Controls Operation and Troubleshooting

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all local building codes and appropriate national electrical codes (in USA, ANSI/NFPA 70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠WARNING

MAGNETIC FIELD HAZARD

Units equipped with the permanent magnet motor option contain rotors with powerful magnetic fields. Permanent magnet motor rotors, when removed from the stator, expose surrounding personnel and equipment to powerful magnetic fields which may cause serious health hazards to persons with pacemakers or defibrillators, hearing aids, metal implants, or other implanted electronic medical devices, and may impact other electronic devices such as mobile phones or smartwatches, watches, credit cards, etc. Persons in a risk group should consult a physician prior to compressor disassembly. Failure to follow these procedures may result in personal injury or death.

⚠WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation. Use lock out/tag out procedures and be aware that there may be more than one disconnect switch. Be sure to tag all disconnect locations to alert others not to restore power until work is completed. Even when the main circuit breaker or isolator is switched off, certain circuits will still be energized, since the 19MV chillers contain an internal UPS, but equipment should be inspected for potential other sources as well. Make sure the UPS power switch is in the off position and remove the lower UPS cover to disconnect the battery terminal before servicing or troubleshooting the unit.

⚠WARNING

Electrical currents cause components to get hot either temporarily or permanently and may cause burns. Handle power cable, electrical cables and conduits, terminal box covers, and motor frames with great care.

⚠CAUTION

Do not apply any kind of test voltage to chiller if the chiller is under dehydration vacuum. Insulation breadown and component damage may occur.

⚠CAUTION

This unit uses a microprocessor control system. Do not short or jumper between terminations on circuit boards or modules; control or board failure may result.

Use extreme care when handling tools near boards and when connecting or disconnecting terminal plugs. Circuit boards can easily be damaged. Always hold boards by the edges and avoid touching components and connections.

This equipment uses, and can radiate, radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. The PIC6 control boards have been tested and found to comply with the limits for a Class A computing device pursuant to International Standard in North America EN 61000-2/3 which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

⚠CAUTION

This unit uses a microprocessor control system. Be aware of electrostatic discharge (static electricity) when handling or making contact with circuit boards or module connections. Always touch a chassis (grounded) part to dissipate body electrostatic charge before working inside control center.

Always store and transport replacement or defective boards in anti-static shipping bag.

GENERAL

This publication contains operation and troubleshooting information for PIC (Product Integrated Control) 6, a system for controlling 19MV semi-hermetic centrifugal liquid chillers. This publication is based on 19MV PIC6 Version 1.0.5 Software (SCG-SR-20S220105).

The PIC6 control system monitors and controls all operations of the chiller. The microprocessor control system matches the capacity of the chiller to the cooling load while providing state-of-the-art chiller protection. The system controls cooling load within the set point plus or minus the dead band by sensing the water or brine temperature and regulating the inlet guide vane and VFD (variable frequency drive) speed. The guide vane is a variable flow prewhirl assembly that controls the refrigeration effect in the cooler by regulating the amount of refrigerant vapor flow into the compressor. An increase in guide vane opening increases capacity. A decrease in guide vane opening decreases capacity. The 19MV compressor is a back-to-back two-stage centrifugal arrangement. At the inlet of each compressor stage there is an inlet guide vane. The position of inlet guide vane 2 (inlet to compressor stage 2) is linked to the position of the inlet guide vane inlet such that there is only active control of the first stage inlet guide vane position. The microprocessor-based control center protects the chiller by monitoring the digital and analog inputs and executing capacity overrides or safety shutdowns as necessary.

The PIC6 control system also provides access to a Control Test function covering all outputs except compressor relay outputs.

Abbreviations Used in This Manual

The following abbreviations are used in this manual:

AWG	—	American Wire Gage
CCN mode	—	Operating Mode: CCN
CCN	—	Carrier Comfort Network
DHCP	—	Dynamic Host Configuration Protocol
DSH	—	Discharge Superheat
ECDW	—	Entering Condenser Water
ECW	—	Entering Chilled Water
EWT	—	Entering Water Temperature
EXCSV	—	Expansion Control System Valve
EXV	—	Electronic Expansion Valve
HMI	—	Human Machine Interface
I/O	—	Input/Output
IOB	—	Input/Output Board
LCDW	—	Leaving Condenser Water
LCW	—	Leaving Chilled Water
LED	—	Light-Emitting Diode
LEN	—	Local Equipment Network (internal communication linking the main board to secondary boards)
MBC	—	Magnetic Bearing Controller
MCB	—	Main Control Board
NIC	—	Network Interface Card
PCB	—	Printed Circuit Board
PIC	—	Product Integrated Control
RLA	—	Rated Load Amps
RTD	—	Resistance Temperature Detector
SIOB	—	Starfire 2 Input/Output Board
TFT	—	Thin Film Transistor
UI	—	User Interface
UPS	—	Uninterruptible Power Supply
VFD	—	Variable Frequency Drive

HARDWARE

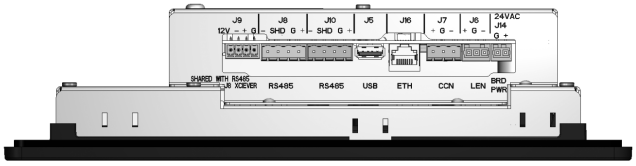
The PIC6 control system consists of one main control board and up to four IOBs (input/output board modules). All boards communicate via an internal LEN bus. The PIC6 control system is compatible with unit-mounted VFD/starter options that do not utilize an integrated starter module. Some VFDs can communicate with LEN while in other applications. LEN is converted to Modbus[1] protocol for starter communication.

Main Control Board

The main control board is supplied from a 24 VAC supply reference to earth ground. In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved, and may in certain cases prevent a circuit or unit from restarting. Figure 1 shows the main controller interface and connectors.

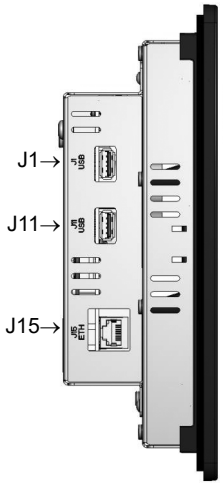
⚠ CAUTION

Maintain the correct polarity when connecting the power supply to the boards. Otherwise, the boards may be damaged.



PIC6 BOTTOM VIEW

PIC6 SIDE VIEW



J1: USB
J5: USB Connector
J6: LEN Connector
J7: CCN Connector
J8: BACnet MS/TP or Modbus RTU
(Phoenix 1757035 - not factory supplied)
J9: RNET
J10: RS485, Modbus/RTU Comm to VFD Starter
J11: USB
J14: Power Supply Connector (24 VAC)
J15:Ethernet Connector (Port 0, default
IP 169.254.1.1, mask 255.255.0.0).
BACnet/IP or Modbus TCP/IP.
J16:Ethernet Connector (Port 1, default
IP 192.168.100.100, mask 255.255.255.0)

NOTES:
1. BACnet is a trademark of ASHRAE.
2. Either BACnet/MSTP or BACnet/IP can be enabled and either Modbus/RTU or Modbus/TCP/IP can be enabled. Controller does not allow both to be enabled at the same time.
3. Modbus RTU can be configured simultaneously with BACnet IP.
4. BACnet MS/TP can be configured simultaneously with Modbus TCP/IP.

Fig. 1 — PIC6 Connectors

1. Modbus is a registered trademark of Schneider Electric.

SIOB/IOB

Power for the Starfire 2 Input/Output Board (SIOB) and the modular Input/Output Boards (IOBs) are supplied from a 24 VAC supply reference to earth ground. Both an SIOB and an IOB board are necessary for proper control of the 19MV chiller, but the input/output boards can be expanded with IOB3 and IOB4 for more options.

IOB CONFIGURATION

The boards can be configured for different types of input/output. If a an input or output type is supported for the specific channel then it can be modified in the Configuration Menu as shown in Table 1. IOB configuration pertains to both SIOB and IOB boards.

Table 1 — IOB Configuration

ANALOG INPUT	
0	Disable
1	0 to 5 VDC
2	4 to 20 mA
3	10 kΩ (thermistor)
4	5 kΩ (thermistor)
5	Ohm (resistance)
6	100 Ohm RTD

ANALOG OUTPUT	
0	Disable
1	4 to 20 mA
2	0 to 10 VDC

BOARD CONFIGURATION AND WIRING

The input/output points listed in Tables 2-5 are available as identified, either at the specific channel listed for the board or, in some cases, run to a terminal block for easy customer connection. Some are available only if the unit is operating in Remote mode. Figures 2-6 show 19MV wiring diagrams. Figures 7-15 show additional control wiring and additional components.

Table 2 — 19MV3 SIOB Connections

DESCRIPTION	CHANNEL	TERMINAL	TYPE	OPTIONAL
Expansion Control System Valve (output)	AO01	4TB-1	0-10 VDC	—
Entering Chilled Water Temperature	AI01	J25-1,2	5 k	—
Leaving Chilled Water Temperature	AI02	J25-3,4	5 k	—
Entering Condenser Water Temperature	AI03	J25-5,6	5 k	—
Leaving Condenser Water Temperature	AI04	J25-7,8	5 k	—
Evaporator Refrigerant Liquid Temperature	AI05	J25-9,10	5 k	—
Auto Demand Limit Input	AI10	J9-2,1 (4TB-18, 19)	4-20 mA	Yes
Chiller Run Status	DO08	J7-6 (4TB-13, T1_N)	24 VAC	Yes, NO (dry contact)
Condenser Pressure	AI07	J19-1,2,3	5 VDC	—
Evaporator Pressure	AI08	J20-1,2,3	5 VDC	—
Economizer Pressure	AI09	J21-1,2,3	5 VDC	—
Evaporator Water Flow Switch	DI01	J1-1,2 (4TB20, 21)	24 VAC	Yes; closed indicates flow
Condenser Water Flow Switch	DI02	J1-3,4 (4TB22,23)	24 VAC	Yes; closed indicates flow
Emergency Stop Status	DI03	J1-5,6	24 VAC	—
Chiller Lockout Input	DI05	J34-1 (4TB-2,3)	24 VAC	Yes, NO (dry contact); closed indicates Lockout condition
Remote Contact Input	DI06	J3-1,2 (4TB-4,5)	24 VAC	Yes, NO (dry contact); closed indicates run condition
Remote Emergency Stop Input	DI07	J3-3,4 (4TB-6,7)	24 VAC	Yes, NO (dry contact); closed indicates E-Stop condition
Ice Build Contact	DI08	J3-5,6 (4TB-8,9)	24 VAC	Yes, NO (dry contact)
Economizer EXV	STRIP2	J18-2,3,4,5 (3TB-1,2,3,4)	12 VDC	Yes
Condenser EXVs	STRIP1	J17-2,3,4,5 (3TB5-6,7-8, 9-10, 11-12)	12 VDC	—
Chiller Alarm Relay	DO03	J6-2 (4TB-12)	24 VAC	Yes, NO (Dry Contact). Field Wire to 4TB-30,31

LEGEND
EXV — Electronic Expansion Valve
IOB — Input/Output Board
NO — Normally Open

Table 3 — 19MV IOB2 Connections

DESCRIPTION	CHANNEL	TERMINAL	TYPE	OPTIONAL
Expansion Control System Valve (feedback)	AIN11	J10-1,7 (4TB-36, T2_N)	0 to 10 Vdc	—
Motor Winding Temperature 1	AIN1	J16-1,5	5 k	—
Economizer Gas Temperature	AIN4	J16-4,8	5 k	Yes
Condenser Liquid Level	AIN3	J16-3,7 (5 VDC J10-8)	5 VDC	—
Guide Vane 2 Actual Position	AIN5	J15-6,12	4 to 20 mA	—
Guide Vane 1 Actual Position	AIN6	J15-5,11	4 to 20 mA	—
Compressor Discharge Temperature	AIN7	J15-4,10	5 k	—
Motor Winding Temperature 2	AIN8	J15-3,9	5 k	—
Refrigerant Leak Sensor	AIN9	J15-2,8 (4TB-37,38)	4 to 20 mA	Yes
Auto Water Temperature Reset	AIN10	J15-1,7 (4TB-39,40)	4 to 20 mA	Yes
Guide Vane 1 Analog Output	AO1	J14-1,4	4 to 20 mA	—
Head Pressure Output	AO2	J14-2,5 (4TB-41,42)	4 to 20 mA	Yes
Guide Vane 2 Analog Output	AO3	J14-3,6	4 to 20 mA	—
Spare Safety	DI1	J13-1,5 (4TB-43,44)	24 VAC	Yes
High Pressure Switch	DI3	J13-3,7 (4TB-45,46)	24 VAC	—
Chiller Water Pump	K1O	J12-6,7	24 VAC	Field connections are terminal 11,14 on CDWP relay
Condenser Water Pump	K2O	J12-9,10	24 VAC	Field connections are terminal 11,14 on CDWP relay
VFD Run/Stop Interlock	K3O	J12-1,2 (4TB-47)	24 VAC	—
Surge Proximity	K4O	J12-4,5 (4TB-48)	5 k	—

Table 4 — 19MV IOB3 Connections (Optional)

DESCRIPTION	CHANNEL	TERMINAL	TYPE	OPTIONAL
Head Pressure Output 2	AO2	J14-2,5 (3TB-13,14)	4 to 20 mA	Yes

Table 5 — 19MV IOB4 Connections (Optional Input/Output Board)

DESCRIPTION	CHANNEL	TERMINAL	TYPE	OPTIONAL
Common Chiller Water Supply Temperature	AIN1	J16-1,5 (4TB -15,16)	5 k	Yes
Common Chiller Water Return Temperature	AIN2	J16-34,35 (4TB-34,35)	5 k	Yes
Entering Evaporator Water Pressure	AIN3	J16-3,7 (3TB-17,18, 5VDC J-11-1 3TB-16)	5 VDC	Yes
Leaving Evaporator Water Pressure	AIN4	J16-4,8 (3TB-20,21, 5VDC J-11-2 3TB-19)	5 VDC	Yes
Entering Condenser Water Pressure	AIN5	J15-6,12 (3TB-23,24, 5VDC J-11-3 3TB-22)	5 VDC	Yes
Leaving Condenser Water Pressure	AIN6	J15-5,11 (3TB-26,27, 5VDC J-11-4 3TB-25)	5 VDC	Yes
Remote Reset Temperature	AIN7	J15-4,10 (3TB-28,29)	5 k	Yes
Evaporator Water Flow Measurement	AIN8	J15-3, 9, (3TB-30,31)	4 to 20 mA	Yes
Condenser Water Flow Measurement	AIN9	J15-2, 8, (3TB-32,33)	4 to 20 mA	Yes
Tower Fan High	K3O	J12-2	24 VAC	Yes, NO (dry contact); field connection 3TB-50 and 4TB-T1_24V terminal 11, 14 of the TFR_HIGH relay
Tower Fan Low	K4O	J12-5	24 VAC	Yes, NO (dry contact); field connection 3TB-51 and 4TB-T1_24V terminal 11, 14 of the TFR_LOW relay
Fire Security Interlock	DI1	J13-5,1 (3TB-41,40)	24 VAC	Yes, NO (dry contact)
Customer Alert	DI3	J13-7,3 (3TB-45,44)	24 VAC	Yes, NO (dry contact)

