost" while performing this operation.

PRESSURE TRANSDUCERS

SUCTION Pressure

The suction pressure is continuously monitored by the PLC. If the suction pressure is below the alarm set point for longer than the programmed time delay, a fault will occur. This low suction fault will be recorded and displayed on the alarm screen.

The fault must be manually acknowledged via the PLC and cleared prior to re-enabling the system or stage.

DISCHARGE Pressure

The discharge pressure is continuously monitored by the PLC. If the discharge pressure is above the alarm set point for longer than the programmed time, a fault will occur. This high pressure fault will be recorded and displayed on the alarm screen.

The fault must be manually acknowledged via the PLC and cleared prior to re-enabling the system or stage.

RELAY OUTPUTS

COMP – COMPRESSOR
PLC COMP output will provide switched power to the contactor coil to enable the compressor normal operation.

CWP – CHILL WATER PUMP
PLC CWP output will provide switched power to the contactor coils for the chilled water pump.

SWP – SEA WATER PUMP
PLC SWP output will provide switched power to the contactor coils for the sea water pump.

RV – REVERSING VALVE
PLC RV output will provide switched power to the coils for the reversing valve.

EH – ELECTRIC HEAT
PLC EH output will provide switched power to the contactor coils for the electric heat.

FAULT
Provides a Normally Open (NO) contact point. Any fault condition will close the NO contact. This output can be used to power a light, relay, or interface to a ship's monitoring system. The output on this terminal will be 230 VAC.

SYSTEM OVERVIEW

SYSTEM POWER-UP

SOFTWARE REVISION

Upon applying power to the system, the display will indicate the software revision number or display it on the main status screen.

PLC is enabled and waiting for user selection.

MODBUS

The PLC comes with a 3 wire Modbus connection as part of the electrical box. This connection is used for multistage configuration and networking to a boat management system.

STARTUP

The PLC Chiller controller can be operated as a single or a multistage chiller plant. During initial setup, the system will be configured for the number of stages and the available options. Select between Return water or Supply water control. The user has the option to select between metric values being displayed or Imperial values being displayed during operation of the system.

Chilled water setpoint will be entered for Cool and Heat mode.
Once enabled, CW and SW pumps will be turned on for operation.

OPERATIONAL CHECKS

Once the PLC is enabled the system will conduct pre-startup checks. The PLC program will check all CW flow switches for faults. The PLC will also check HP and LP switches for faults.
Individual stage faults will only disable that stage.

SETPOINTS

COOLING
Cooling set-point is an adjustable parameter for Return control (default) from 48°F (8°C) to 58°F (14°C) in one degree increments and for Supply control from 42°F (5°C) to 58°F (14°C). To adjust the cooling set point, simply touch the PLC screen and change to desired new set point. In cooling mode you will not be able to enter a number outside of this range.

HEATING

Heating set-point is an adjustable parameter from 95°F (35°C) to 120°F (49°C) in one degree increments, for both Return & Supply control. To adjust the heating set point, simply touch the PLC screen and change to desired new set point. In heating mode you will not be able to enter a number outside of this range.

COMPRESSOR STAGING TIME

Compressor staging time is a PLC adjustable parameter from 10 seconds to 110 seconds in 10-second increments. To adjust the staging time, simply touch the PLC screen and change to desired new set point. User will not be able to enter a number outside of this range. Once the PLC initiates a cooling cycle, the staging time is the time it will take (in seconds) for the next compressor relay to close.

RUN MODE – COOLING

Compressor rotation is active during run mode. The compressor with the lowest running hours will be enabled first and compressor with the highest running hours will be disabled first.

First stage will be enabled and the compressor will start after CW and SW flows are stable for 10 seconds (default).

First stage will continue to run for 1 minute before enabling the next stage. If the loop requires demand, then the next stage will be enabled.

RUN MODE – REVERSE CYCLE HEATING

Compressor rotation is active during run mode. The compressor with the lowest running hours will be enabled first and compressor with the highest running hours will be disabled first.

Enable Reverse Cycle Heat only for the system.

First stage heating will be enabled and the compressor will start after CW and SW flows are stable for 10 seconds.

First stage will continue to run for 5 minutes before enabling the next heater stage. If the loop requires demand, then the next stage will be enabled.

RUN MODE – ELECTRIC HEATING (optional heater barrel)

Heater rotation is active during run mode. The heater with the lowest running hours will be enabled first and the heater with the highest running hours will be disabled first.

Enable Electric Heat only for the system.

First stage will be enabled and the electric heater will start after CW flow is stable for 10 seconds.

First stage will continue to run for 5 minutes before enabling the next heater stage. If the PID loop requires demand then the next stage will be enabled.

OPERATIONAL MODES

PUMP OPERATION

CHILLED WATER PUMP

The chilled water pump relay shall close if the system is in heat mode or cool mode. The pump will be enabled 5 second prior to the first stage being enabled. Pump will be on for continuous operation when system is enabled

SEA WATER PUMP

The sea water pump will have a selectable operating mode between continuous operation or cycle with compressor operation. The default configuration is to cycle with the demand.

The sea water pump relay shall close 5 seconds before the compressor starts in heating or cooling modes and will open 5 seconds after the last compressor cycle is completed. If immersion heating is available and used, the sea water pump will be disabled.

In a multistage configuration the pump outputs can be daisy chained at the back of the unit to supply power to the pumps. This will allow any stage to supply power to the pumps when being staged on and off and as a redundant control for the pumps.

COOLING MODE

Cooling mode is entered when Cool is selected on the touchscreen or with the display buttons. The system will automatically start cooling depending on temperature setpoint. The pumps will operate as described in the pump operation section.

The board will energize the compressor relay if return water/supply water temperature is above the cooling setpoint and the staging delay has elapsed.

The compressor will continue to run until the cooling setpoint has been reached or an alarm condition exists. A stage will have a minimum run time of 100 seconds before it can be turned off and a minimum off time of 120 seconds before it can be re-enabled. This minimum on time is required to ensure that the system is not cycling on and off and not allowing the compressor to properly warm-up. This ensures proper oil lubrication of the system. If the system calls for a stage to be toggled on/off, the next available stage will be used that meets the staging criteria. Load shedding will occur in multistage operation when approaching chilled water setpoint. The reversing valve is toggled to relieve head pressure at the end of a compressor run cycle.

HEATING MODE

Reverse Cycle Heating mode is entered when Heat is selected on the touchscreen or with the display buttons. The system will automatically start heating depending on the temperature setpoint. The pumps will operate as described in the pump operation section.

The reversing valve relay will be energized to change the unit to operate in Reverse Cycle Heating mode.
The PLC will energize the compressor relay if return/supply water temperature below the programmed heating setpoint and the staging delay has elapsed. The compressor will continue to run and the reversing valve will remain energized until the heating setpoint has been reached or an alarm condition exists.

Electric Heating mode is entered when Electric Heat is selected on the touchscreen or with the display buttons. The system will automatically start heating depending on the temperature setpoint.

The PLC will energize the heater relay if return/supply water temperature is below the programmed setpoint and the staging delay has elapsed in a multistage configuration.

Status Screen Navigation

The main home screen is the status screen where the single stage operation can be reviewed or in a multistage configuration the user can scroll and see the values of the chilled water and other parameters of the additional stages. The user will simply use the down arrow key to scroll through the various parameters being displayed on the LCD screen. The LCD screen will also indicate on the main screen the mode of operation whether it is Cool, Heat or EH mode. The main screen will also indicate if there is an alarm present on the system by flashing the word alarm in the lower right-hand corner or Load shedding if it has been activated.

Figure 2

The following screen will indicate the chilled water return temperature the chilled water supply temperature as well as the control sensor temperature which is the value based on the type of control chosen. Return water or supply water control and this will be the averaged value of the number of stages enabled.

Figure 3
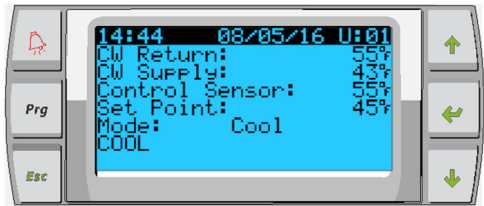
The second screen following the main screen will contain information on the pump status.

Figure 4
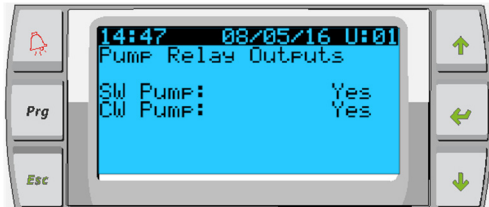
The third screen will contain the chiller 1 information or the water temperatures, the status of the safeties and compressor. The following screens will contain information for the additional stages enabled up to 6 stages.

Figure 5
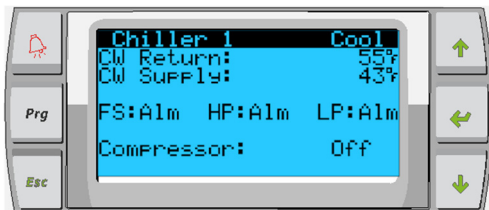
The final screen will contain the image of the refrigerant circuit and contain the valve position information.

Note: Screen orders may differ depending on what features are enabled.

Main Menu Items: Screen Navigation Tree

Press enter to select items to view and up/down arrows to scroll through screens. Press Esc to exit Menu being viewed and to return to Main Status screen. After 3 minutes of screen inactivity the screen will automatically return to the main status screen.

Menu A: On/Off Unit

- o Unit Address: 1 (Default)
- o Mode   Cool, Heat, EH, OFF
- o Status: Displayed

Menu B: Setpoints:

Cool Cntrl   SP: 45 F

- o Stage Up   Stage Down
- o SP+ 1 F   >>   - 0 F
- o SP+ 3 F   >>   - 2 F

Heat Cntrl   SP: 110 F

- o Stage Up   Stage Down
- o SP- 1 F   >>   + 0 F
- o SP- 3 F   >>   + 2 F

Seawater Pump Control: By Demand (Default) or By Unit On (Continuous Operation)

Configuration:

- o Temperature Units: F (Default) Or C
- o Pressure Units: PSI (Default) or Bar

Menu C: Clock/Scheduler

- o Date: Change date here.
- o Hour: Change time here.
- o Day: Displayed

Next Screen:

- o DST: Enabled (Default)
- o Description Follows:

Menu D: Input/Output   **View values or status of analog sensors, digital inputs or relay outputs.**

- o A: Analog Inputs:
  - o CW Return
  - o Input B001:   Actual Value
  - o Scroll for additional sensor values with down arrow button then ESC to exit.

- o B: Digital Inputs:
  - o Flow Switch
  - o DI 3 Status: Actual State (Open or Closed)
  - o Scroll Down for additional active digital inputs. This will change depending on what is enabled in the system configuration.

- o C: Relay Outputs:
  - o SW Pump

- o Relay 1 Status: Actual State (ON or OFF)
- o Scroll Down for additional active relay outputs. This will change depending on what is enabled in the system configuration.

- o D: Analog Outputs:
  - o NOT USED

Menu E: Alarm History

Will capture the status of the following parameters at the time of the alarm. The most recent alarm will be shown. Use up arrow to to view previous alarms.

- o Alarm will be displayed followed by:
- o CW Return: Actual value
- o CW Supply: Actual value
- o Sea Water: Actual value
- o Control Value: Actual value

Menu F: Board Switch

This menu allows you to change to view additional boards and make changes to that particular board. This only applies to a multi-stage configuration when units are networked together.

- o Unit Address: 1 (Default)
- o Switch to unit: Desired board address

Menu G: Service

Some subscreens will require a password. Please contact Dometic for service password.

Submenus:

Sub Menu A: Information

- o The service contact information is available on this screen.
- o Scroll to view additional firmware information.
- o The next screen will contain the flash RAM information.
- o The next screen will contain the power cycle status which indicates how many days the unit has been running in the last time it was turned off or on.
- o The next screen will contain the Evo firmware information.

Sub Menu B: Commission

- o On this screen the technician will be able to enter the dealer contact information. The default contact information is the Dometic contact information. Then the user will select to update the information by selecting yes at the prompt.
- o Then scroll to the next screen. On the screen the user will be asked to commission the system and must select between yes or no then press enter. This will save the information and once commission that the state cannot be changed.

Sub Menu C: Working Hours

- o Compressor
- o Run hours: Actual
- o Num Starts: Actual

Scroll to next screens to view pump and electric heat hours (optional if installed).

Sub Menu D: BMS Config

Used only for configuration system to work with STIIC network.

- o BMS Port 1
- o Protocol: Carel
- o Adddress   1 (Default)
- o Baud Rate   19200 (Default)

Sub Menu E: Test Mode

- o Test Mode: Disabled (Default)
- o Timeout: Disabled (Default)

Sub Menu F: Service Settings

Sub Sub Menu A: Working Hour Set
- o Compressor
- o Service Set Point: 0000h (Default)   Can be used to set a service interval for system. Will display message on screen.
- o Reset to Zero?   NO (Default).   Used to reset the run hours
- o Run hours: Actual Value.   Used to set the run hours if compressor or board has been replaced.

Scroll to view additional items such as the pumps and electric heat if installed.

Sub Sub Menu B: Probe Adjustment

Temp Sensor Curve: Can select a different sensor for retrofits that have the 30 k sensor.

- o CW Return: 10k (Default) or 30k
- o CW Supply: 10k (Default) or 30k
- o SW Inlet: 10k (Default) or 30k

To be used for calibrating the installed temperature sensors or pressure transducers.

- o CW Return
- o Input B001
- o Offsett   0.0 (Default)
- o Value   Actual Value

Scroll to view additional analog sensors for calibration.

Sub Sub Menu C: Thermoregulation

This menu allows you to set the superheat setpoint.