LEGEND
IOB — Input/Output Board
NO — Normally Open

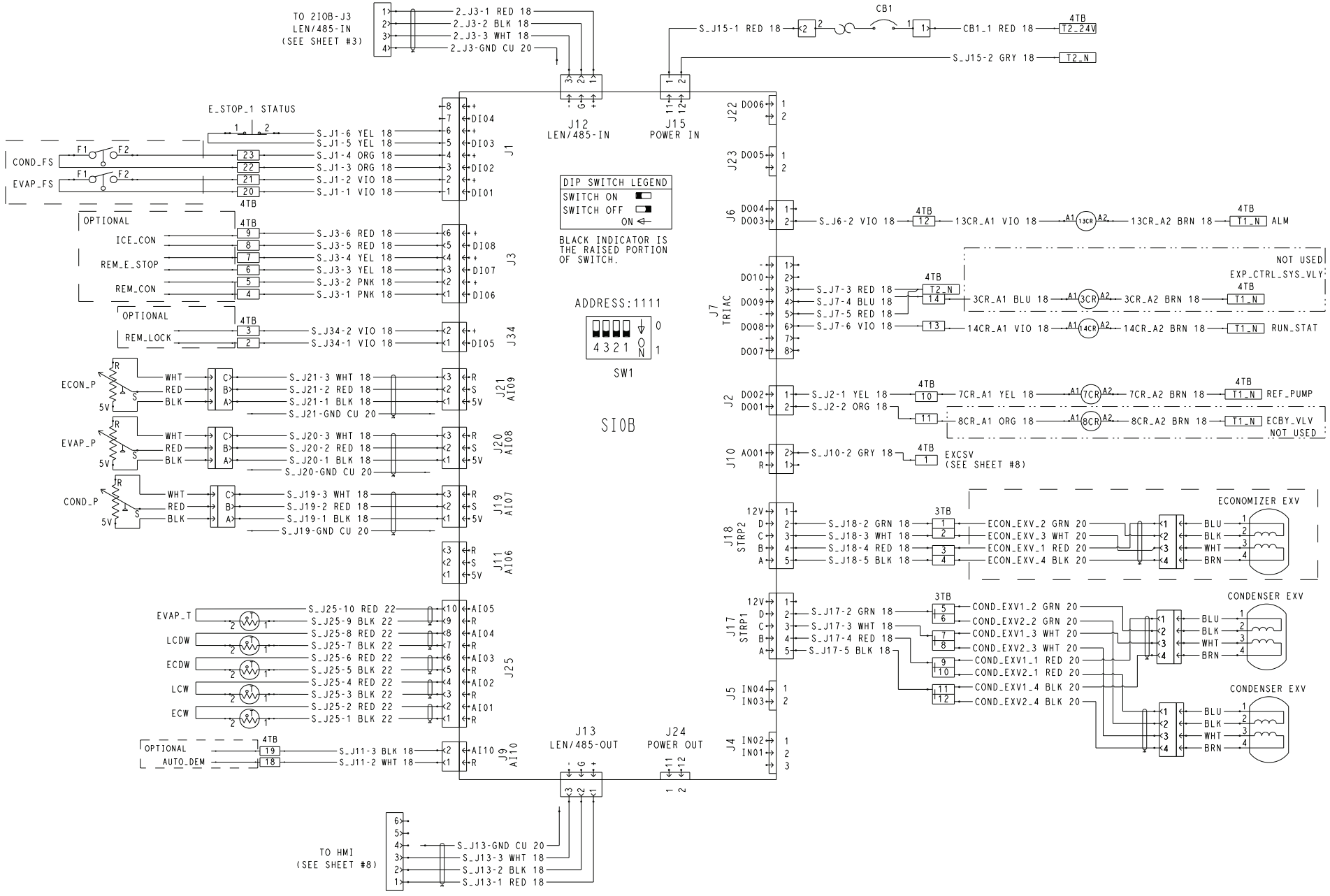


Fig. 2 — 19MV SIOB

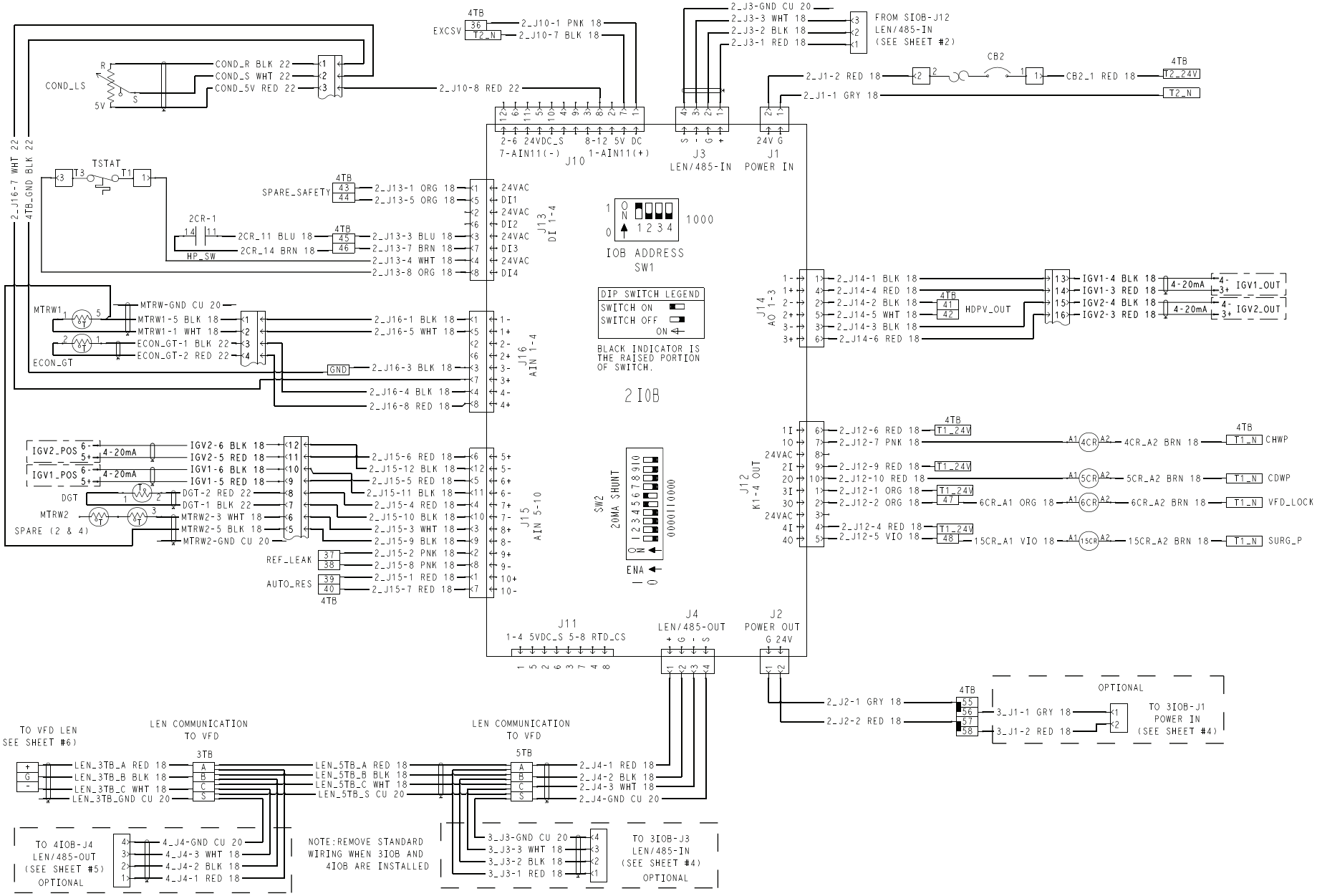


Fig. 3 — 19MV IOB2

OPTIONAL

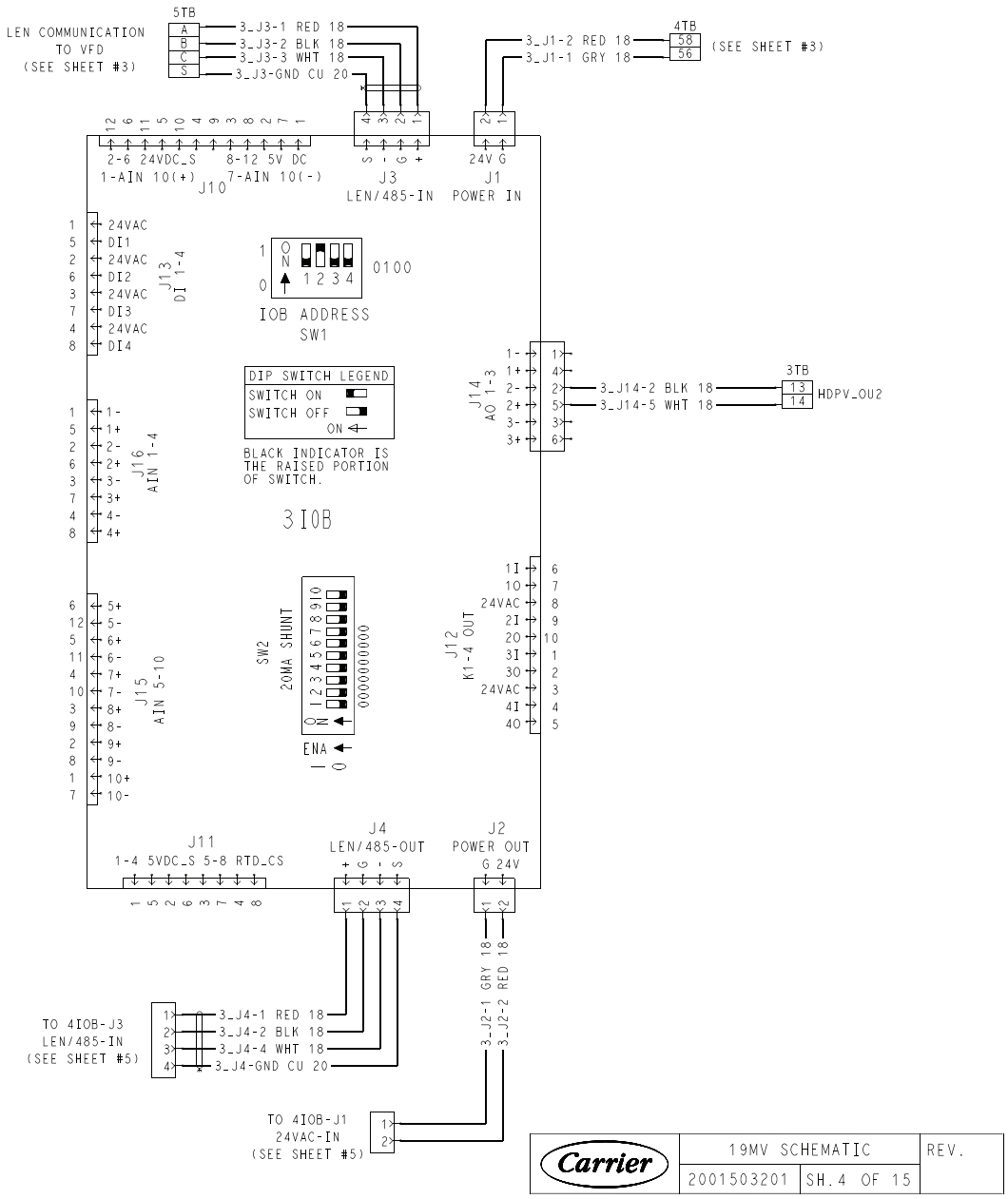


Fig. 4 — 19MV IOB3

OPTIONAL

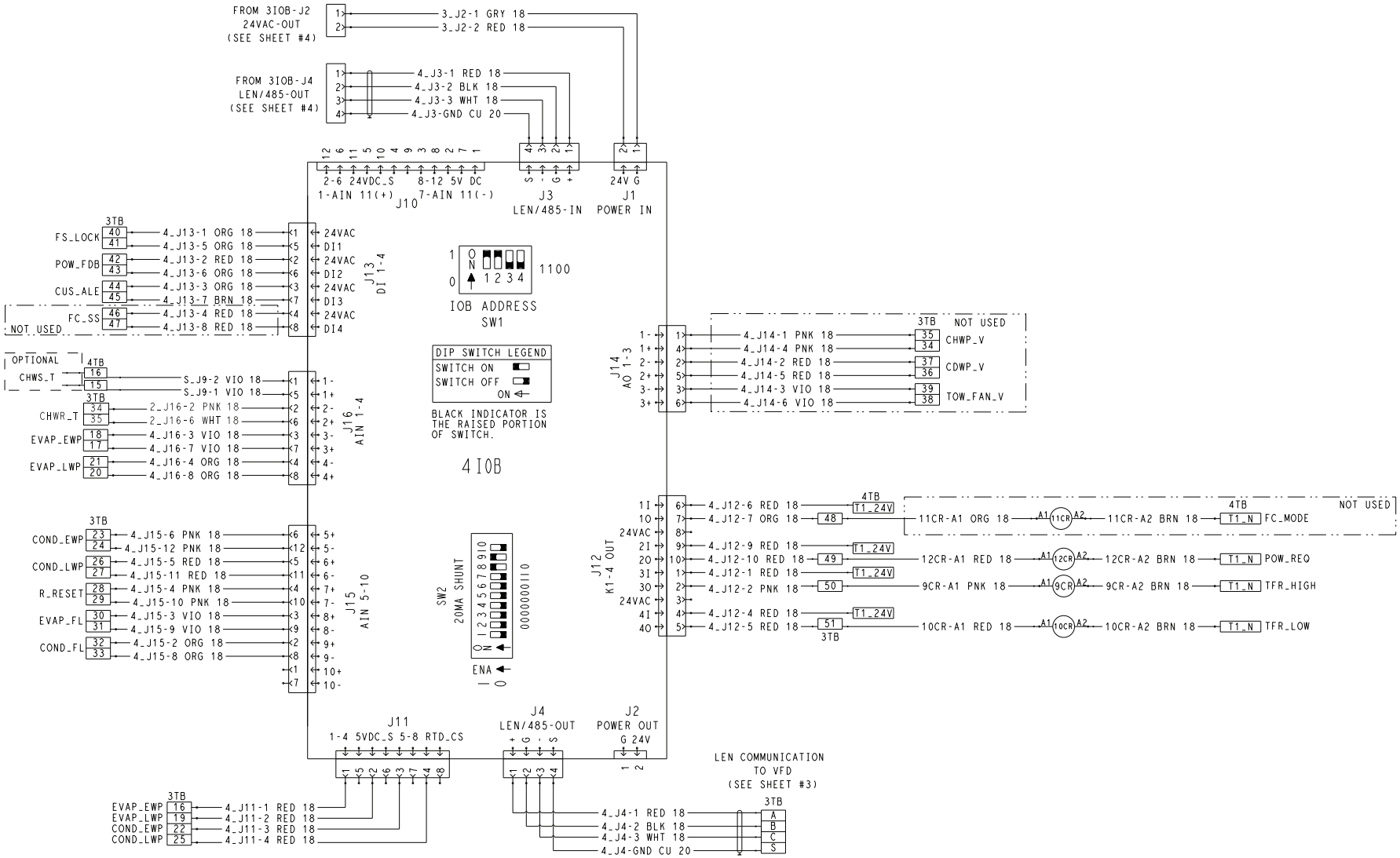


Fig. 5 — 19MV IOB4

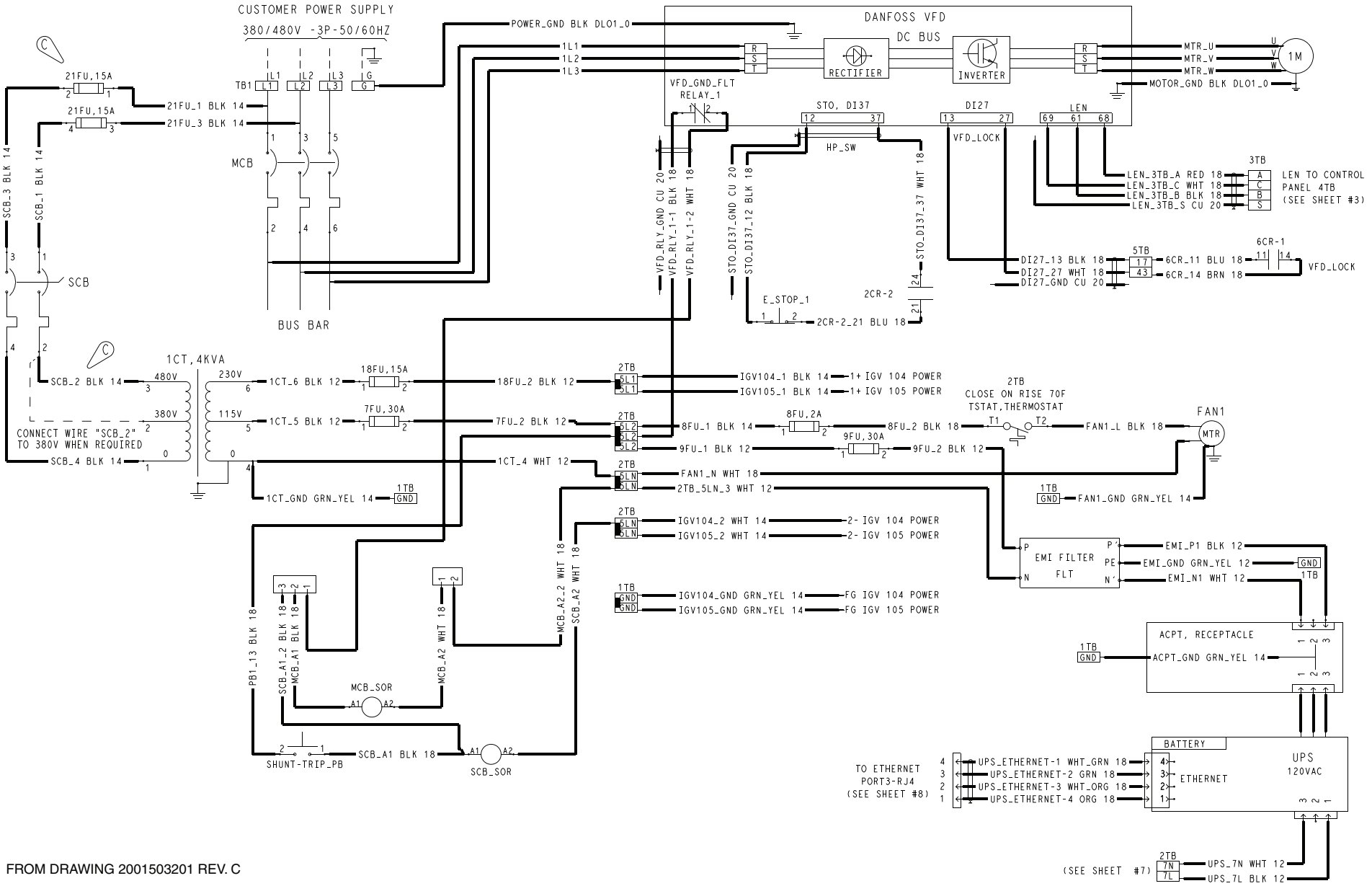


Fig. 6 — Customer Power Supply and Danfoss VFD Wiring

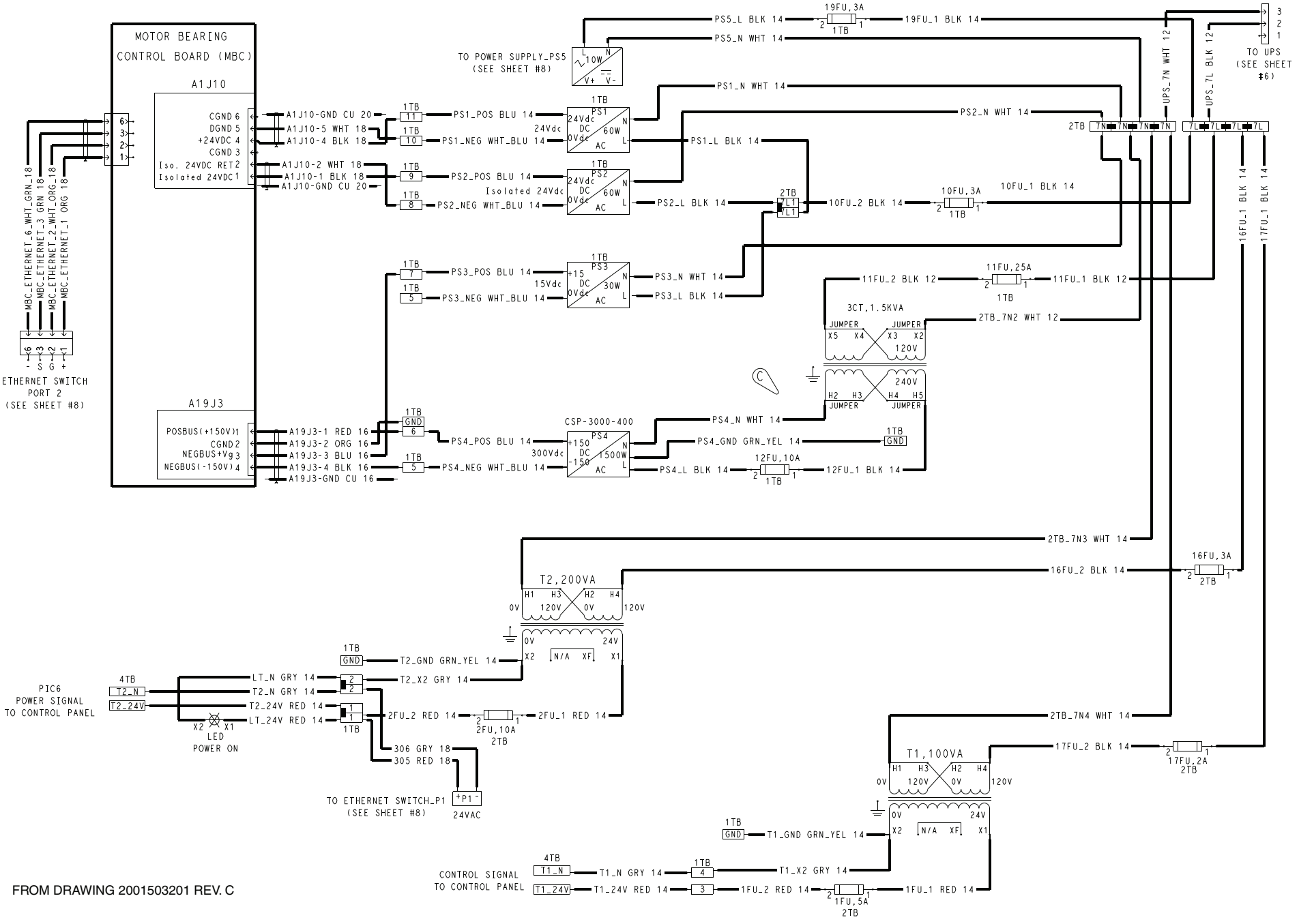
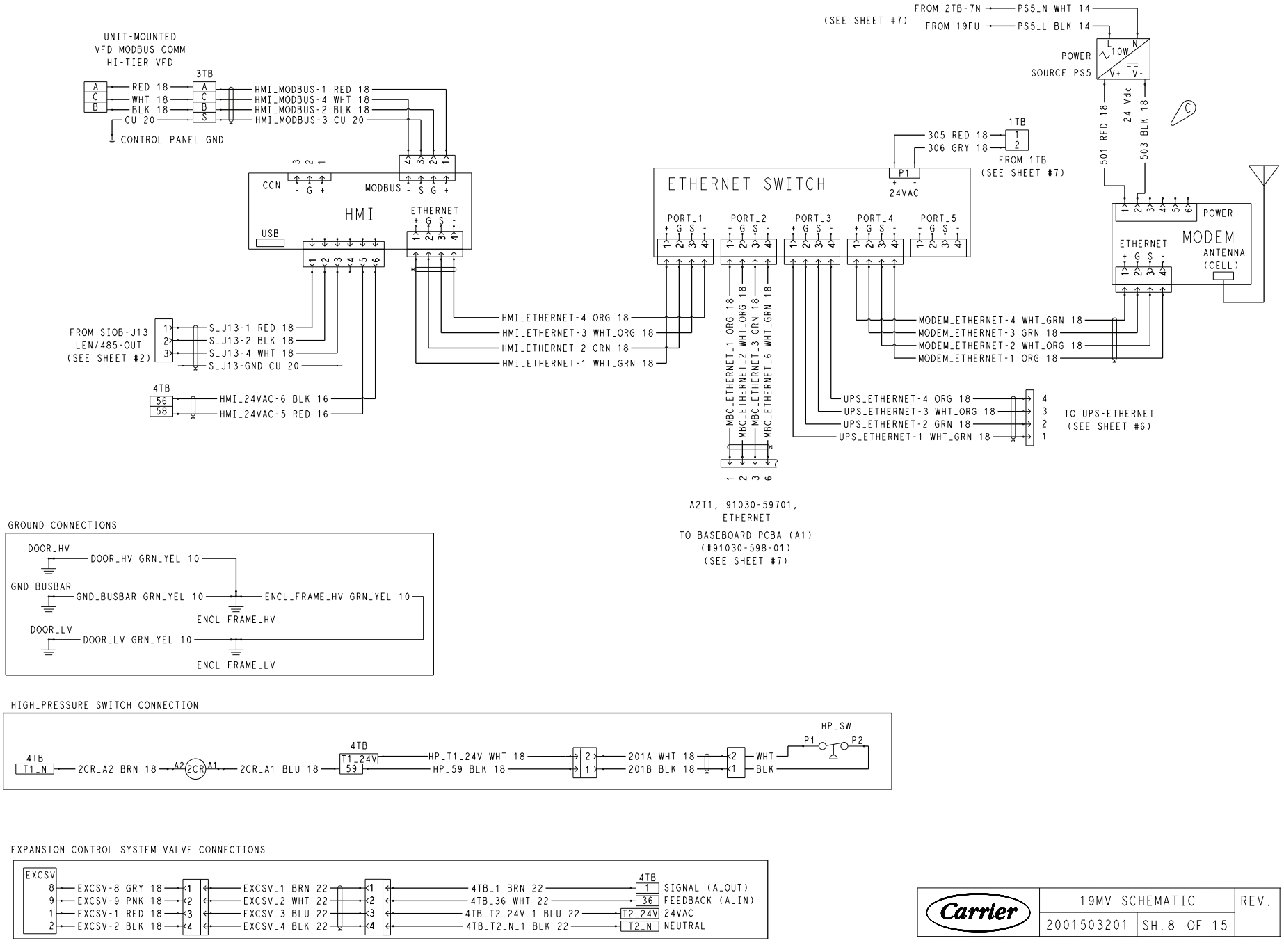


Fig. 7 — Motor Bearing Control Board Wiring



Carrier	19MV SCHEMATIC	REV.
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Fig. 8 — HMI and Ethernet Switch Wiring