- o Superheat
- o Cool Setpoint: 10 F (Default)
- o Heat Setpoint: 10 F (Default)

Next screen

- o Setpoint SH: 10F(Default)
- o LowSH thresh: 2.0F (Default)
- o LOP thresh: -30.0F (Default)

- o MOP thresh: 82.4F(Default)

Sub Sub Menu D: User Save

This is used to save any user specific settings.

- o Save? No (Default) Yes
- o Restore? No (Default) Yes
- o Enable Auto Save: Yes (Default) No

Sub Sub Menu E: Stage Address

This menu is to be used in a multistage configuration to change the additional unit addresses. This is to be done so that there are no address conflicts when daisy chaining the additional unit mod bus connections. This must be done prior to connecting all the units together.

- o pLAN Board Addressing
- o Current Address: 1(Default)
- o Change Address to: 1(Default)

Next Screen

System Setup

- o Num of Stages 1 (Default) Max 6

Sub Sub Menu: F Stage Disable

This menu is to be used when in a multistage configuration. This allows a technician to take a stage off-line so that repairs can be made and the rest of the system be operational in auto mode. The system must be in an off state to enable stage control.

- o Maintenance
- o Stage Control: No (Default) Yes.

If Enabled,

- o Stage 1: Enabled (Default) Disabled
- o Stage 2: Enabled (Default) Disabled
- o Stage 3: Enabled (Default) Disabled
- o Stage 4: Enabled (Default) Disabled

Sub Menu G: Manual Management

This menu allows the technician to manually operate the relay outputs as well as enable or disable analog sensors.

- o **Sub Sub Menu A: Analog Input**
  - o CW Return
  - o Manual Control B001: Off (Default) On
  - o Manual Position: Value Desired
  - o Value: Actual Value

  Scroll to adjust additional sensors

- o **Sub Sub Menu B: Digital Input**
  - o Flow Switch
  - o Manual DI 3: Off (Default) ON
  - o Manual Position: Actual (Enter Desired Position)
  - o DI Input Status: Actual Value

Scroll to adjust additional inputs

- o **Sub Sub Menu C: Relay Output**
  - o SW Pump
  - o Manual Relay 1:   OFF (Default) No
  - o Manual Position: OFF (Enter Desired)
  - o Relay Status: Actual Position

Scroll to adjust additional Outputs

- o **Sub Sub Menu D:Analog Outputs**
  - o **NOT USED**

Appendix I Navigation Tree

Main Status Screen

Main Status Screen

CW Supply Temp	#.#°F
Mode	Off/Cool/Heat/ **El Ht***
CW Return temp	#.#°F
CW Supply temp	#.#°F
Control Sensor	#.#°F
Mode	Off/Cool/Heat/**El Ht***
Pump Relay Outputs	
SW Pump	On/Off
CW Pump	On/Off
Chiller #1	
CW return temp	#.#°F
CW supply temp	#.#°F
Flow status	Ok/Alm/Off
High pressure status	Ok/Alm/Off
Electric Heat*	Ok/Alm/Off
EH FL*	Ok/Alm/Off
Compressor	Ok/Alm/Off
Supply Temp	
Chiller 1	#°F
Flow Diagram	
Super Heat	# °F
Compressor	# °F
TXV Open	# %
Steps	# stp
Suction Pressure	# psi
Suction Temperature	# °F

Legend

* Asterisk indicates this item is only viewable when activated in the factory settings.

➡️ ⬜ A solid box means that it is a submenu of the menu and needs to be accessed by pressing enter.

➡️ ⬜ A dotted box is a break out of the additional information that is contained below that menu category.

Program

Setpoints

Cool control	
Setpoint	#°F
1-Stage Up	#°F
1-Stage Down	#°F
Heat control	
Setpoint	#°F
1-Stage Up	#°F
1-Stage Down	#°F
SW Pump Control	By Demand/By Unit On
Temperature Units	°F/°C
Pressure Units	psi/bar

Manufacturer
See page #

Technician
See page #

Program
Setpoints
Clock
Input/Output
Alarm History
Board Switch
Technician
Manufacturer

Clock/Scheduler

Date	##/##/##
Hour	##:##
Day	#
DST	Enable/Disable
Trans. Time	#
Start	#
End	#

Analog Input

CW Return Input B001	###
CW Supply Input B002	###

Board Switch

Unit address:	##
Switch to unit:	##

Input/Output
Analog Input
Digital Input
Relay Output
Analog Outputs

Digital Input

High pressure DI 1	Open/Close
Low pressure DI 2	Open/Close
Water Flow DI 3	Open/Close
El Heat Flow DI 5	Open/Close
Hand Cool DI 6	Open/Close
Hand Heat DI 7	Open/Close

Alarm History

Alarm#	Alarm Message
CW Return	#
CW Supply	#
Control valve	#

Relay Output

SW Pump Relay 1	On/Off
CW Pump Relay 2	On/Off
Fault Relay 3	On/Off
Compressor Relay 7	On/Off
Reversing Valve Relay 4	On/Off

Analog Output

Valve status	Std-by
Valve opening	#.#%
Valve position	# stp
Cool capacity	#%
Superheat	#.#°F
S1 probe	
Evap. Press	#.# psig
Evap. Temp	#.#°F
S2 probe	
Suction Temp	#.#°F
S1 probe	#.# psig
S2 probe	#.#°F
S3 probe	#.# psig
S4 probe	#.#°F

Program/Technician

BMS Configuration
BMS Port No.	#
Protocol	###### (scroll to select)
Address	#
Baud Rate	#####

Information
Service Contact Phone	###-###-####
Code:	LE Module
Version & Date	#.## ##/##/##
BIOS & Date	#.## ##/##/##
Boot & Date	#.## ##/##/##
Flash Ram	# Kb
T memory	#
## Cycle/s	# ms
Power Cycle Status	
Last Off Time	##/##/## ##:##:##
Last On Time	##/##/## ##:##:##
Length Time off Days: #	Hrs: ## Min: ##
EVO no.	
FW Version	#.#
Service Version	#.#

Test Mode
Test mode	Enabled/Disabled
Timeout	Enabled/Disabled
Parameters*	
Test mode timers	
Test mode time	## s
Sea water pump	# m
Chill water pump	# m
Stage 1 Comp	# s
Stage 2 Comp	# s
Test mode settings*	
Sea water pump	Yes/No
Chilled water pump	Yes/No
Compressor	
Stage 1	Yes/No

Technician
Information
Commission
Working Hours
BMS Configuration
Test mode
Pump Control
Service Settings
Manual Management

Commission
Enter contact info	
Name	####
Telephone No.	###-###-####
Update info?	Yes/No
Commission date	##:## ##/##/##
Commission system?	Yes/No

CW Pump Control
Manual Control	Relay 2 On/Off
Manual Pos.	On/Off
Status Value	On/Off

Service Settings
See page #

Working Hours
	Run Hours	Number Starts
Compressor	# h	#
Reversing Valve	# h	#
Chilled Water Pump	# h	#
Seawater Pump	#h	#
Electric Heat	# h	#

Manual Management
See page #

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Manual Management
Analog Input
Digital Input
Relay Output
Analog Output