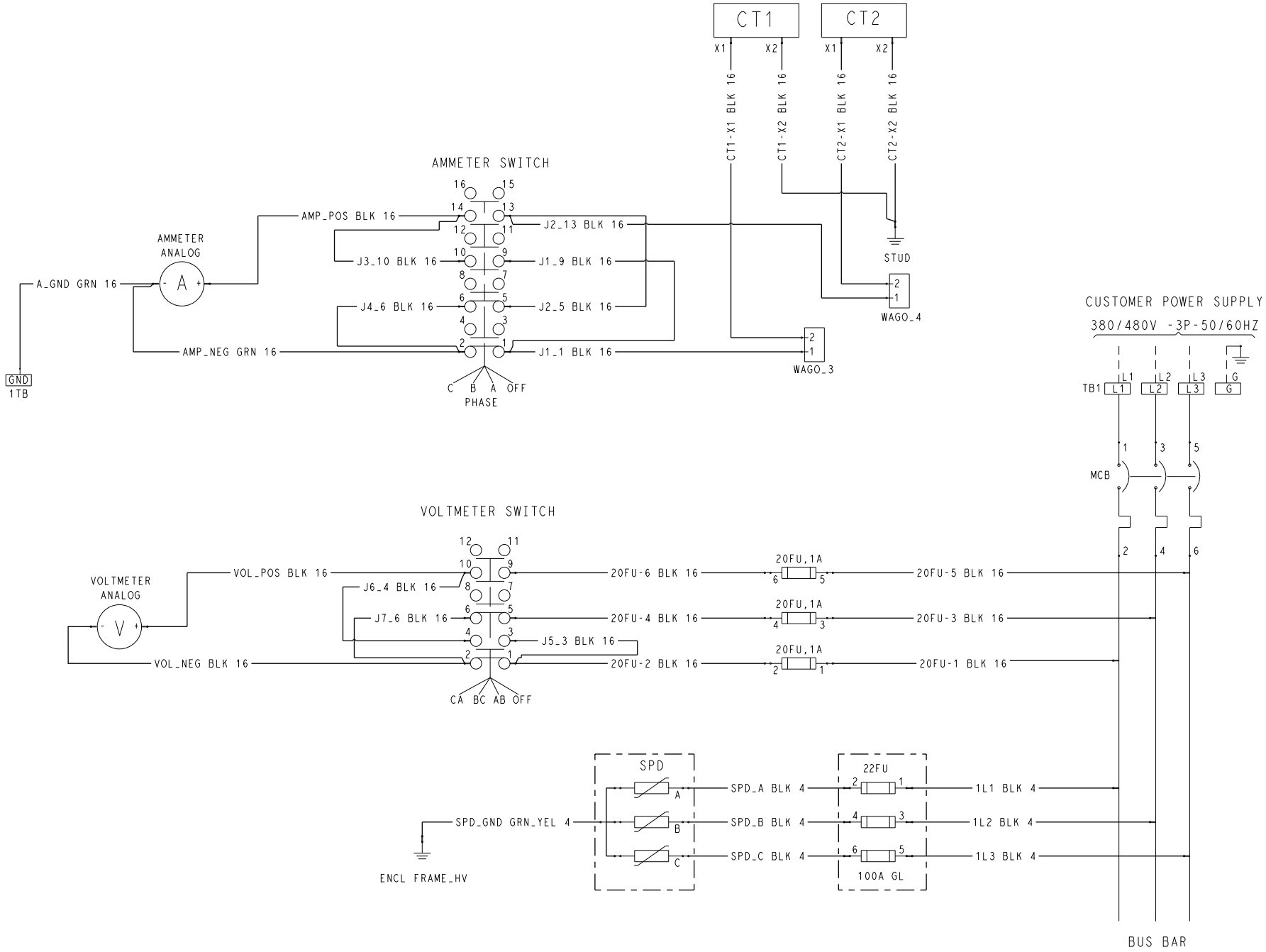


Fig. 9 — Ammeter Switch and Voltmeter Switch Wiring

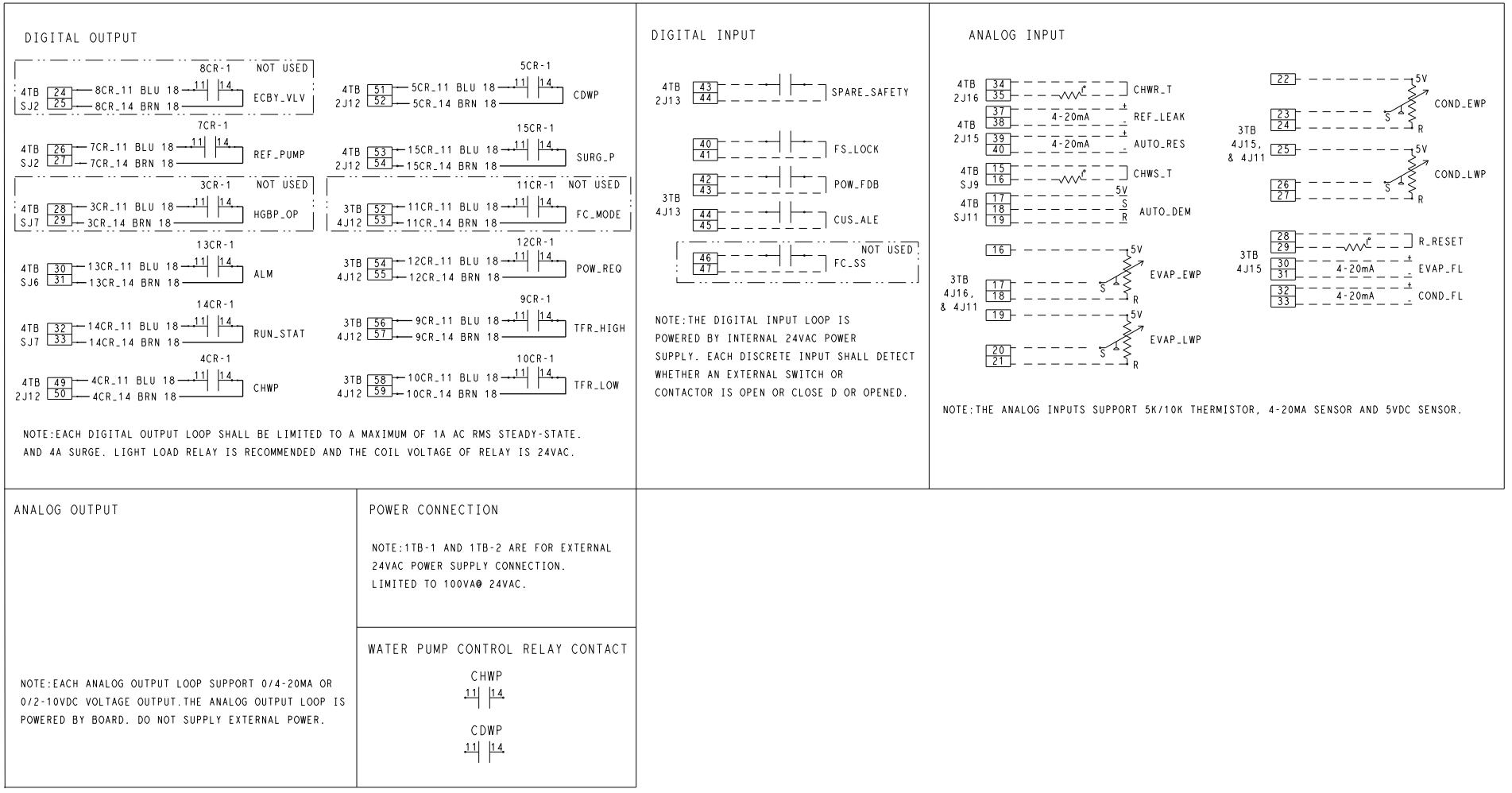


Fig. 10 — Field Wiring

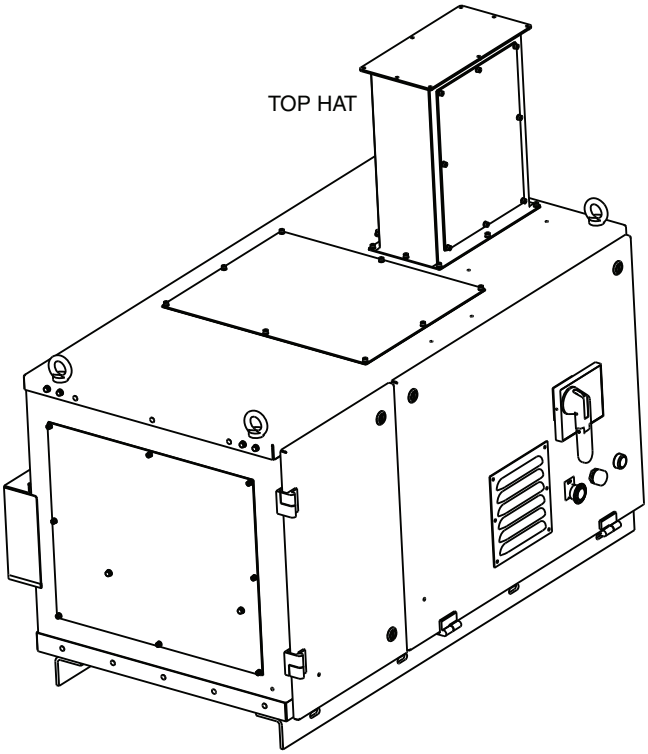


Fig. 11 — 19MV3 Power Control Panel, Isometric View

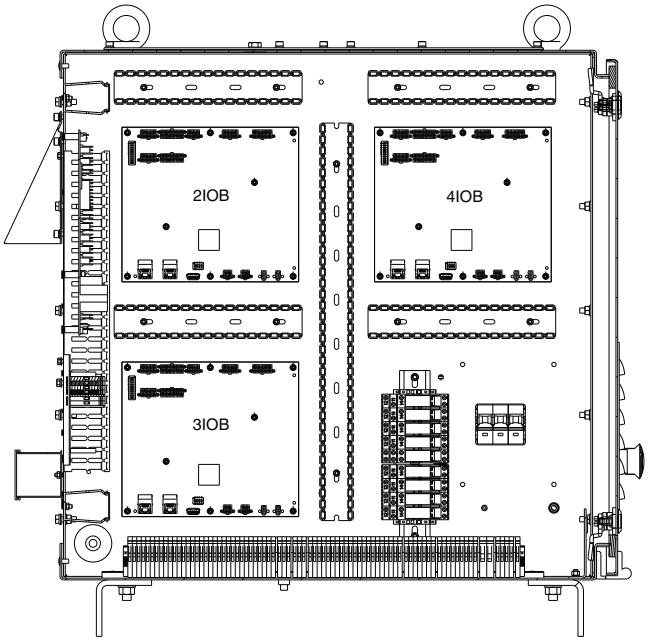
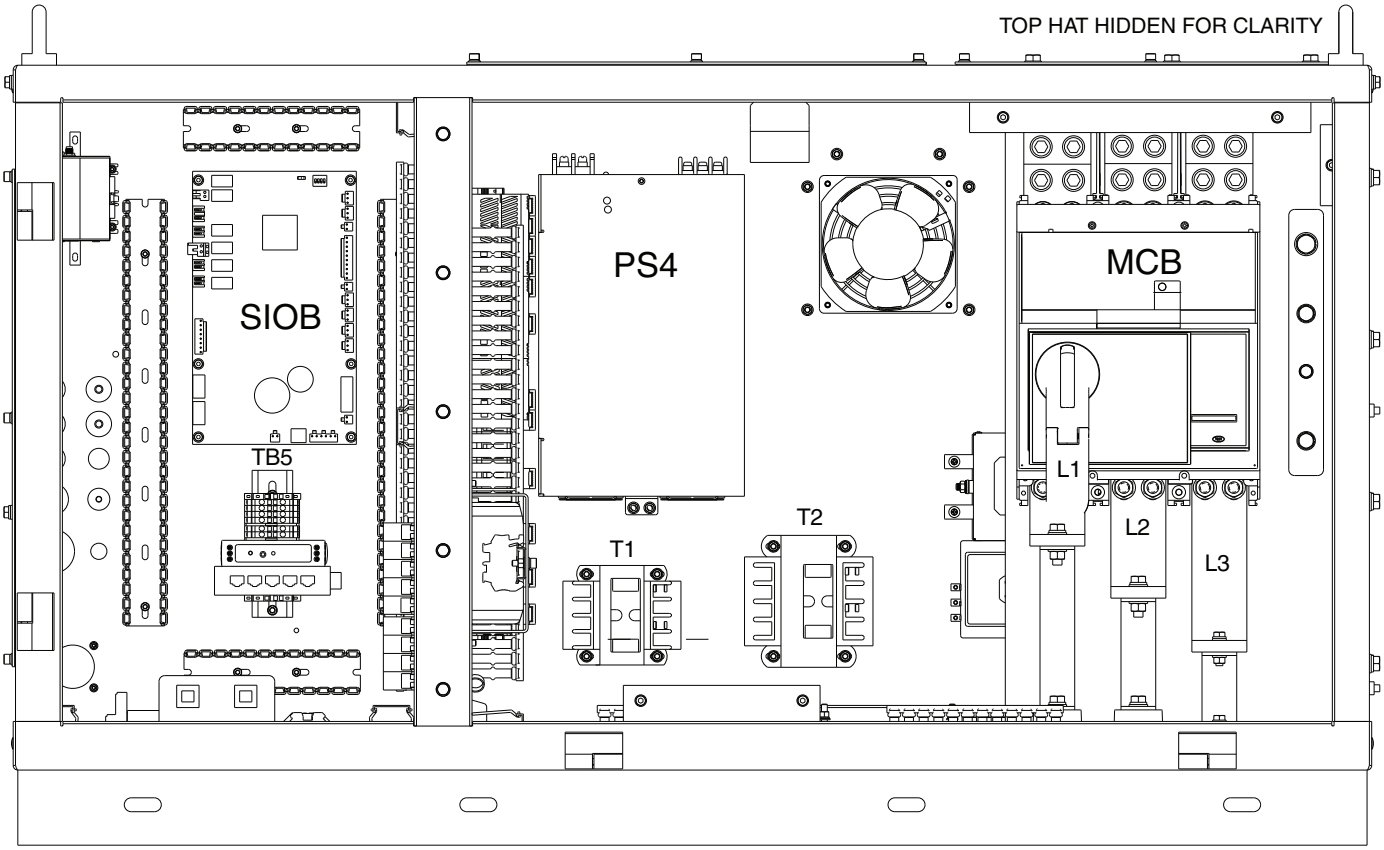
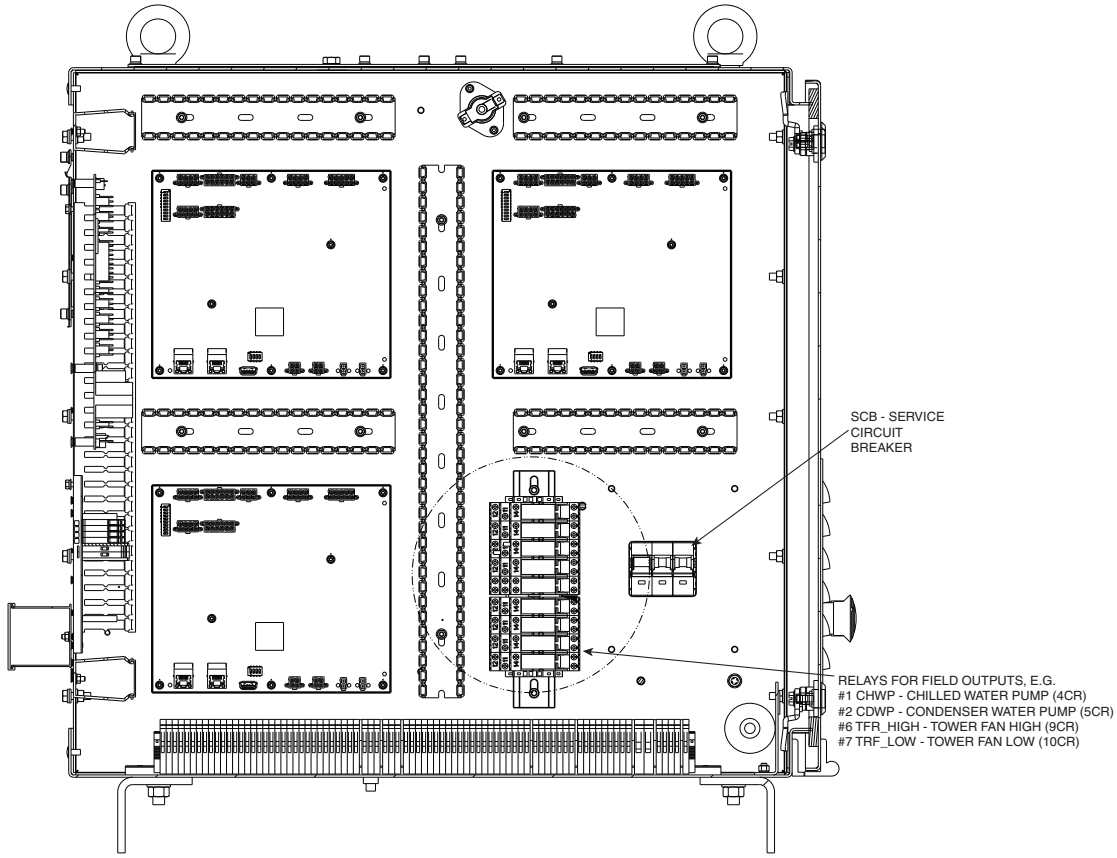


Fig. 12 — 19MV3 Control Panel Layout



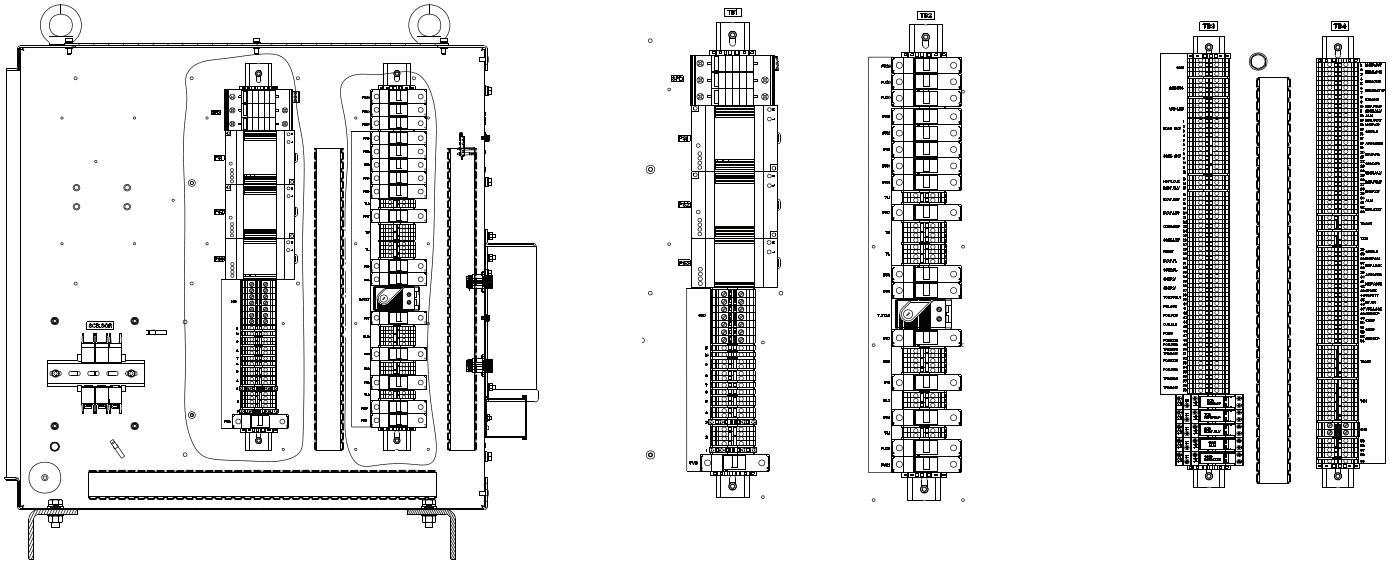
NOTE: UPS hidden for clarity.

Fig. 13 — 19MV3 Power Control Panel Layout



NOTE: Some components hidden for clarity.

Fig. 14 — Right Side Wall of 19MV Control Panel, IOB Layer



NOTE: Some components hidden for clarity.

Fig. 15 — 19MV Control Panel, Bottom Layer

Communication Cables

The communication transmission cables have the following electrical characteristics:

- 2 signal conductors and one ground conductor of 22 AWG or larger, 100% shielded
- One tinned copper braid (65% coverage)

The cable recommended for RS-485 communication is Belden 3106A. For other types of communication such as low voltage analog signals, low voltage control, and general panel wiring, the following cables are recommended:

USAGE	CABLE
Intra-Building	Belden 8772
High Temperature	Belden 85240
Plenum	Belden 89418

To avoid potential interference, route communication cables and other low voltage cables as far away as possible from high voltage cable and other likely disturbances. Always separate communication cables from other cables and always run wiring as directly as possible.

BOARD LAYOUTS

Dip switch SW1 controls the board address. If a board is replaced ensure same address is configured as prior. If board is of IOB type, both SW1 and SW2 have to be set, while for SIOB only SW1 has to be verified to be set at 0000. Dip switch SW2 has to be set depending on AI input type. A channel has to be configured ON if signal in is 4-20 mA. See Fig. 16 and 17.

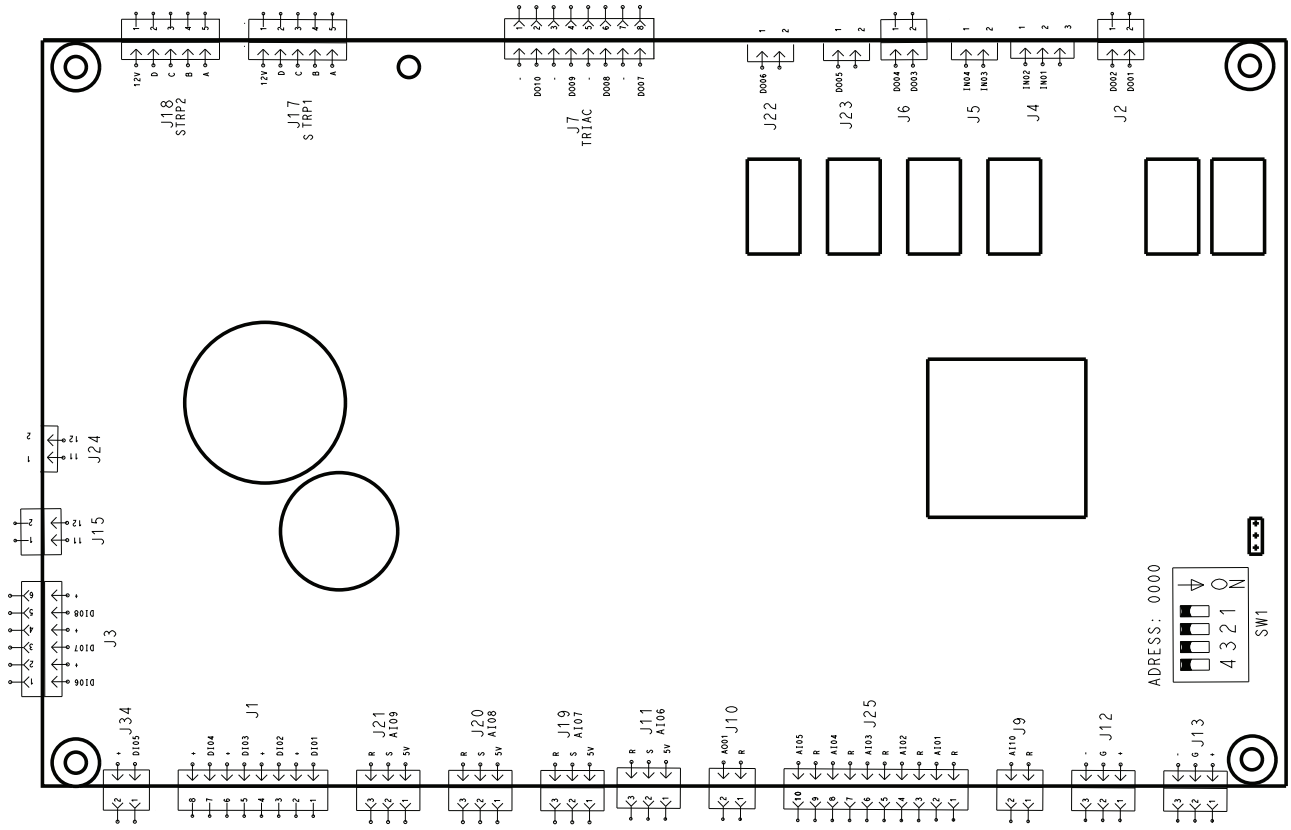


Fig. 16 — SIOB Board

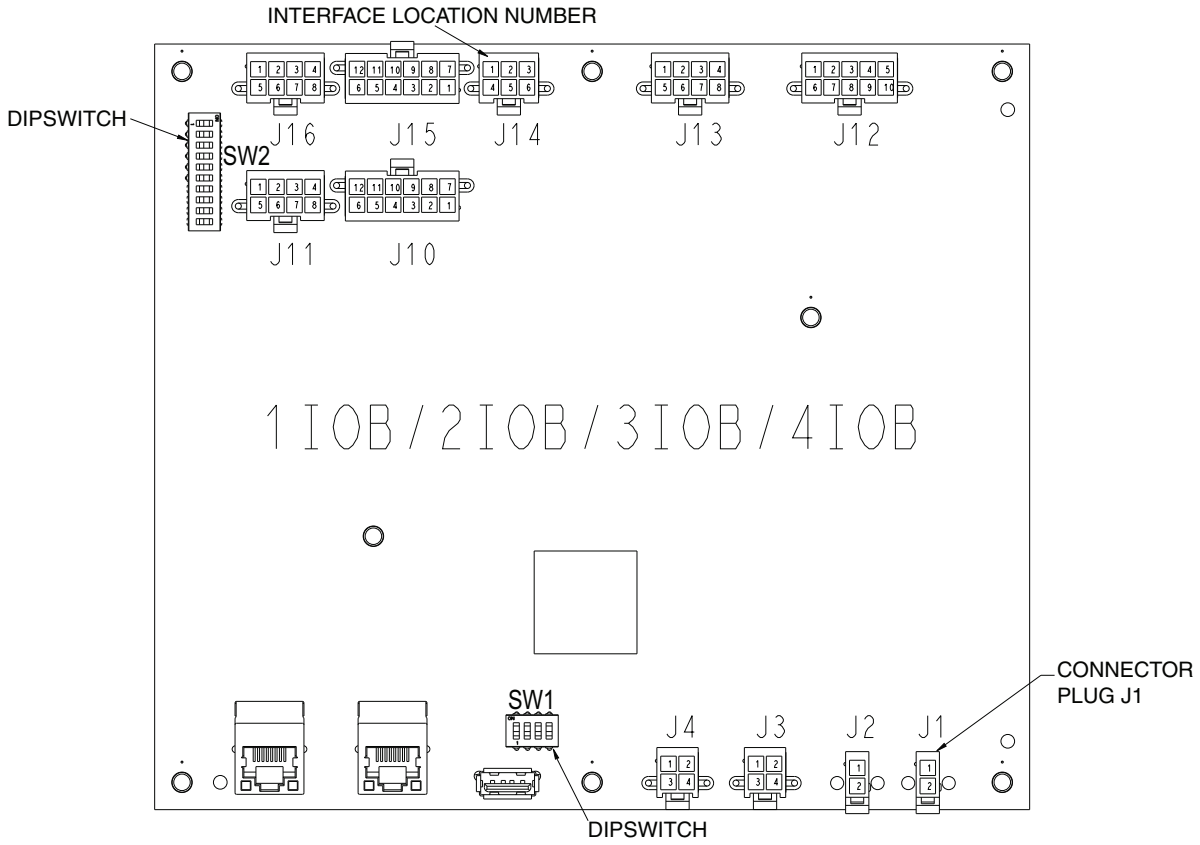


Fig. 17 — IOB Board

Sensors

PRESSURE TRANSDUCERS

Pressure transducers measure the pressures in the unit. These electronic sensors deliver 0 to 5 VDC. The transducers can be calibrated through the controller. The pressure transducers are connected to the PCBs. See Table 6.

Table 6 — Pressure Transducers

PRESSURE TRANSDUCER	PURPOSE
Evaporator	Measure evaporator pressure
Condenser	Measure condenser pressure
Economizer	Measure economizer pressure (if economizer)
Evaporator Water Pressure Difference	(Optional) Measure pressure difference between entering and leaving water
Condenser Water Pressure Difference	(Optional) Measure pressure difference between entering and leaving water
Evaporator Entering Water	(Optional) Measure pressure of evaporator entering water
Evaporator Leaving Water	(Optional) Measure pressure of evaporator leaving water
Condenser Entering Water	(Optional) Measure pressure of condenser entering water
Condenser Leaving Water	(Optional) Measure pressure of condenser leaving water

TEMPERATURE SENSORS