Analog Input

	Manual Control	Manual Pos.	Status Value
CW Return	B001 On/Off	#.#	#.#
CW Supply	B002 On/Off	#.#	#.#

Digital Input

	Manual Control	Manual Pos.	Status Value
High Pressure	DI 1 On/Off	Open/Close	Open/Close
Low pressure	DI 2 On/Off	Open/Close	Open/Close
Water Flow	DI 3 On/Off	Open/Close	Open/Close
Load shedding	DI 5 On/Off	Open/Close	Open/Close
Elect Ht Flow*	DI 4 On/Off	Open/Close	Open/Close
Hand Cool	DI 6 On/Off	Open/Close	Open/Close
Hand Heat	DI 7 On/Off	Open/Close	Open/Close

Relay Output

	Manual Control	Manual Pos.	Status Value
SW Pump	Relay 1 On/Off	On/Off	On/Off
CW Pump	Relay 2 On/Off	On/Off	On/Off
Fault	Relay 3 On/Off	On/Off	On/Off
Compressor	Relay 7 On/Off	On/Off	On/Off
Rev valve	Relay 4 On/Off	On/Off	On/Off
Electric Heat*	Relay 5 On/Off	On/Off	On/Off

Analog Output
Enable manual valve position*   Yes/No
Manual Valve position*   # stp

Program/Technician/Service Settings

Probe Adjustments
Temp Sensor Curve

	Input	Offset	Value
CW Return	# k		
CW Supply	# k		
CW Return	B001	#.#	#.#
CW supply	B002	#.#	#.#

Probe adjust
S1 offset	#.# psig	
S1 probe	#.# psig	
S2 offset	#.# °F	
S2 probe	#.# °F	
S3 offset	#.# psig	
S3 probe	#.# psig	
S4 offset	#.# °F	
S4 probe	#.# °F	

Working Hour Set

	Set Point	Reset to Zero?	Run Hours
Compressor	# h	Yes/No	# h
Chilled Water Pump	# h	Yes/No	# h
Seawater Pump	# h	Yes/No	# h
Electric Heat*	# h	Yes/No	# h

Stage Address
pLAN Board Addressing
Current Address	#
Change Address to	#
No. of Stages	#

Service Settings
Working Hour Set
Probe Adjustments
Thermoregulation
User Save
Stage Address
Stage Disable
System Setup

Stage Disable
Stage Control	Yes/No

Thermoregulation
Superheat Setpoint
Cool Setpoint	#.# °F
Heat Setpoint	#.# °F
Setpoint SH	#.# °F
LowSH thresh	#.# °F
LOP thresh	#.# °F
MOP thresh	#.# °F

System Setup
Water Loop Control	Supply/Return
Heat Sup Temp	Yes/No
Electric Heat	Yes/No
EH Flow Switch*	Yes/No

User Save
Save?	Yes/No
Restore?	Yes/No
Enable auto save	Yes/No

Program/Manufacturer

I/O Configuration
See page #

Manufacturer
Configuration
I/O Configuration
Factory Settings
Initialization

Configuration

Temperature Units	°F/°C
Pressure Units	psi/bar
Force clock enable	Yes/No
Clock mode	24h/12h
Disable Buzzer	Yes/No
Startup delay	# s
Enable Unit by	
Digital Input	On/Off
Supervisor	On/Off
pLAN network	On/Off
Schedule	On/Off
Manual Control Reset	
Enable	Yes/No
Time	# m
PW/Return Delay	# s
Scheduler	
No. of Schedules	#
Optimized Start	Yes/No
Set 1 Adjust	Yes/No
Set 2 Adjust	Yes/No
Holidays No.	#
EVO Configurator	

Factory Settings
See page #

EVO Configuration
See page #

Initialization

This will clear the alarm history continue?	Yes/No
Insert New Passwords	
User	####
Technician (PW1)	####
Factory (PW2)	####
Factory Save	
Save?	Yes/No
Restore?	Yes/No
Auto Restore?	Yes/No
User Save	
Save?	Yes/No
Restore?	Yes/No
Auto Restore?	Yes/No
Default installation	
Erase user setting and install	
global default value?	Yes/No

Program/Manufacturer/Factory Settings

Factory Settings

Control Temp	CCW supply/CCW return
Control Valve	Unit 1/Low/High/Average
Modules	#
Logo	Select appropriate
Power Cycle	Retain Mode/Off
Low Voltage Detect	Yes/No
Heat Sup Temp	Yes/No
Cond Refrg Temp	Yes/No
Electric Heat (EH)	Yes/No
Elec Ht Flow Switch*	Yes/No
Load Shedding	Yes/No
Mode Switch	Yes/No
SW Pump current	Yes/No
CW Pump current	Yes/No
Compressor current	Yes/No
Expansion Valve	Yes/No
Refrigerant	Select appropriate
SH Control*	T/P or T/T
Discharge Pressure	Yes/No
Discharge Temp*	Yes/No
Suction Pressure*	Yes/No
Temp Sensor Curve	
CW Return	# k
CW Supply	# k
Elect Heat Setup	
On Delay	# s
Delay Btw Heaters	# s
Rotation Hours	# h
CW Pump Settings	
Flow Prove Delay	# s
Off Delay	# s
SW Pump Settings	
Off Delay	# s
Control	By Demand/By Unit On
Compressor Setup	
Supply High Temp	#.#
Differential	#.#
Supply Low Temp	#.#
Differential	#.#
Supply/Return	
Differential	#.#
Alarm Delay	# s
Alarm Setup	

Compressor Setup

Mode	Cool+Heat/Cool only
Comp Type	# Stage
Pump-Comp Delay	# s
Minimum On	# s
Minimum Off	# s
Delay Btw Comps	# s
Rotation hours	# h
RV Delay Time	# s
RV Toggle On	# s
RV Toggle Off	# s

Alarm Setup

	Retries	Set Dis	Status
CW Flow sw	#/## m	## s	#/## m
High Pressure sw	#/## m	## s	#/## m
Low Pressure sw	#/## m	## s	#/## m
CW Supply High Temp	#/## m	## s	#/## m
CW Supply Low Temp	#/## m	## s	#/## m
Low Pressure sensor	#/## m	## s	#/## m
High Pressure sensor	#/## m	## s	#/## m
Cond Freeze	#/## m	## s	#/## m

Configuration

Valve	Select Type			
Main Regulation	Select Type			
Auxiliary Regulation	Select Type			
Probe Configuration				
	Probe S1	Probe S2	Probe S3	Probe S4
Alarm	Enable/Disable	Enable/Disable	Enable/Disable	Enable/Disable
Type	Select	Select	Select	Select
Minimum	#.# psig		#.# psig	
Maximum	#.# psig		#.# psig	
Alarm Min.	#.# psig	# °F	#.# psig	# °F
Alarm Max.	#.# psig	# °F	#.# psig	# °F
Alarm Mngt	Use backup S3/valve at fixed pos/valve forced closed/no action	valve at fixed pos/valve forced closed/no action	Use backup S3/valve at fixed pos/valve forced closed/no action	valve at fixed pos/valve forced closed/no action

EVO Configuration
Configuration
Regulation
Custom

Regulation

Valve opening at start-up	# %
Valve opened in standby	# %
Prepositioning delay	# s
PID parameters	
Prop. Gain	#.#
Integral Time	# s
Derivat. Time	#.# s
Integral Time	
LowSH protection	#.# s
LOP protection	#.# s
MOP protection	#.# s
Alarm delay	
Low SH	# s
LOP	# s
MOP	# s
Alarm low suction temp	
Threshold	#.# °F
Timeout	# s

Custom

Minimum steps	#
Maximum steps	#
Closing steps	#
Nom. Step rate	# Hz
Fast step rate	# Hz
Holding current	# mA
Duty cycle	# %
Opening synchronicity	Yes/No
Closing synchronicity	Yes/No

Program/Manufacturer/IO Configurations

Analog Inputs

	CW Return Temp	**CW Supply Temp**
Enable	On/Off	On/Off
Channel	B001	B002
Setting	Normal/High Res.	Normal/High Res.
Input Type	Select/(On/Off)	Select/(On/Off)
On/Off		
Direction*	Reverse/Direct	Reverse/Direct
Delay Time*	# s	# s
Select type		
Minimum*	#.#	#.#
Maximum*	#.#	#.#
Offset	#.#	#.#
Value	#.#	#.#
Power Delay	# s	# s
Run Delay	# s	# s
Units	Temp/Press/Other	Temp/Press/Other

Digital Inputs

Switches	Enable	Channel	Action	Delay	Status
High Pressure	On/Off	#	Open/Close	### s	Open/Close
Low Pressure	On/Off	#	Open/Close	### s	Open/Close
Water Flow	On/Off	#	Open/Close	### s	Open/Close
Load Shedding	On/Off	#	Open/Close	### s	Open/Close
Elec Ht Flow	On/Off	#	Open/Close	### s	Open/Close
Hand Cool	On/Off	#	Open/Close	### s	Open/Close
Hand Heat	On/Off	#	Open/Close	### s	Open/Close

I/O Configuration
Analog Inputs
Digital Inputs
Relay Outputs

Relay Output

	Enable	Channel	Direction	Status
SW Pump	Yes/No	#	NO/NC	On/Off
CW Pump	Yes/No	#	NO/NC	On/Off
Fault	Yes/No	#	NO/NC	On/Off
Compressor	Yes/No	#	NO/NC	On/Off
Reversing Valve	Yes/No	#	NO/NC	On/Off
Electric Heat*	Yes/No	#	NO/NC	On/Off

Display Address

```
Display Address
Display address setting        #
I/O Board address              #
Terminal config
```

```
Terminal configuration
P: 02 Adr          Priv/Shared
Trm1      16/17/...  Pr
Trm2      32         Sh
Trm3
```

Appendix II Installation & Setup Procedures

The Low End Chiller can be supplied as a standalone chiller or it can be supplied as part of a staged system.

The factory default setting is set as a standalone chiller.

When supplied as part of a modular system the following connections need to be configured.

- o CW & SW connections between each stage.
- o Network connections between each stage. Physical and network addressing.
- o Ensuring Firmware is identical between each stage.
- o Remote control panel configuration.

This document aims to cover all of the above and to run through setting the time, date and unit of measurement.

Chillers supplied on a frame package will be configured and wired as part of the build process.

Please also note that as part of a correctly configured multistage system there is no need to set differential/hysteresis settings.

Basic wiring diagram

Figure 6
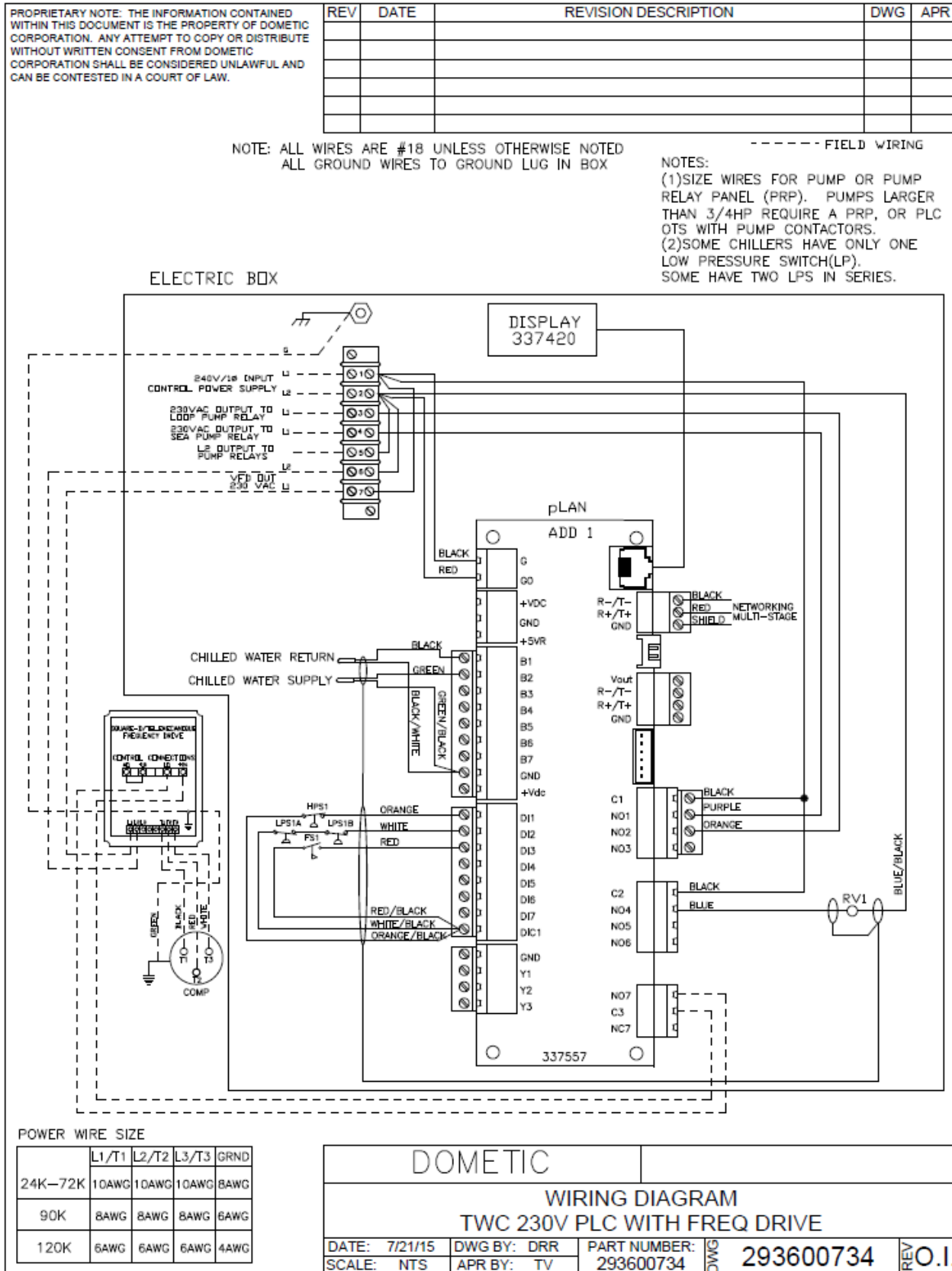
Ensuring the Firmware of each chiller is compatible

Chillers should come with the correct firmware preloaded. However, it is worth checking the versions match as incompatible firmware can seem to work during initial setup then but cause networking problems later down the line.