The system uses electronic sensors to measure and control the temperatures in the unit. Controller supports three types of temperature sensors: 5K thermistor, 10K thermistor, and RTD (resistance temperature detector, 100 ohm, 3-wire) based on IOB channel configurations. The temperature sensor range is –40°F (–40°C) to 245°F (118°C). See Table 7.

Table 7 — Temperature Sensors

TEMPERATURE SENSOR	PURPOSE
Entering Chilled Water	Measure entering evaporator water temperature
Leaving Chilled Water	Measure leaving evaporator water temperature
Entering Condenser Water	Measure entering condenser water temperature
Leaving Condenser Water	Measure leaving condenser water temperature
Evaporator Refrigerant Liquid	Measure evaporator refrigerant liquid temperature
Compressor Discharge	Measure compressor discharge temperature
Motor Winding 1	Sensor(s) measure the first stage winding temperature of each phase of the compressor motor
Motor Winding 2	Sensor(s) measure the second stage winding temperature of each phase of the compressor motor
Common Chilled Water Return Temp	Measures return liquid temp if common sensor is enabled. Typically used for lead/lag control.
Common Chilled Water Supply Temp	Measures leaving liquid temp is common sensor is enabled. Typically used for lead/lag control.
Compressor Discharge Temp	Compressor discharge
Economizer Gas Temp (option)	Measures gas temperature going to the compressor.

MBC Sensors

The active magnetic bearing system comes equipped with sensors to monitor component temperature, position, and shaft speed. The outputs of these sensors are communicated from the MBC to the PIC6 via Modbus communication and used to monitor the operation of the compressor and bearings, and raise alerts and alarms if necessary. See Table 8.

The MBC bearing system consist of two radial bearings and one thrust bearing. Bearing J is the first stage radial bearing. Bearing H is the thrust bearing, which is located at the first stage. The second stage radial bearing is referred to as bearing K.

MBC contains calibration data, clearance check and drop counter information which are interfaced with PIC6. To access MBC detail operational information, factory access level is required.

Table 8 — MBC Sensor

MBC SENSOR	PURPOSE
J Average Position X	Monitor average position of J radial magnetic bearing in the X direction
J Average Position Y	Monitor average position of J radial magnetic bearing in the Y direction
H Average Position	Monitor average position of H thrust bearing
K Average Position X	Monitor average position of K radial magnetic bearing in the X direction
K Average Position Y	Monitor average position of K radial magnetic bearing in the Y direction
J Bearing Coil Temp	Measure temperature of J radial bearing coil
H Outboard Coil Temp	Measure temperature of H bearing coil
H Inboard Coil Temp	Measure temperature of H bearing coil
K Bearing Coil temp	Measure temperature of K radial bearing coil
Coldplate Temp	Measure temperature of MBC coldplate
Rotational Shaft Speed	Measure rotational speed of motor shaft in rpm

Controls Outputs

EVAPORATOR/CONDENSER WATER PUMP

The chiller must be able to establish cooler/condenser water flow either directly by hardwire or indirectly by chiller command to the building automation system. This is a requirement since the pumps contribute to the chiller's freeze and overpressure protection.