Figure 7
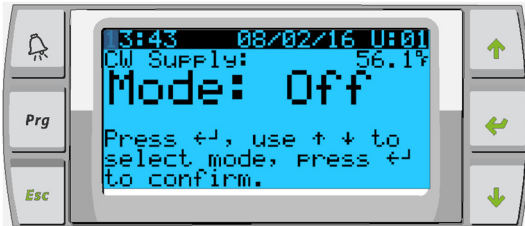
Main Screen

Figure 8
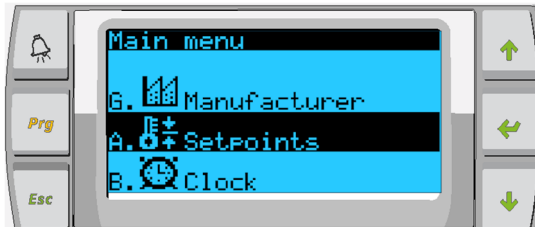
Press Prg button to the left

Figure 9
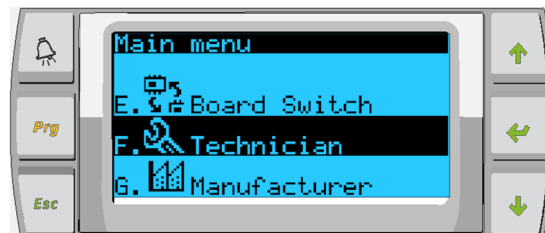
Scroll up or down to Technician, if prompted for a password, 3156

Figure 10
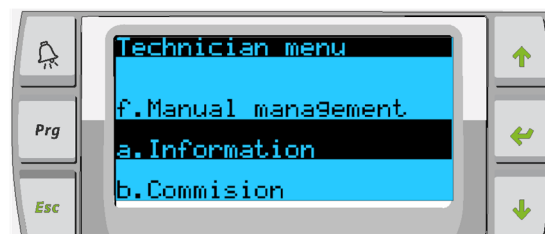
Select Information

Figure 11
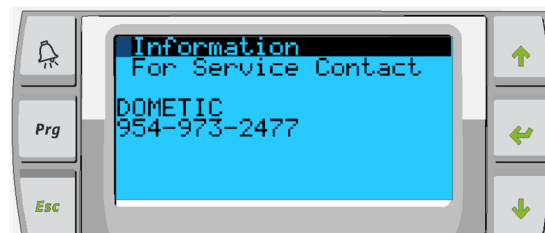
Figure 12
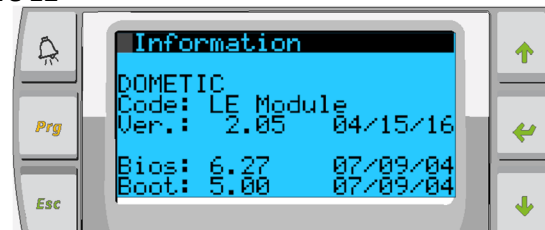
Scroll down for Version

Repeat for each stage.

In the unlikely event there is a difference between stages, PCB firmware will require re-flashing by a Dometic approved engineer

Repeat for each stage and ensure **VER.:** is the same for each stage

27

Figure 13

When setting up the stages for networking, you need to ensure the chillers are not connected. Stage one requires minimal changes so start with stage 2 leaving stage 1 till last. Power off all stages except stage 2. Go into program on standard PLDPRO control

Figure 14
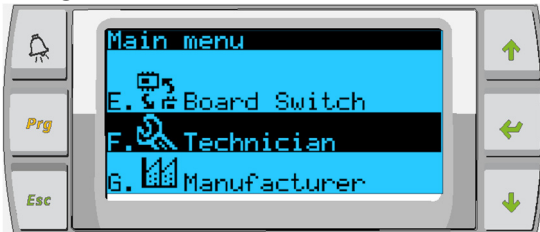
Go to Technician

Figure 15
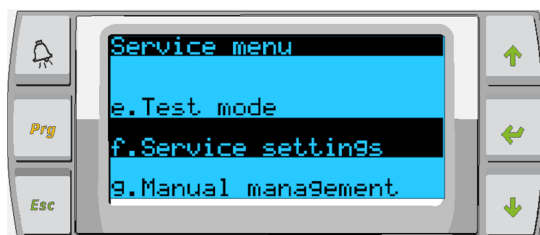
Scroll down

Figure 16
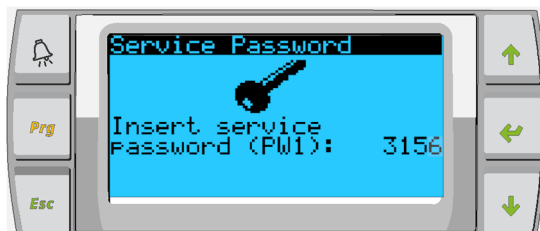
Enter Technician Password 3156

Figure 17
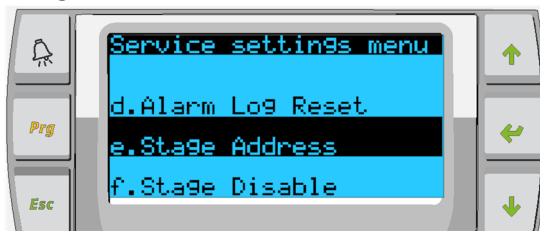
Go to stage address

Figure 18
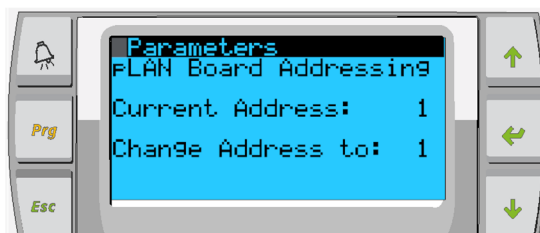
Hit enter, change address to 2 for chiller 2. 3 for chiller 3 etc….

Exit screen back to main menu and you will see confirmation of change in the top right hand corner of the main screen. "U:02" or "U:03"

Complete the next step of networking before moving on to the next chiller stage.

Please note when configuring the stages, they must not be able to communicate with each other.

Either disconnect the network connection or power down all other stages before trying to network.

Figure 18

Step 1

Press and hold Up, Down and enter simultaneously until screen changes, about 6 seconds

Figure 19

If the system has PLDPRO for each stage then each display must be addressed, but if there is 1 PGD1 display then the display address should be 32. If there is a 2nd PGD1 display it should be addressed 28.

Chiller stage 2 needs to have a display address of 17, chiller stage 3 will be 18 and 4 will be 19. I/O Board address should reflect the change you have just made

Figure 20
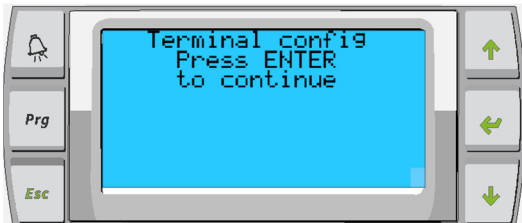
At this point screen may go blank, if it does, start from step 1 again (above) and ensure display address and I/O board address is correct for stage. .Press enter to go into the terminal config settings

Figure 21
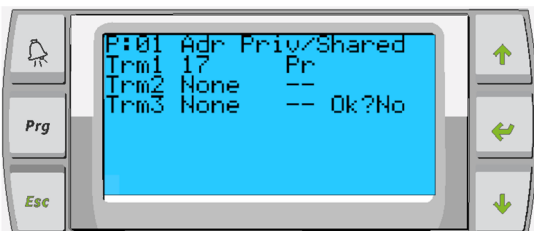
Trm1 = 16 for stage 1, 17 for stage 2, 18 if stage 3 etc... and Pr for PLDPRO display

ID 32 & Sh - this will allow for PGD1 control if used.

ID 28 & Sh - this will allow for 2nd PGD1 control if used.

Only enable controls that are being utilised in the working

Figure 22
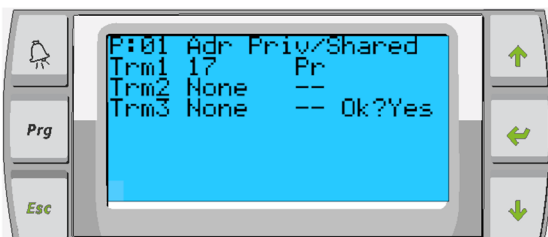
Press enter until you get to OK? Change to Yes to save settings.

Power down stage and repeat process for all stages, once all complete. Turn on stage 1 and repeat this page (only) ensuring Trm1 = 16 Pr

Networking (3 of 3)

Make all network connections between stages; turn on all of the units and on stage 1 select the number of stages as shown below:

Figure 23

Press Prg button

Figure 24
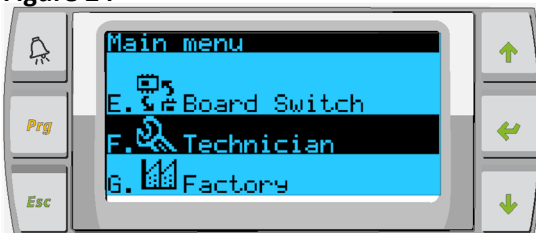
Go to Technician

Figure 25
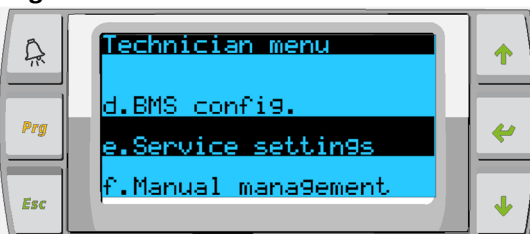
Scroll down

Figure 26

Enter Technician Password 3156

Figure 27
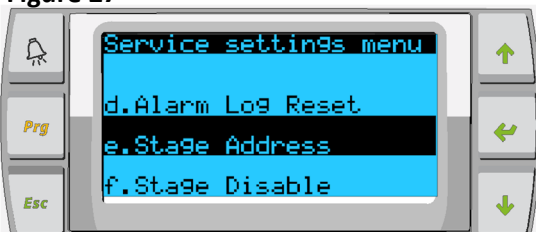
Go to stage address

Figure 28

Press enter until the cursor is on "Num of stages" change from 1 to the correct number of stages for current system.

Setting Time and Date

Figure 29
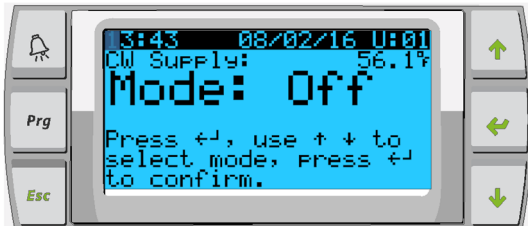
Press Prg button

Figure 30

Scroll to Clock/Scheduler and press

Figure 31
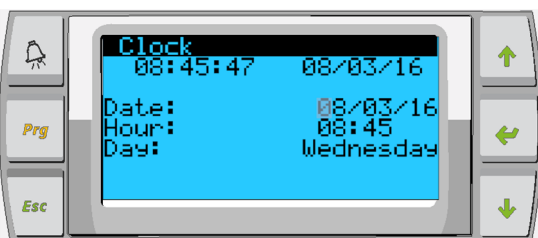
Press enter, notice the cursor flashes on the date field mm/dd/yyyy.

Use the up and/or down keys to select the correct month. Hit enter the press up and/or down to select the correct day.

Press enter to select the year and/or up down buttons to select the correct year.

Press enter again and the cursor drops down to the "Hour" field.

Figure 32
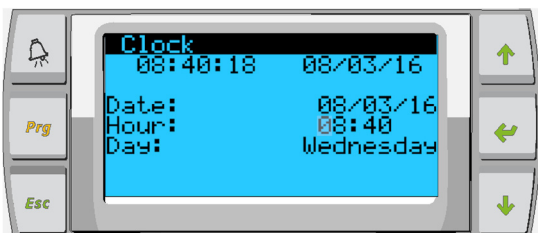
Use the up and down keys to select the correct hour, then minute

Figure 33
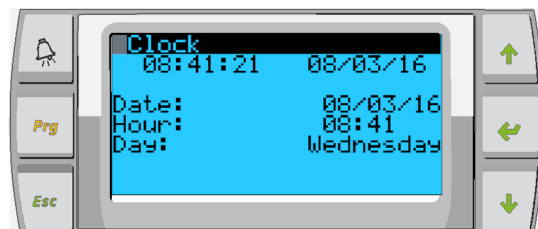
Cursor goes back to the "Clock" title. Settings have been saved and you can exit to main screen. Daylight Saving is enabled by default. Scroll down from the clock screen if you wish to disable.