INLET GUIDE VANE

The inlet guide vane adjusts the refrigerant vapor flow into the compressor to adapt to change in the operating conditions of the machine. To adjust the refrigerant flow, the guide vane opens or closes to vary the cross-section of the refrigerant path. The high degree of accuracy with which the guide vane is positioned ensures that the flow of refrigerant is precisely controlled. The inlet guide vane for stage 2 is linked to the position of stage 1 IGV.

ECONOMIZER EXV

The economizer EXV lowers the pressure across one side of the BPHX, which allows the refrigerant flow diverted through the EXV and BPHX to boil prior to entering the compressor 2nd stage suction. The boiling is caused by the min hot condenser liquid flow through the other side of the BPHX and lowers the main flow's enthalpy.

MAIN EXV

The main EXV will control inlet flow going into the evaporator according to the load condition.

EXPANSION CONTROL SYSTEM VALVE

The expansion control system valve (EXCSV) will work as a complement to the main EXVs. When the main EXV signal approaches its upper limit, the expansion control valve will open (factory default is 80%). The valve will close when the EXV approaches its lower limit (factory default is 30%).

VFD

The VFD modifies motor frequency to allow compressor start-up and capacity control. The VFD controls continually monitor parameters to ensure compressor protection. Should a problem occur, the controller triggers an alarm and the compressor is stopped.

UPS

The UPS provides backup power to the MBC and PIC6 HMI in the case of a power loss event. This prevents potential damage to the motor shaft and auxiliary bearings due to unexpected delevitation at high speeds. The UPS communicates with the PIC via Modbus, and is able to relay battery health and status information.

PIC6 USER INTERFACE

The PIC6 Human Machine Interface (HMI) is a color 10.4-in. TFT touch screen. Navigation is either direct from the touch screen interface or by connecting to a web interface at the Ethernet IP port of the controller. The navigation menus are the same for both connection methods.

Web Connection

Two web connections may be active at the same time. When two users are connected simultaneously, there is no priority between users; that is, the last modification is in effect regardless of user.

Connection is from a personal computer using a Java-enabled web browser. See the section Settings for the Controller on page 48 for configuration instructions. The minimum browser configuration includes:

- Microsoft Internet Explorer (version 8 or higher) or Mozilla Firefox (version 3.5.2 or higher). In the advanced connection options, add the unit address to the address list. Do not use a proxy server.
- Java platform (version 6 or higher). In the control panel, deselect (uncheck) the option that allows storing temporary internet files and use a direct connection.

To access the PIC6 user interface, enter unit IP address in the web browser address bar. The IP address, Subnet Mask, and Gateway can be viewed or changed from the PIC6 interface. For more information on the web browser and Java platform configuration, see the Diagnostics and Troubleshooting section.

General Interface Features

ICONS

Table 9 shows general interface icons.

SCREENS

The Human Machine Interface includes the following screens:

- Home screen, which displays the main parameters
- Menu screens for navigation
- Data/configuration screens, which list the parameters by type
- Operating mode selection screen
- Password entry and language selection screen
- Parameter modification screen
- Time schedule screen
- Alarm screen

If the interface is not used for about 10 minutes, it goes into screen-saver mode and displays a black screen. However, the control is always active and the unit operating mode remains unchanged. When a user presses the black screen, the Home screen displays.

Table 9 — Interface Icons

ICON	MEANING
	Green: Indicates unit is running Gray: Indicates unit is off
	Home
	Main menu
	Indicates user is logged off
	Indicates user is logged in
	Gray: Indicates no alarm or alert is active Red: Indicates alarm or alert
	Back (not visible in main menu)
	Previous and next screen

Home Screen

The Home Screen (see Fig. 18) is displayed when the unit is switched on or when the user presses the screen when the interface has gone into screen-saver mode. The Home Screen displays the current software version number. To exit from this screen, press the Home icon .

System Overview (Home) Screen

Figure 18 shows the system overview screen. Press a component image to see current status. This screen is also displayed when the user presses the screen after the interface has gone into screen-saver mode. For details, see Status Display Screens on page 23.

Messages

The Set Point screen, On/Off screen, User Login screen, and Main Menu screens described in the next sections may display status messages at the bottom of the screen. See Table 10.

LEGEND
1 — Home Screen Access Button
2 — Back Button
3 — Main Menu Access Button
4 — Globe Button
5 — User Login Screen Access Button
6 — Unit Start/Stop Access Button
7 — Alarm Menu Access Button
8 — Condenser Pump Status (hydraulic system option is enabled)
9 — Condenser Water Inlet and Outlet Temperature
10 — Condenser Saturated Temperature and Pressure
11 — Guide Vane 2 Position Percentage
12 — Unit Capacity Percentage (motor load current percentage)
13 — Guide Vane 1 Position Percentage
14 — Eco EXV Status
15 — VFD Status
16 — Evaporator Pump Status (hydraulic system option is enabled)
17 — Evaporator Water Inlet and Outlet Temperature
18 — Evaporator Saturated Temperature and Pressure
19 — Set Point
20 — Main EXV Status

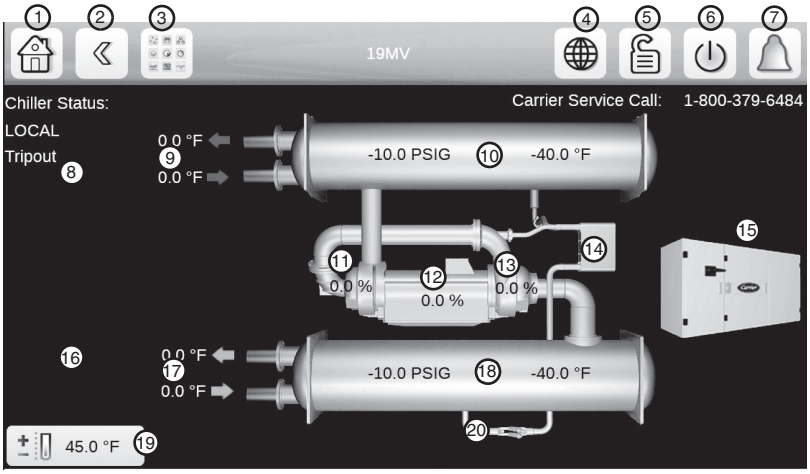


Fig. 18 — System Overview (Home) Screen

Table 10 — Status Messages

MESSAGE	STATUS
COMMUNICATION FAILURE!	Equipment controller did not respond while reading the table content.
ACCESS DENIED!	Equipment controller does not allow access to one of the table data blocks.
LIMIT EXCEEDED!	The value entered exceeds the table limits.
Save changes?	Modifications have been made. The interface waits to confirm exit; press Save or Cancel.
HIGHER FORCE IN EFFECT!	Equipment controller rejected a Force or Auto command because the interface force level is lower than that of the equipment controller.

Set Point Screen

The Set Point screen displays the current set point table. See Fig. 19. For more information about these settings, see the Set Point section on page 26.

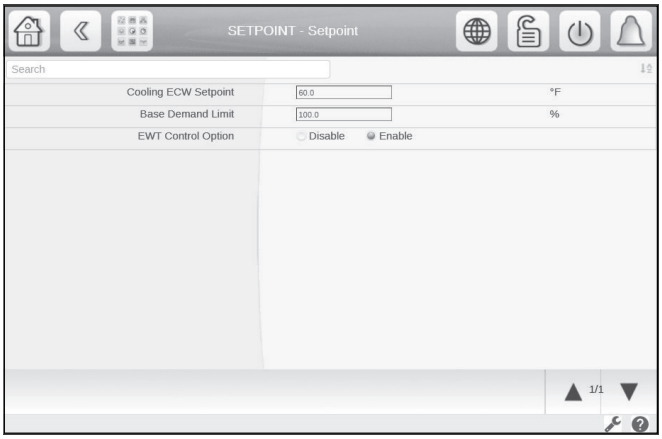


Fig. 19 — Set Point Screen

Unit Start/Stop Screen

The Unit Start/Stop screen allows the user to select the unit operating mode.

For unit start-up, with the unit in Local Off mode, press the gray Off icon ⏻ to display the list of operating modes. Select the required mode to start up the chiller. See Fig. 20.

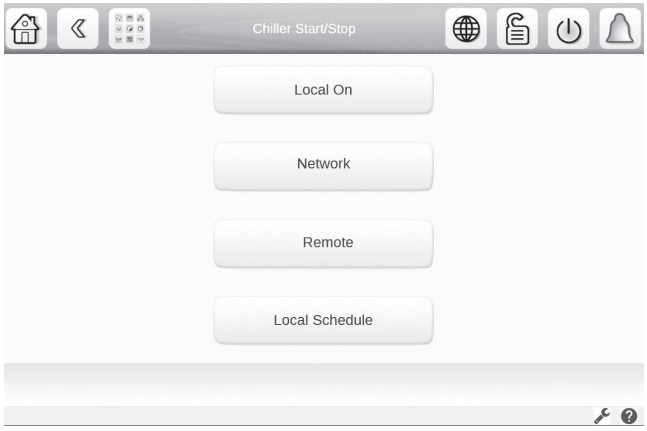


Fig. 20 — Unit Start/Stop Screen

When a start-up mode is selected, a status screen displays the progress of the start-up sequence (Fig. 21).

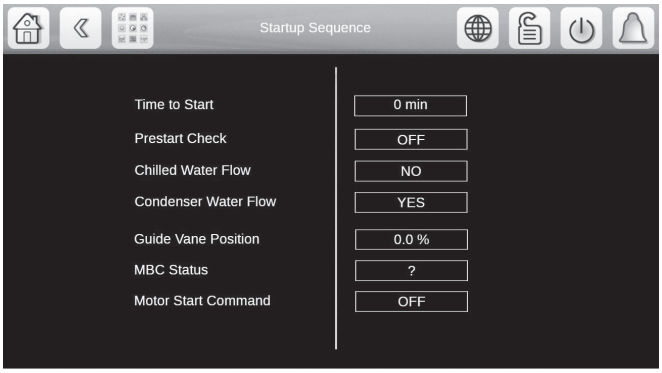


Fig. 21 — Start-Up Sequence Progress

To stop the unit, press the green On icon ⏻ . Then press Confirm Stop to stop the unit, or press the Back icon to cancel the stop and return to the previous screen. See Fig. 22.

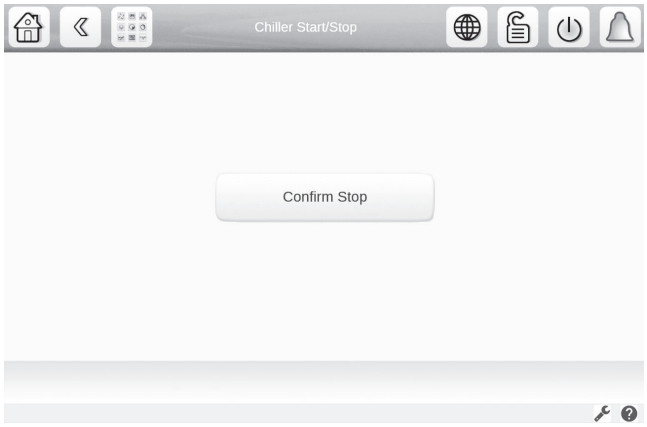


Fig. 22 — Confirm Stop

User Login Screen

Use this screen to login or log off and to set interface language and measurement system. See Fig. 23. There are three levels of password access:

- Basic access allows the user to view all data without a password.
- User access gives the user the additional ability to view and change many configuration settings, including set points and schedules. The default User password is 1111.
- Service access is obtained by entering Service Login password. This allows access to critical factory configuration settings.

Upon entering correct password, select green checkmark and the Login Level will be updated accordingly.

NOTE: Password is validated after user presses the log-in icon.

Fig. 23 — User Login Screen

Main Menu Screen

To access the Main Menu screen, press the Main Menu icon . Press the icons on the screen to access the appropriate table or menu. Press the arrows at the bottom right corner, if present, to navigate through pages of tables. The options shown on the Main Menu screen depend on the user's level of access. Figure 24 shows the Main Menu screen as it appears for the User level of access.

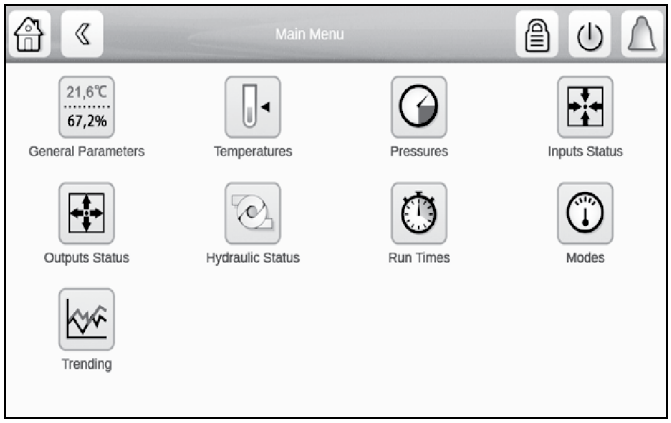


Fig. 24 — Main Menu Screen (User Access)

Configuration Screen

To access the Configuration menu, press the Configuration icon on page 2 of the Main Menu (User, Service, or Factory access level). The Configuration menu opens. Then press the General Configuration icon on the Configuration menu. Press the arrows at the bottom right corner to navigate through pages. See Fig. 25. (Certain configuration settings are available only for Service or Factory access levels.) Refer to Appendix A, page 57, for more information about Configuration options.

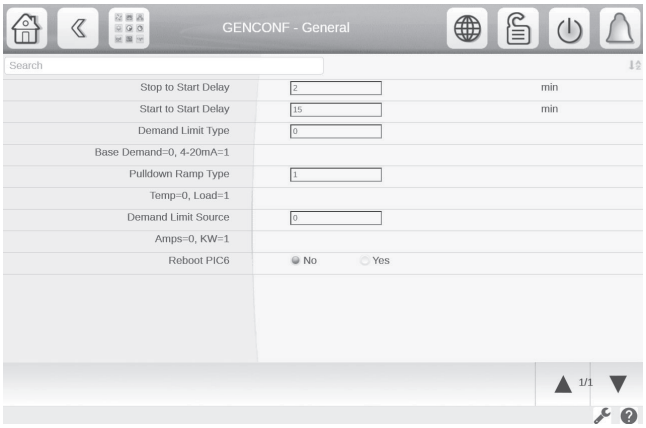


Fig. 25 — General Configuration Screen

After changing a value, press Return. The Save and Cancel icons are displayed. Press the Save icon to save the changed value. Figure 26 shows an example.

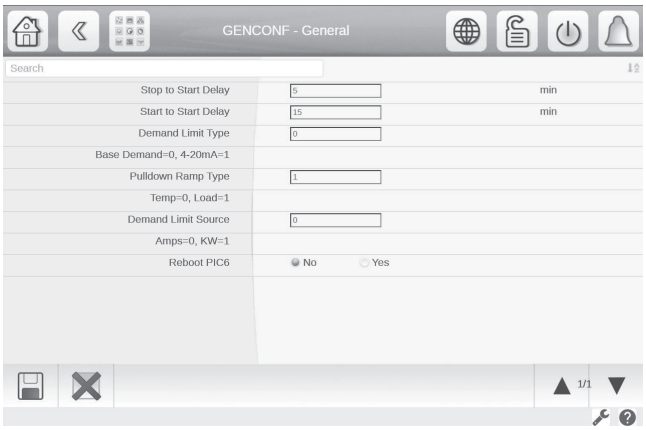


Fig. 26 — Saving a Change (General Configuration)

Schedule Menu Screen

To access the Schedule menu screen, press on the Configuration menu screen. Select Local Schedule, Ice Build Schedule, or Network Schedule as applicable. Press the arrows at the bottom right corner to navigate through the time periods. See Fig. 27.

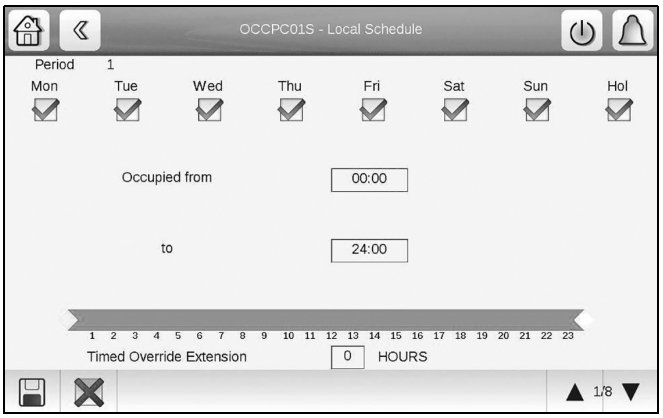


Fig. 27 — Local Schedule Menu Screen

Status Display Screens

Figure 28 shows the system status overview (home) screen. Press any component on the screen to see the status of that component. Press the arrows at the bottom right corner to navigate through the component status displays. Figures 29-38 show the component status displays.

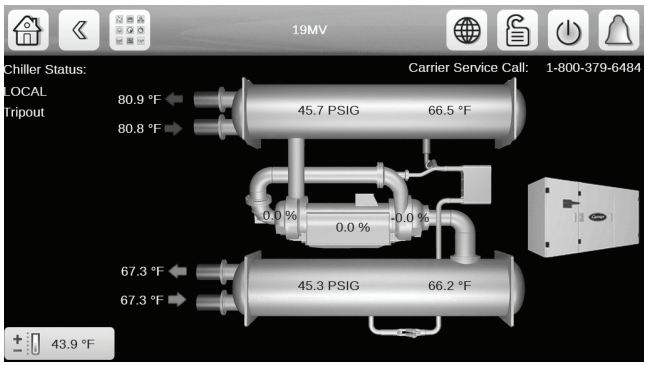


Fig. 28 — System Overview (Home) Screen

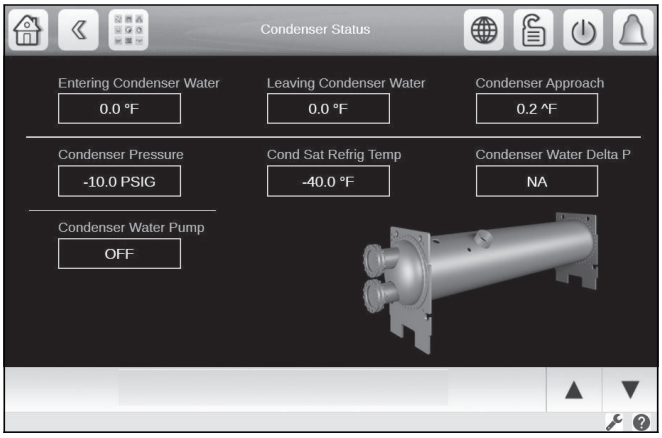


Fig. 29 — Condenser Status

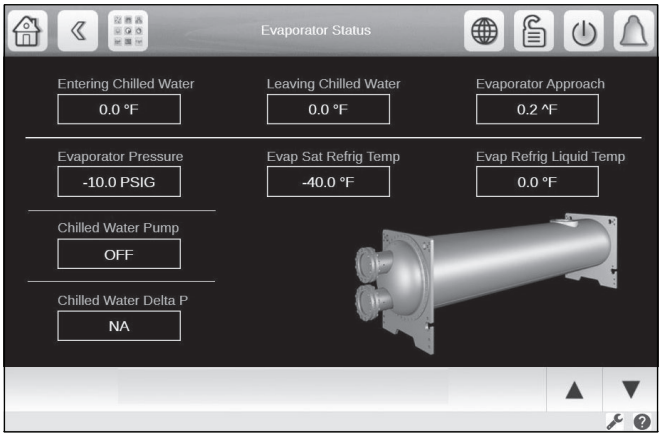


Fig. 30 — Evaporator Status

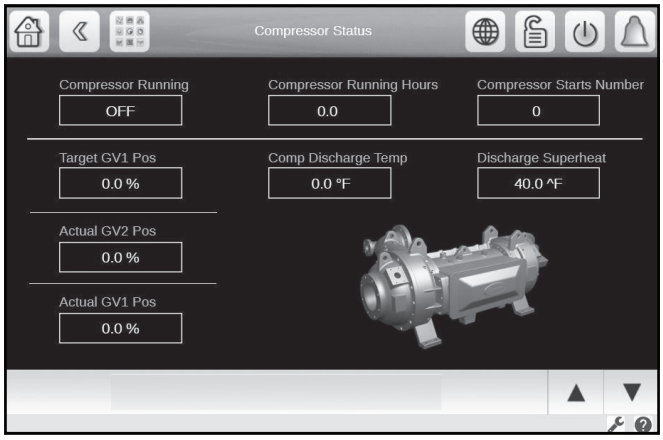
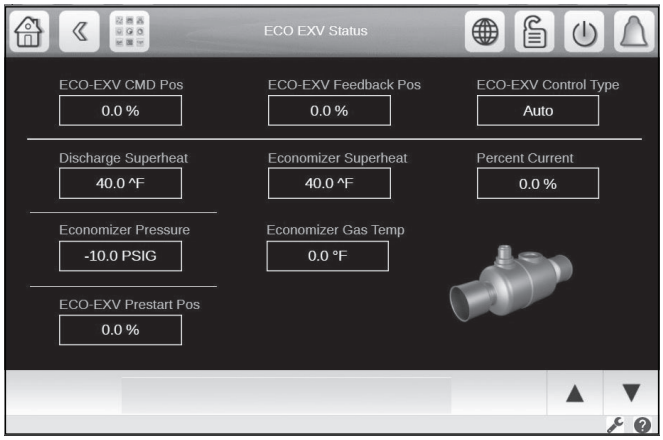


Fig. 31 — Compressor Status

Fig. 32 — Motor Status



NOTE: The pressure difference shown in this screen is the difference between economizer EXV pressure and evaporator pressure.

Fig. 33 — Economizer Status

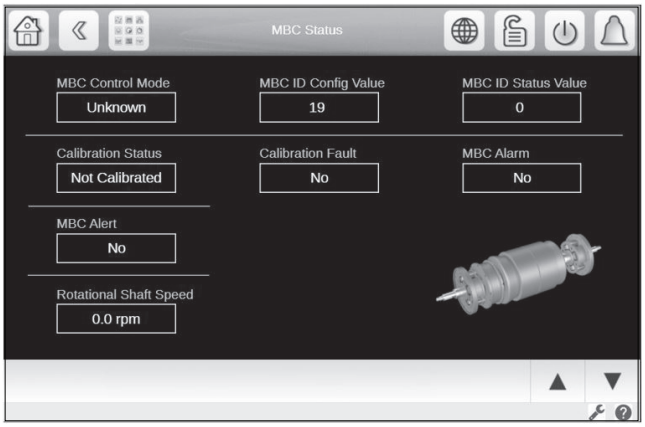


Fig. 34 — MBC Status

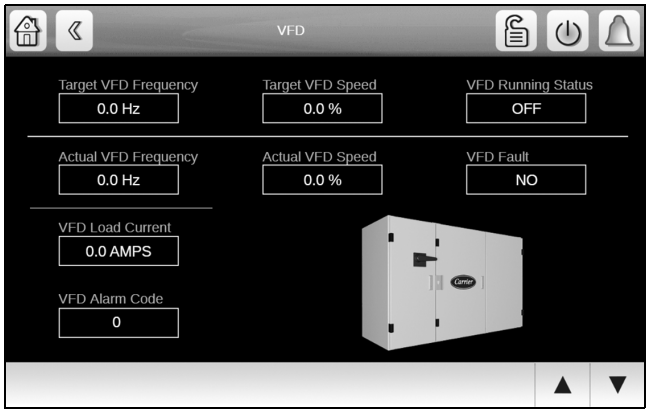


Fig. 35 — VFD Status

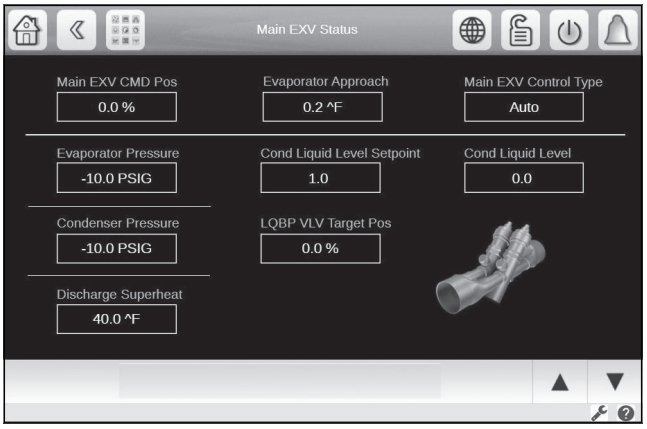


Fig. 36 — Main EXV Status

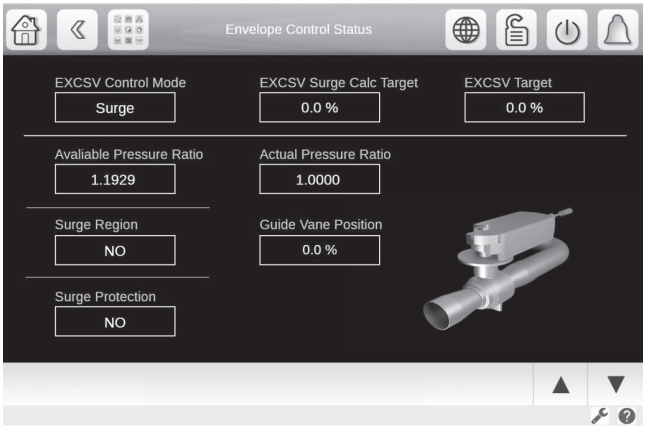


Fig. 37 — EXCSV - Expansion Control System Valve

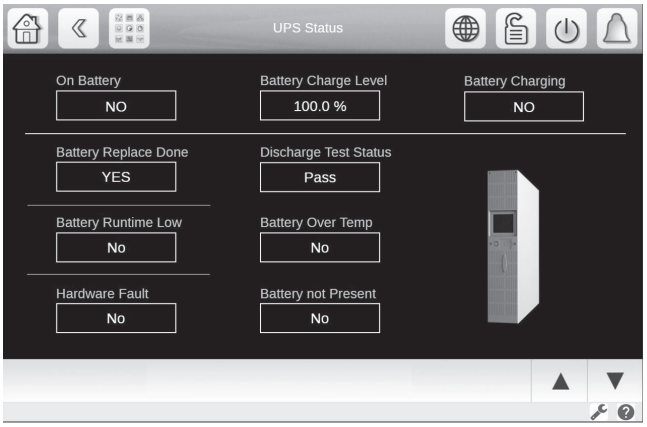


Fig. 38 — UPS Status

PIC6 CONTROL OPERATION

Start-Stop Control

This function controls the chiller START-STOP command. The four selectable control modes are as follows: LOCAL, LOCAL SCHEDULE, REMOTE, or NETWORK. See Unit Start/Stop Screen on page 21. Specific control sources are valid to start or stop the chiller for each control mode.

LOCAL

When the control mode is LOCAL, the chiller can be started by the "Local ON" button on the PIC6 interface screen, and can be shut down by the Confirm Stop button on the screen or by the EMSTOP software point.

LOCAL SCHEDULE

When the control mode is LOCAL SCHEDULE, the chiller will be started automatically if the configurable local schedule is Occupied. The chiller can be shut down by the unoccupied schedule, the Stop button on the PIC6 interface screen, or by the EMSTOP software point.

REMOTE

When the control mode is REMOTE, the chiller will be started by the remote discrete input (REM_CON) located on the I/O board. The chiller can be shut down by the remote discrete input, the Stop button on the PIC6 interface screen, or by the EMSTOP software point.

NETWORK

When the control mode is NETWORK, the chiller can be started and stopped by the CHIL_S_S and CHIL_OCC software points, which are written by other equipment through network commands and network schedule (both must be TRUE for chiller to start). To shut down the chiller, use the EMSTOP software point or stop using the HMI.

See Appendix for BACnet and Modbus tables.

Compressor Run Status

Compressor run status is shown at the top of the system overview (home) screen. Table 11 lists the chiller status numbers, names, and descriptions.

Chiller Start-Up Sequence

PRE-START CHECK

Once start-up begins, the controller performs a series of pre-start tests to verify that all pre-start alerts and safeties are within limits. Progress is shown on the Startup Sequence screen (Fig. 39). This screen can be accessed by clicking the VFD and then selecting the downward arrow. Table 12 lists pre-start alert and alarm conditions.

The compressor RUN STATUS parameter on default screen line now reads PRESTART. The PIC6 controls will perform the pre-starts test as indicated in Fig. 13 to ensure system is ready for Start-up. System will automatically monitor MBC and UPC health prior to startup. If a test is not successful, start-up is delayed or aborted. If all tests are successful, the chilled water pump relay energizes, and the main screen line now reads STARTUP.

START-UP

After a successful pre-start check, the system shall command the MBC to clear all alarms if there is no loss of communication with the MBC.

The systems shall abort startup and set System Alarm to TRUE if any of the following condition is TRUE:

2—There is loss of communication with the MBC.

3—The MBC has alarms after having been commanded to clear the alarms.

4—The MBC Control Mode is not "1" (Standby) as viewed on the MBC Status screen and the chilled water and condenser water pump relays are energized.

Five seconds later, the control monitors the chilled water and condenser water flow devices and waits until the WATER FLOW VERIFY TIME (service-configured, default 5 minutes) expires to confirm water flow.

After water flow is verified, the water temperature is compared to CONTROL POINT + 1/2 Controlled Fluid DB. If the temperature is less than or equal to this value, the control turns off the condenser pump relay and goes into RECYCLE mode.

If the RECYCLE condition is not satisfied, the start-up sequence continues and checks the guide vane and expansion control valve positions.

Motor shaft must be levitated before the compressor can be commanded to run at any speed. PIC6 should command the MBC to levitate the rotor shaft prior to each compressor start. The levitation command is sent via the Modbus. After sending the command, PIC6 must ensure that the levitation command was successful and the shaft is actually levitated. In case of an unsuccessful attempt, PIC6 retries levitating the shaft for 10 seconds, and then goes in Alarm if still unsuccessful.

When the MBC success registers levitation of the shaft, the compressor is issued a speed command and upon compressor startup the chiller starts its capacity control algorithms to get to setpoint.

Table 11 — Compressor Run Status

STATUS NO.	STATUS NAME	DESCRIPTION
0	OFF	STATSTOP is STOP, no alarm.
1	CTLTEST	Controls Test is active.
2	PUMPDOWN	Pumpdown is active.
3	LOCKOUT	Lockout is active.
4	RECYCLE	Recycle shutdown completed on low load in effect until the need for cooling resumes; non-fault condition.
5	TRIPOUT	Shutdown completed due to alarm fault condition.
6	TIMEOUT	The controller is delaying the start sequence until the Start to Start or Stop to Start timers have elapsed.
7	PRESTART	The chiller is in the process of system checking before energizing the compressor motor.
8	STARTUP	Normal start-up in progress.
9	AUTORST	Auto Restart in progress.
10	RAMPING	Ramp loading in progress. The chiller has started and is gradually increasing its load to control electrical demand charges.
11	RUNNING	The chiller has completed ramp loading following start-up. Normal running mode, no override or demand limit.
12	OVERRIDE	Running with Override active.
13	DEMAND	Running with Demand Limit active. The chiller is prevented from loading further because it has reached an AVERAGE LOAD CURRENT limit or a MOTOR KILOWATTS limit.
14	SHUTDOWN	Compressor shutdown in progress.

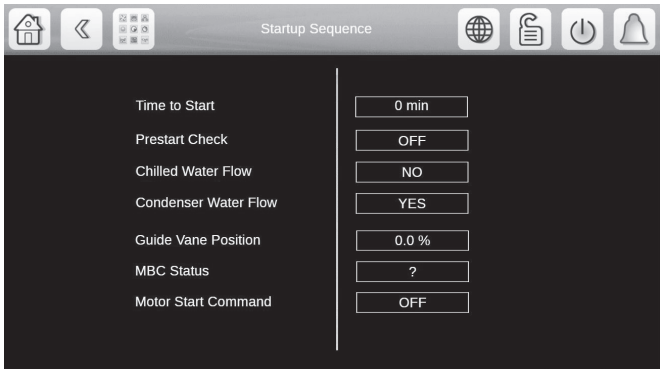


Fig. 39 — Start-Up Sequence Screen

Table 12 — Prestart Checks

PRESTART CHECK CONDITION*	STATE NUMBER†
STARTS IN 12 HOURS ≥ 8 (not counting recycle restarts or auto restarts after power failure) and Frequent Start Option is not enabled. If Frequent Restart Option is enabled then STARTS IN 12 HOURS ≥ 24	Alert 100
COND PRESSURE ≥ COND PRESS OVERRIDE	Alert 102
# Recycle restarts in the last 4 hours > 5 if Frequent Start Option is not Enabled. RECYCLE RESTARTS LAST 1 HOURS > 4 if Frequent Start Option is Enabled.	Alert 103
MBC ALERT	Alert 106
MBC NOT READY TO LEVITATE	Alert 115
COMP MOTOR WINDING TEMP ≥ COMP MOTOR WINDING – 10°F (5.6°C)	Alarm 231
COMP DISCHARGE TEMPERATURE ≥ COMP DISCHARGE ALERT – 10°F (5.6°C)	Alarm 232
EVAP_SAT < refrig trip** + EVAP OVERRIDE DELTA T	Alarm 233
EVAP REFRIG LIQUID TEMP < refrig trip** + EVAP OVERRIDE DELTA T	
AVERAGE LINE VOLTAGE ≤ UNDERVOLTAGE THRESHOLD	Alarm 234
AVERAGE LINE VOLTAGE ≥ OVERVOLTAGE THRESHOLD	Alarm 235
GUIDE VANE 1 CALIBRATION NOT COMPLETED	Alarm 236
GUIDE VANE 2 CALIBRATION NOT COMPLETED	Alarm 238
EXCSV (EXPANSION CONTROL SYSTEM VALVE) CALIBRATION NOT COMPLETED	Alarm 242
POWER PANEL OVER TEMPERATURE	Alarm 243
MBC UNABLE TO LEVITATE	Alarm 456

* If Prestart Check Condition is True, then resulting State is as indicated in the State Number column.
† See the Controls Operation and Troubleshooting guide for alarm and alert codes.
** Refrig trip = 33°F (0.6°C) (water) or and configurable for (brine) applications.

Chiller Shutdown Sequence

Chiller shutdown beings by initiating any of the following:

- Local STOP is pressed
- A recycle condition is present
- Time schedule has gone into unoccupied mode
- The chiller has gone into Alarm that require shutdown
- The start/stop status (CHIL_S_S) is overwritten to stop from the network and (CHIL_OCC) is occupied when in Network mode
- Remote contact is opened (when in Remote mode)

After the compressor has received the stop command the PIC will wait until the compressor speed is less than 5 rpm at which point it will send a de-levitation command to the MBC. The PIC checks with the MBC that the command is successful and that the shaft is actually no longer levitated and once confirmed the chilled water/brine pump and condenser water pump are shut down.

Control Points

SET POINT

The set point can be configured at the Setpoint menu (USER access level). The set point is determined by the Cooling LCW Setpoint, Base Demand Limit and EWT Control Option setting. See Table 13.

Table 13 — Set Point Determination

EWT CONTROL OPTION	COOL MODE
	COOLING
Disabled	Cooling LCW Set Point
Enabled	Cooling ECW Set Point

NOTE: When the ice build option is enabled and ice build is active, the control point is the Ice Build Set Point and the controlled water temperature is the leaving chilled water temperature.

CONTROL POINT TEMPERATURE

Capacity control is based on achieving and maintaining a control point temperature, which is the sum of a valid set point (from the SETPOINT screen) and a temperature reset value. In Cooling mode, the control point temperature is equal to the set point plus temperature reset. In Heating mode, the control point temperature is equal to the set point minus temperature reset.

The control point can be viewed directly on the main screen or the General Parameters menu.

TEMPERATURE RESET

Three types of chilled water or brine reset are available and can be viewed or modified on the Reset Configuration screen.

The default screen indicates when the chilled water reset is active. The control point Reset on the General Parameters screen indicates the amount of reset. See Fig. 40.

To activate a reset type, access the Reset Configuration (RESETCFG) screen and input all configuration information for that reset type.