Enabling Electric Heat

Figure 34

Press Prg button

Figure 35
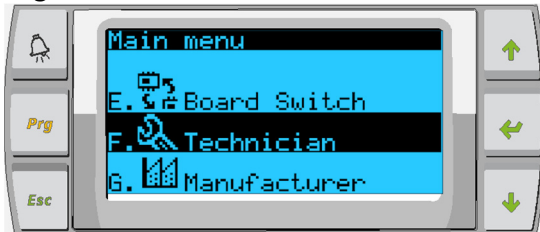
Figure 36
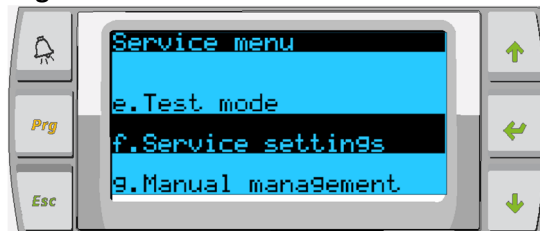
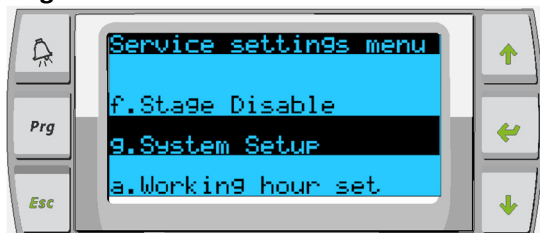**Figure 37**
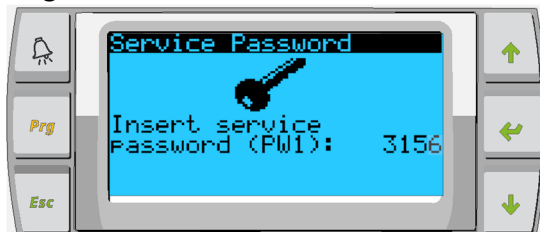
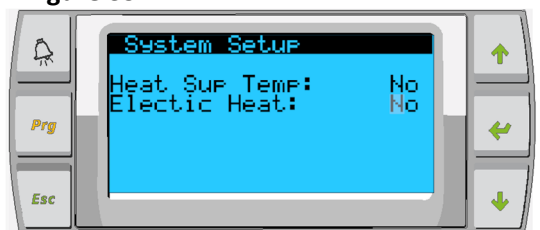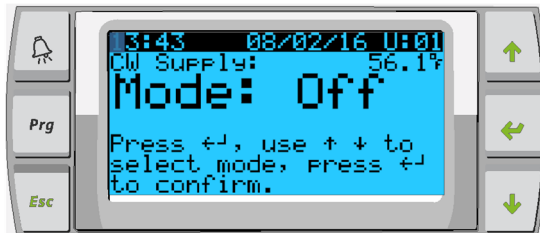Enter service password 3156

Figure 38

Figure 39

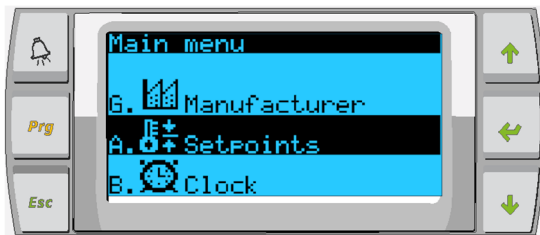Scroll down to Electric Heat, enter to select, up or down to toggle setting.

Enter to save

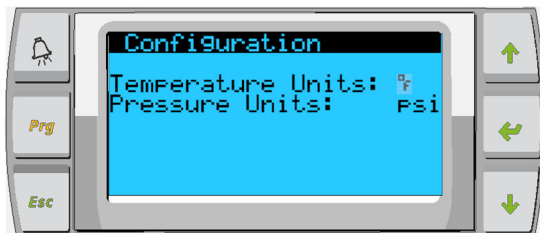# Change from Celsius to Fahrenheit or vice versa

Figure 40

Press Prg button

Figure 41

Go to Setpoints

Figure 42

Scroll down to Temperature Units screen. Hit enter to select. Up or down button to toggle between options.

Once changed, hit enter to return the cursor to the top of the screen.

You will need to make this change to all stages for it to correctly reflect temp readings on remote display

Appendix III Alarm Table

Alarm code	Display description	Reset	Delay	Alarm relay	Action
System Alarms					
N/A	Chilled Water Flow	Manual	10 sec		Off compressor or heat relay
N/A	High Pressure Limit	Manual	Immediate	Yes	Off compressor
N/A	Low Pressure Limit	Manual	Immediate	Yes	Off compressor
N/A	High Temperature Chilled Water	Manual	Immediate	Yes	Off compressor or heat relay
N/A	Freeze Temperature of supply water	Manual	Immediate	Yes	Off compressor
N/A	Low Suction pressure	Manual	30 sec	Yes	Warning Signal
N/A	High discharge pressure	Manual	30 sec	Yes	Warning Signal

Appendix IV Default Parameters

Parameter	Value	Data Type
Cool Control Setpoint	45	°F
Heat Control Setpoint	110	°F
Seawater Pump Control	By demand	
Factory Settings		
Control Temp mode	CCW Return	
Control Value	Average	
Modules	1	
Low Voltage Detection	No	
Heat Sup Temp	No	
Cond Refrg Temp	No	
Electric Heat	Yes	
Electric Heat Flow Switch	Yes	
Load Shedding	Yes	
Mode Switch	Yes	
SW Pump Current	No	
CW Pump Current	No	
Compressor Current	No	
Expansion Valve	Yes	
Refrigerant	R410a	
SH Control	T/T	
Discharge Pressure	No	
Suction Pressure	Yes	
Temp Sensor Curve		
CW Return	10k	
CW Supply		
Electric Heat Setup		
On Delay	10	Seconds
Delay Btw Heaters	30	Seconds
Rotation Hours	0	Hours
CW Pump Settings		
Flow Prove Delay	10	Seconds
Off Delay	5	Seconds
SW Pump Settings		
Off Delay	5	Seconds
Control	By demand	
Compressor Setup		
Mode	Cool+Heat	
Comp Type	1Stage	
Pump-Comp Delay	10	Seconds
Min-On	10	Seconds
Min-Off	10	Seconds
Delay Btw Comps	30	Seconds
Rotation Hours	1	Hour
RV Delay Time	5	Seconds
RV Toggle On	2	Seconds
RV Toggle Off	2	Seconds
Supply High Temp	125	°F
Differential	20	°F
Supply Low Temp	38	°F
Differential	4	°F
Supply Return		
Differential	14	°F
Alarm Delay	120	Seconds
Alarm Setup		
High Pressure Sensor SP	550	PSI
Low Pressure Sensor		
Heat Mode	78	PSI
Heat Mode	60	PSI

Parameter	Value	Data Type
Alarm Delay	10	Seconds
CW Flow switch		
Retrys	3/30	1/min
Set Disable	20	Seconds
High Pressure switch		
Retrys	3/30	1/min
Set Disable	20	Seconds
Low Pressure switch		
Retrys	3/30	1/min
Set Disable	20	Seconds
CW Supply High Temp		
Retrys	3/0	1/min
Set Disable	20	Seconds
CW Supply Low Temp		
Retrys	3/30	1/min
Set Disable	20	Seconds
Low Pressure Sensor		
Retrys	3/30	1/min
Set Disable	20	Seconds
High Pressure Sensor		
Retrys	3/30	1/min
Set Disable	20	Seconds
Cond Freeze		
Retrys	3/30	1/min
Set Disable	180	Seconds
Configuration Menu		
Temperature Units	F	degrees
Pressure Units	PSI	