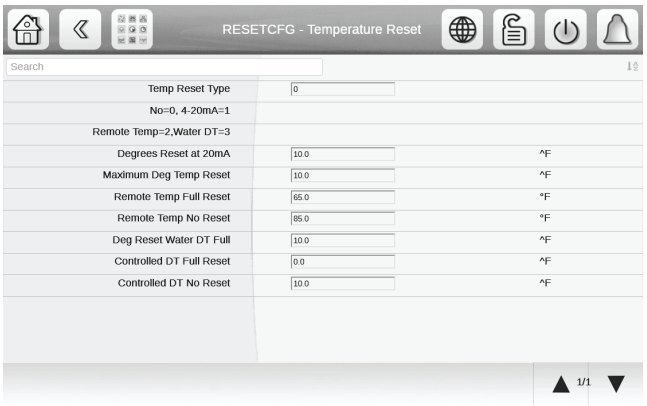


Fig. 40 — Temperature Reset

Reset Type 1: 4 to 20 mA Temperature Reset

Reset Type 1 is an automatic reset utilizing a 4 to 20 mA analog input signal provided from any external sensor, controller, or other device which is appropriately configured. For this type, Degrees Reset At 20 mA is configured in the RESETCFG table.

Reset Type 2: Remote Temperature Reset

Reset Type 2 is an automatic water temperature reset based on a remote temperature sensor input signal. This function can be accessed by setting the following configurations:

1. Configure the remote temperature at which no reset occurs (***Remote temp → NO RESET***).
2. Configure the remote temperature at which full reset occurs (***Remote temp → FULL RESET***).
3. Enter the amount of reset (Deg Reset Water DT Full).

Reset Type 3: Controlled Water Temp Delta Reset

Reset Type 3 is an automatic controlled water temperature reset based on heat exchanger temperature difference. This function can be accessed by setting the following configurations:

1. Configure the controlled water temperature delta T at which no reset occurs (***Controlled Water DELTA T → NO RESET***).
2. Configure the controlled water temperature delta T at which full reset occurs (***Controlled Water DELTA T → FULL RESET***).
3. Enter the amount of reset (Deg Reset Water DT Full).

CAPACITY CONTROL

Capacity control provides chilled or condenser water temperature control by modulating the position of the inlet guide vane 1, and VFD speed for variable speed compressors.

If increased capacity is needed, the control will first try to increase IGV TARGET POSITION if it has not reached the travel limit; if the travel limit has been reached, the control increases VFD TARGET SPEED. If decreased capacity is needed, the control first tries to decrease VFD TARGET SPEED if it has not reached the minimum VFD speed; if the minimum VFD speed has been reached, the control decreases IGV TARGET POSITION instead. See Fig. 41.

From the compressor relay closed point to the end of ramp loading, the VFD TARGET SPEED is the configured VFD start-up speed. When the chiller is running normally, the capacity control determines whether and how much to change VFD TARGET SPEED. When the chiller is in the shut-down process, VFD TARGET SPEED will be the minimum VFD speed.

NOTE: If the VFD option is set to NO VFD, or the compressor relay is not closed, VFD TARGET SPEED will be 0.

The guide vane position is determined by the Capacity Control function under normal conditions and other functions in abnormal conditions, which include capacity inhibit request or capacity decrease request. The guide vane actuator is driven by comparing the guide vane target position and the actual position. Guide vane position is limited to a value between zero and IGV Travel Limit, which is configured from the Service Configuration menu. When the chiller is shutting down or off, the guide vane is always driven to zero during normal shutdown.

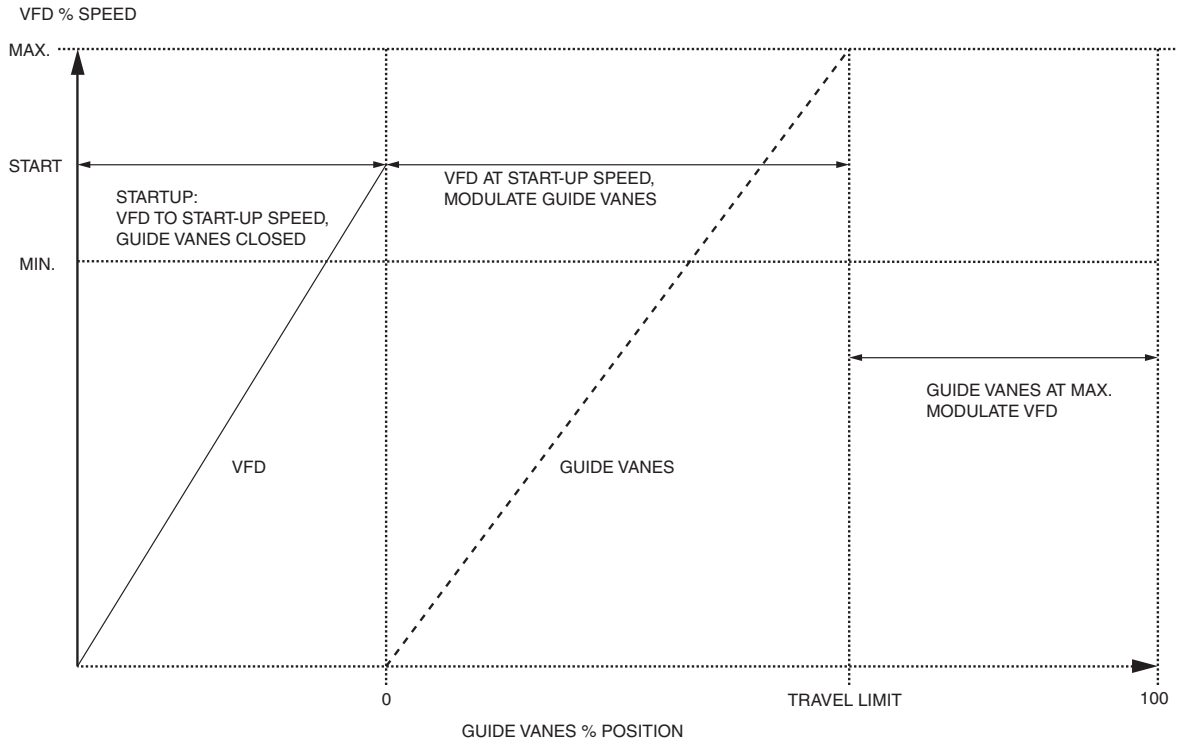


Fig. 41 — Guide Vane Position and VFD Speed

RAMP LOADING

The ramp loading control slows the rate at which the compressor loads up. This control can prevent the compressor from loading up during the short period of time when the chiller is started and the chilled water loop has to be brought down to CONTROL POINT (Setpoint Table). Ramp loading helps reduce electrical demand charges by slowly bringing the chilled water to CONTROL POINT. The total power draw during this period remains almost unchanged. If the power outage lasts for more than 3 hours, then Temperature Ramp Loading will be used regardless of user configuration and the minimum loading rate (1°F/min) will be used.

Two methods of ramp loading are available: temperature ramp loading and motor load ramp loading.

Temperature Ramp Loading

Temperature ramp loading limits the rate at which the controlled water temperature decreases for cooling and increases for heating during ramping by reducing on cooling mode or increasing in heating mode the Temp Ramp per Min (***Configuration Menu → Service Parameters***) at the configured rate, until the pulldown set point is less than the cooling mode control point or greater than the heating mode control point. The Pulldown Ramp Type (***Configuration Menu → General Configuration***) is configured to 0 for temperature ramp loading.

Motor Load Ramp Loading

Motor load ramp loading limits the rate at which either the load current percentage or motor kilowatt percentage increases by incrementing the ramp demand limit at the configured rate. The PULLDOWN RAMP TYPE (***Configuration Menu → General Configuration***) is configured to 1 for motor load ramp loading.

If DEMAND LIMIT SOURCE (***Configuration Menu → General Configuration***) is set to AMPS, then PERCENT LOAD CURRENT is used for motor load ramp loading. If DEMAND LIMIT SOURCE is set to kW, then MOTOR PERCENT KILOWATTS is used for motor load ramp loading.

The rate of either Amps or KW Ramp per Min is configured at ***Configuration Menu → Service Parameters***. The motor load ramp loading algorithm is deactivated when the Ramp Demand Limit is greater than or equal to the Base Demand Limit (Setpoint Menu). It is also deactivated when Ramp Demand Limit is greater than or equal to 80%. There will be a one-minute delay for the compressor to be uploaded to target load (ramping load target 80% or Base Demand Limit if less than 80%) after ramping load demand limit is set to 80% (or Base Demand Limit if less than 80%).

SURGE CORRECTION CONTROL

There are two stages for surge correction: envelop control (surge prevention) and surge protection.

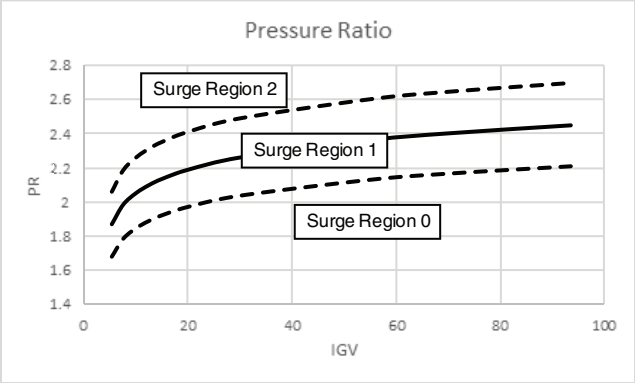
Surge Prevention

A surge condition occurs when the lift becomes so high that the gas flow across the impeller reverses. This condition can eventually cause compressor damage. The surge prevention algorithm notifies the operator that chiller operating conditions are marginal and to act by lowering entering condenser water temperature and getting water flow back to design conditions in order to prevent compressor damage.

The 19MV surge line is factory configured using a PR Table (***Configuration → Surge Correction → Surge Line Configuration*** (2=PR Table). The PR table contains the Calculated Reference PR based on speed and IGV1 settings and this is coded into the PIC6 controller. The controller will interpolate the data based on actual speed and IGV1 setting and derive the actual Calculated Reference PR for this operation point. A representative line for the calculated pressure ratio for a given speed is shown in Fig. 42.

Surge prevention action is determined based on how close the Actual PR (absolute condenser pressure divided by absolute evaporator pressure) is to the actual surge line. Surge prevention is calculating a PR value for the operation point and, depending on where the Actual PR value is mapped (Region 0, 1 or 2), the chiller will take appropriate action to prevent the unit from actual real surge.

- Surge Region 2 (Surge Prevention High) – Surge Prevention Correction; typical action is to speed up drive, temporary open expansion control system and hold for and inlet guide vane.
- Surge Region 1 (Surge Prevention Low) – Capacity Inhibit; typical action is to increase speed, decrease inlet guide vanes and hold expansion control system valve.
- Surge Region 0 (No Surge Prevention) – no surge



Upper dashed line	High offset (Calc PR High Offset)
Solid line	Calculated reference pressure ratio (Calc Ref PR)
Lower dashed line	Low offset (Calc PR Low Offset)

NOTE: Offsets are exaggerated for graphical purposes.

Fig. 42 — Pressure Ratio Representation

If Actual PR is in Region 1, a capacity inhibit signal will be sent. If Actual PR is in Region 2, the controller will take appropriate action to prevent surge. This action will be canceled once Actual PR is removed from the referenced surge region.

The Surge Correction Menu (***Main Menu →Maintenance Menu → Surge Correction***) will display if unit is in Surge Prevention mode.

Note that surge will occur if the maximum lift for a particular impeller wheel is reached. This is a physical condition that surge prevention cannot change. At sufficiently high lift the gas flow becomes unstable and will reverse through the impeller state resulting in high pressure pulsations. These pressure pulsations can exceed the limits of the magnetic bearings system capability of controlling the levitated shaft. At this point the rotor will be dropped out of orbit and the auxiliary bearings engaged until rotation is stopped.

Surge Protection

The Surge Protection algorithm will run after the Surge Delay Time has elapsed when compressor has been commanded to turn on. It compares the present Percent Load Current value with the previous value once every second. If the difference exceeds the maximum Amps change value (Surge Delay% Amps + (Percent Load Current / 10)), an incidence of surge has occurred, and the surge protection signal will be sent. When an incidence of surge determined in this manner has occurred, the Surge Counts will be incremented by one and Surge Protection becomes active.

On receiving the surge protection signal, Capacity Control will make corrections on IGV1 Target Position, VFD Target Speed, and Expansion Control System Valve (EXCSV) Target Position.

When correction is in effect first correction will be VFD correction followed by guide urge and EXCSV. Action will be executed every 10 sec. If there is correction by either VFD, IGV or EXCSV the surge protection counts is incremented by 1.

Guide vane movement will be inhibited for 1 minute after surge protection ends.

Chiller will do Alarm shutdown under the following conditions:

- If Surge Protection Counts exceed 20 within a Surge Time Period (default 8 minutes). Note that VFD target speed must equal max before this alarm is activated.
- If IGV, VFD, and EXCSV cannot be further adjusted for surge protection when Surge Protection Counts exceed 4 within a Surge Time Period.

The Surge Correction Menu (***Main Menu →Maintenance Menu → Surge Correction***) will display if unit is in Surge Protection mode.

EXPANSION CONTROL SYSTEM VALVE (EXCSV)

The EXCSV is the actuated valve which is parallel to the main EXV valve. The EXCSV valve can be selected for:

- Surge Prevention
- Low Load
- Combination (surge and low load)

The EXCSV can be selected to modulate to support surge correction 1 = Surge, or 2 = Low Load operation, or the combination of both. See Fig. 43.

For surge correction the EXCSV will hold or modulate by EXCSV Step Surge (default 4%). Similarly, for low load operation the EXCSV will begin operation at EXVSV Open IGV Position (default 5%) or EXVSV on DT Low Load (default 2^F). The EXCSV will close at default 10% guide vane or Delta T = 4^F.

Opening the EXCSV will increase massflow at constant pressure drop and will extend the operation envelope for the 19MV compressor.

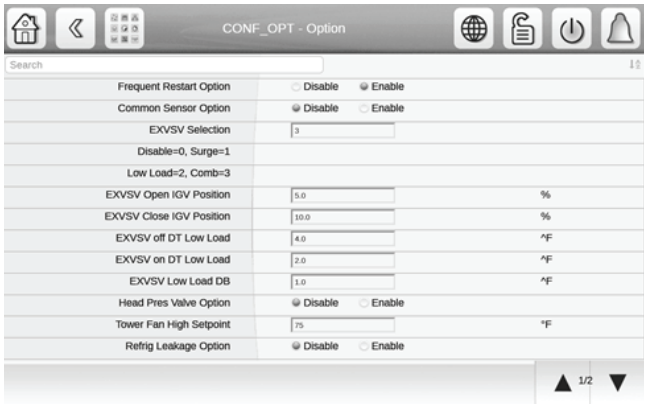


Fig. 43 — CONF_OPT - Option Screen

ECONOMIZER EXV CONTROL

The optional economizer EXV controls the metering into the low pressure/temperature side of the BPHX economizer. The Economizer EXV is enabled/disabled in the ***Configuration→ Config Metering Menu***. At power-up the EXV is commanded to be fully closed. The EXV is only allowed to operate when the system capacity [Amps] is greater than the configured Eco EXV Active Threshold = 0%. EXV control is based on economizer superheat setting (Eco Super Heat setting default =10^F).

CONDENSER LIQUID LEVEL CONTROL

The metering of the main stream of refrigerant from the condenser to the evaporator is handled by a combination of the main EXV and the EXCSV. The PIC6 evaluates EXV control action every 1 second. Primary EXV control is based on the condenser liquid level control configured in the Config Metering Configuration Menu. Level is set so target condenser level is slightly higher at full load compared with low load.

EXV has the following states visible in ***Maintenance Menu→Maintenance Metering***:

State	State No.
Off	0
Not Ready	1
Ready	2
Start	3
Run	4
Stop	5
Disabled	6
Tripout	7

EXV has 4 control modes also visible in visible in ***Maintenance Menu→ Maintenance Metering***.

Control Mode	Control Mode No.
Not running	0
Manual (Quick Test)	1
LIQ Valve (Primary Control)	4
SST Low	6

Primary main EXV control mode is control mode 4. Here the EXV controls the condenser liquid level based on configured level settings in the Config Metering Menu. For SST control mode the Main EXV is adjusted according to SST. When SST is below the Calc Low SST SP [default is 34°F (1.1°C)], the main EXV will open to keep the actual SST equal/above the setpoint.

DEMAND LIMIT

The PIC6 controls provide a feature for limiting AVERAGE LOAD CURRENT or MOTOR KILOWATTS by limiting capacity via guide vane control/VFD control. The limit may be applied in two ways. The first is called ACTIVE DEMAND LIMIT, which is equal to a BASE DEMAND LIMIT value (set in the SETPOINT screen, default value 100%). ACTIVE DEMAND LIMIT may also be forced to be different from BASE DEMAND LIMIT by manually overriding (forcing) the value via a CCN network device. If the DEMAND LIMIT SOURCE exceeds the ACTIVE DEMAND LIMIT by 5% or less, capacity will be inhibited. If the DEMAND LIMIT SOURCE exceeds the ACTIVE DEMAND LIMIT by more than 5%, capacity will be decreased.

Alternatively, the limit may be applied by AUTO DEMAND LIMIT INPUT, an optional 4 to 20 mA input. This demand limit control option (4 to 20 mA DEMAND LIMIT TYPE) is externally controlled by a 4 to 20 mA signal. The option is set up on the ***Configuration Menu → General*** screen. When enabled, 4 mA will set ACTIVE DEMAND LIMIT to 100% of the DEMAND LIMIT SOURCE (regardless of the value of BASE DEMAND LIMIT), and 20 mA will set ACTIVE DEMAND LIMIT to the value configured for DEMAND LIMIT AT 20 mA in the ***Configuration Menu → Service Parameters*** screen.

OVERRIDE CONTROL

Capacity overrides can prevent some safety shutdowns caused by exceeding the motor amperage limit, evaporator refrigerant low temperature safety limit, motor high temperature safety limit, and condenser high pressure limit. In these cases there are two stages of capacity control:

1. When the value of interest crosses the first stage set point into the override region, the capacity is prevented from increasing further, and the status line on the PIC6 controller indicates the reason for the override. Normal capacity control operation is restored when the value crosses back over the first stage set point, leaving the override region.
2. When the value of interest is in the override region and further crosses the second stage set point, capacity is decreased until the value meets the override termination condition. The PIC6 controls resume normal capacity control operation after the override termination condition has been satisfied. (In the case of high discharge superheat, there is an intermediate stage.) Table 14 summarizes the override parameters.

Table 14 — Override Parameters

OVERRIDE CONDITION	OVERRIDE PARAMETER	FIRST STAGE CAPACITY INHIBIT	DEFAULT VALUE/ CONFIGURABLE RANGE	SECOND STAGE CAPACITY DECREASE	OVERRIDE TERMINATION
High condenser pressure override (Unit Type Cool Only = 0 in Configuration Menu → Factory Parameters. This corresponds to a condenser with standard 185 psig design pressure.)	CONDENSER PRESSURE	> COND PRESS OVERRIDE LOW	140 psig/90 to 170 psig	> COND PRESS OVERRIDE LOW + 2.4 psi	< COND PRESS OVERRIDE LOW — 1 psi
Low evaporator temperature override	CALC EVAP SAT TEMP or EVAP REFRIG LIQUID TEMP	< EVAP SAT OVERRIDE TEMP (EVAP SAT OVERRIDE TEMP = EVAP TRIPPOINT + EVAP OVERRIDE DELTA T)		< EVAP SAT OVERRIDE TEMP - 1°F (0.56°C)	> EVAP SAT OVERRIDE TEMP + 2°F (1.1°C)
High motor temperature override	COMP MOTOR WINDING TEMP	> COMP MOTOR TEMP OVERRIDE	200°F/150 to 200°F (93.3°C/65.6 to 93.3°C)	COMP MOTOR WINDING TEMP > COMP MOTOR TEMP OVERRIDE + 10°F (5.6°C)	COMP MOTOR WINDING TEMP < COMP MOTOR TEMP OVERRIDE – 2°F (1.1°C)
High current override	PERCENT LOAD CURRENT	PERCENT LOAD CURRENT > 100%		PERCENT LOAD CURRENT > 105%;	PERCENT LINE CURRENT ≤ 100%
Low discharge superheat override	Discharge Superheat (DSH)	< DSH REQUIRED + 1		< DSH REQUIRED –3	> DSH REQUIRED + 2
High Compressor Discharge	Comp Discharge Tem	p: > Comp Discharge Alert			<Comp Discharge Alert – 2°F (1.1°C)

RECYCLE CONTROL

The chiller may cycle off and wait until the load increases to restart when the compressor is running in a lightly loaded condition. This normal cycling is known as "recycle."

In cooling mode, a recycle shutdown is initiated when either of the following conditions is true:

- Leaving chilled water temperature (or entering chilled water temperature, if the EWT CONTROL OPTION is enabled) is more than 5°F (2.8°C) below the CONTROL POINT for 5 consecutive seconds. This can be modified or adjusted with the PIC6 control.
- Leaving chilled water temperature (or entering chilled water temperature, if the EWT CONTROL OPTION is enabled) is below the CONTROL POINT, and the chilled water temperature difference is less than the RECYCLE SHUTDOWN DELTA T, and Ice Build is not active.

NOTE: Recycle shutdown will not occur if the CONTROL POINT has been changed by more than 1°F (0.56°C) within the previous 5 minutes of operation.

When the chiller is in RECYCLE mode, the chilled water pump relay remains energized so the chilled water temperature can be monitored for increasing load. The recycle control uses RECYCLE RESTART DELTA T to check when the compressor should be restarted. In cooling mode, the compressor will restart when the leaving chilled water temperature (or entering chilled water temperature, if the EWT CONTROL OPTION is enabled) is greater than the CONTROL POINT plus the RECYCLE RESTART DELTA T for 5 consecutive seconds.

Note that Recycle Shutdown Delta T and Recycle Restart Delta T are located in the Service Parameters Menu (***Main Menu→Configuration Menu→Service Parameters***).

RUNNING TIMERS AND COUNTERS

The PIC6 control maintains two run-time clocks: Compressor Running Hrs and After Service Hrs. Compressor Running Hrs indicates the total lifetime compressor run hours. After Service Hrs is a resettable timer that can be used to indicate the hours since the last service visit or any other event. A separate counter tallies compressor starts as Compressor Starts Num. All of these can be viewed on the RUN TIMES screen. Both Ontime counters roll over to 0 at 500,000 hours. Manual changes to After Service Hrs from the screen are permitted at any time. If the controller is replaced, one opportunity before the first start-up with the new controller is provided to set Compressor Running Hrs and Compressor Starts Number to the last readings retained with the prior controller.

The chiller also maintains a start-to-start timer and a stop-to-start timer. These timers limit how soon the chiller can be started and are displayed on the system overview (home) and RUN TIMES screens. They can be configured in the ***Configuration Menu → General*** screen. They must expire before the chiller starts. If the timers have not expired, the RUN STATUS parameter on the System Overview (Home) and GENERAL PARAMETERS screen reads TIMEOUT.

Additionally the PIC6 maintains a MBC Drop Counter to monitor the aux bearings wear. When the limit of the drop counter is reached, plans should be made to replace the aux bearings. Once service work is completed, be sure to reset the counter to zero so accurate diagnostics of the new set of aux bearings can be maintained. Resetting counter is done from the MBC Status Screen, MBC Drop Counter. See Fig. 44 and 45.

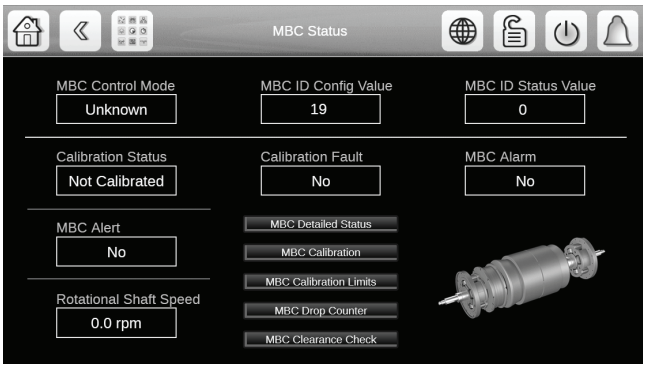


Fig. 44 — MBC Status Screen

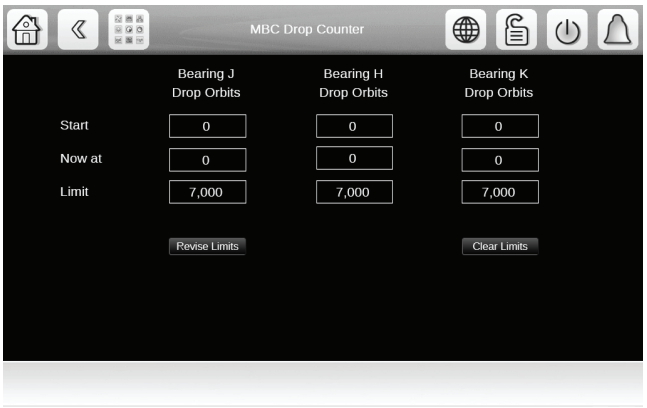


Fig. 45 — MBC Drop Counter

WATER PUMPS CONTROL (FREEZE PREVENTION)

Evaporator Freeze Prevention

When the evaporator saturated refrigerant temperature or evaporator refrigerant temperature is less than the EVAP REFRIG TRIPPOINT + REFRIG OVERRIDE DELTA T (configurable from 2°F to 5°F (1.1°C to 2.8°C) in the ***Configuration Menu → PROTECTIVE LIMIT CONFIG screen***), an OVERRIDE—LOW EVAP REFRIG TEMP event will occur.

For any running status, if either of the conditions below is true then unit will shut down under Alarm PROTECTIVE LIMIT - EVAPORATOR FREEZE (State 261):

- Evaporator saturated refrigerant temperature or evaporator refrigerant temperature is equal to or less than the EVAP REFRIG TRIPPOINT (33°F [0.6°C] for water, (configurable for brine in ***Configuration Menu → PROTECTIVE LIMIT CONFIG screen***) plus 1°F (0.56°C).
- Leaving chilled water temperature or entering chilled water temperature is less than EVAP REFRIG TRIPPOINT plus 1°F (0.56°C).

NOTE: If the chiller is in recycle mode, it will transition to TRIPOUT, and the CHILLED WATER PUMP will remain on.

The alarm will be clearable when the evaporator saturated refrigerant temperature, evaporator refrigerant temperature, leaving chilled water temperature, and entering chilled water temperature rise 5°F (2.8°C) above the EVAP REFRIG TRIPPOINT.

Condenser Pump Control

The chiller will monitor the condenser pressure and may turn on the condenser pump. If the condenser pressure is greater than or equal to the COND PRESS OVERRIDE, and the entering condenser water temperature is less than 115°F (46.1°C), the condenser pump will energize to try to decrease the pressure and Process Alert - High Condenser Pressure Chiller Off (Alert 157) will be generated. The pump will turn off when the condenser pressure is 3.5 psi (24.1 kPa) less than the pressure override and the condenser refrigerant temperature is less than or equal to the entering condenser water temperature plus 3°F (1.7°C).

NOTE: COND PRESS OVERRIDE is found in the ***Configuration Menu → Protective Limit*** screen.

Condenser Freeze Prevention

This control helps prevent condenser tube freezing by energizing the condenser pump relay. The PIC6 module controls the pump and, by starting it, helps to prevent water in the condenser from freezing.

When the chiller is off and condenser saturated refrigerant temperature is less than or equal to the condenser freeze point, the condenser water pump will be energized (Alert 168, Process Alert - Low Temp/Potential Cond Freeze-up). The fault state will clear and the pump will turn off when the condenser saturated refrigerant temperature is more than 5°F (2.7°C) above the condenser freeze point and the entering condenser water temperature is greater than the condenser freeze point. If the chiller is in recycle shutdown mode when the condition occurs, the controls will transition to a non-recycle shutdown.

CONTROL TEST

This feature allows the operator to quick-test the controls and related hardware, including all unit-controlled outputs except compressor output. Test of components with position feedback requires calibration in Quick Calibration prior to control test.

The compressor must be off to run the test function. If the unit is on, the test function cannot be accessed. The compressor can only be started after the control test is finished. The test function requires Service or higher level log-in. All control test parameters are accessible through the Quick Test table. To perform the control test function, set the first item Quick Test Enable in the Quick Test table to Enable.

Unless otherwise noted, all protective limits remain active during the controls test.

Discrete Outputs

When the control test is enabled, discrete outputs can be enabled using the Quick Test table. Discrete valves that can be tested in Quick test are: Main EXV, Economizer EXV, Run Status Relay, Alarm Relay, Alert Relay, Condenser Pump, Evaporator Pump, VFD Interlock, Tower Fan High and Low Relays.

Analog Output

When the control test is enabled, the Chiller Status Output (Q_CHST) analog output can be enabled by entering the positions in the QCK_TST table:

- Head Pressure Valve
- Head Pressure Valve Position

Quick Calibration

The guide vane actuators should be calibrated before starting the chiller. Guide vane calibration can be started by setting Quick Test Enable to Enable and GV1 Calibration Enable to Enable in the Quick Calibration menu.

Both Inlet Guide Vane 1 and 2 must have successfully passed calibration in order to operate the chiller.

- The fully closed guide vane feedback mA value will be in the range of 3 mA to 5 mA.
- The fully opened guide vane feedback mA value will be in the range of 19 mA to 20.8 mA.

The Expansion Control System Valve (EXCSV) also requires calibration prior to startup. The fully closed/Open EXCSV feedback value will be in the range 0 to 10DC respectively.

Successful calibration will be indicated by status "Completed" in the Quick Calibration menu.

MAG-BEARING CALIBRATION

NOTE: Quick Test must be enabled to perform Mag Bearing Calibration.

The calibration process operates while the bearings are not levitated. It moves the shaft around the available clearance with the magnets but without levitating, using fixed currents. Any calls for calibration require the system to be halted and de-levitated.

The calibration routine is available over Modbus by a calibration request. Calibration should be run and saved to MBC flash in the following cases:

- MBC installed on a system for the first time.
- MBC replaced on an existing system.
- A change has been made to the hardware, especially magnetic bearing, aux bearing, or amplifier replacement.
- An Average-Gap-Change warning, indicating possible sensor drift.

The system will perform Mag-Bearing Calibration if:

- During Prestart Checks, MBC Calibration On Powerup1 is Enable. This setting is set in MBC Configuration.
- During Prestart Checks, there is an Average-Gap-Change warning.
- During OFF State, invoked manually from the MBC Calibration Screen.

NOTE: MBC Calibration on Powerup is a user-configured point provided to automatically enable mag-bearing calibration after power-up.

The system will not perform Mag-Bearing Calibration if the chiller is in Freeze Protection (vacuum). This can happen in the event that the chiller has not been charged yet. Energizing coils in a vacuum can lead to short circuits.

If the MBC Calibration fails, the system will take the following actions, in the sequence provided:

1. Command the MBC to re-calibrate (maximum two retries).
2. If “1” above fails, recover archived calibration data set from the flash file into MBC.
3. After performing “2” above, display a message asking the user to reset power to the MBC.

NOTE: Quick Test must be enabled to perform Mag Bearing Calibration.

The system provides an HMI MBC Calibration Screen (Fig. 46, accessible via MBC Main Menu) including:

- Means to invoke the following:
  - Manual Calibration Request
  - Read-from-flash (Calibration Data) Request

The calibration status will display on the MBC Calibration screen.

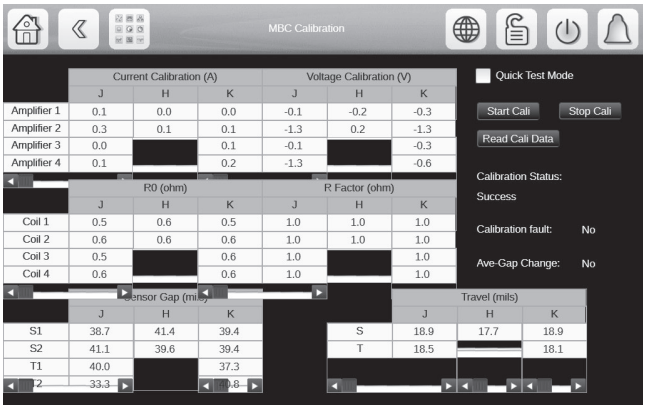


Fig. 46 — HMI MBC Calibration Screen

MAG-BEARING CLEARANCE CHECK

Clearance checks are done while the rotor is levitated but not rotating. It operates on one bearing at a time, moving the shaft outwards from center until it meets an obstruction, at which point it returns to center. Clearance checks for the radial bearings are done every 45 degrees for the full 360 degrees. The clearance check records endpoints, center point, min, max, and average clearances.

A clearance is required after the following events:

- Commissioning
- Mag bearing reassembly
- Auxiliary bearing replacement
- Hard drop of rotor

The clearance check can be enabled automatically by selecting Clearance Chk on Powerup = Enable (default = Disable). The clearance check can be invoked manually by selecting Start Manual in the MBC Clearance Check Menu. See Fig. 47.

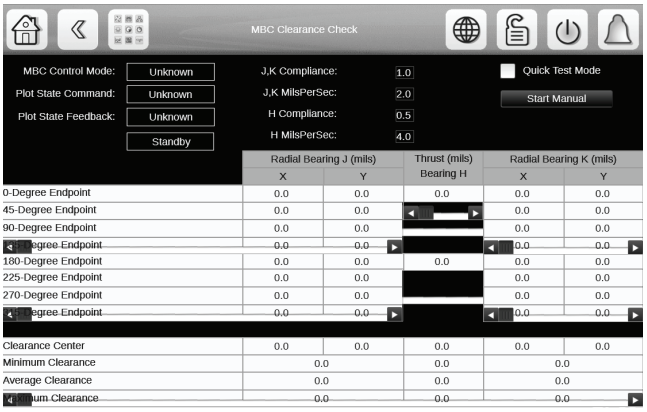


Fig. 47 — MBC Clearance Check Screen

UNINTERRUPTIBLE POWER SUPPLY

The 19MV units come with an uninterruptible power supply (UPS). The UPS is required for the magnetic bearing system in case of unexpected power failure, in which case the UPS will keep the shaft levitated until the shaft rotation has stopped and it can be safely de-levitated. See Fig. 48.

The UPS is automatically tested at periodic intervals to ensure that the UPS battery holds enough charge to safely handle a power failure. Should the UPS fail the test, the PIC6 will issue alert 117, which will have to be addressed by installing a replacement battery within 14 days. If the alert has not been addressed after 14 days, alarm 481 will be issued which will prevent the chiller from running.

Upon battery replacement, “Battery Replace Done” must be configured to “Yes” in the UPS Configuration Menu.

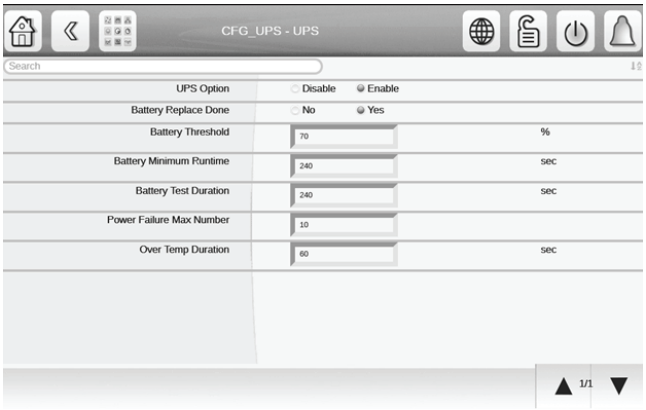


Fig. 48 — Uninterruptible Power Supply Screen

FREQUENT RESTART OPTION

The 19MV controller can be configured for Frequent Restarts in the option menu. When this option is selected, the system shall prevent a compressor starting if:

- The system has exceeded 24 restarts in 12 hours or 4 restarts in 1 hour.
- The system is not restarting after a loss of power.
- User provides a one-time bypass of the startup protection.
- All starts occurred after or without the system transitioning out of the ON state.

The unit is shut down until the first restart has cleared.

COOLING TOWER CONTROL

If IOB3 and IOB4 Options are enabled in Option 2 (under Configuration Menu), there will be an optional hydraulic control I/O board in the PIC6 control system to allow PIC6 control for the water pumps and cooling tower fans (high speed and low speed).

The cooling tower fans are controlled by the pressure difference between condenser and evaporator and entering water temperature of condenser. The objective is to maintain the entering condenser water temperature in the optimal range.

HEAD PRESSURE CONTROL

If the chiller system is equipped with a head pressure control valve or other device to modulate the condenser water flow, and the Head Pres Valve Option in the CONF_OPT table is ENABLED, the PIC6 control system will control the opening of the head pressure valve to maintain the pressure difference between condenser and evaporator. The output of this valve is 4 to 20 mA type.

Before using this function, the pressure difference values for 20 mA and 4 mA should be set. The head pressure valve should be in fully closed position when chiller is in OFF mode. It is recommended to set the Head Pressure Deadband = 0 psig.

ICE BUILD OPTION

The PIC6 controller provides an ice build option based on efficiency improving point. The ICE BUILD OPTION in the CONF_OPT table should be set to ENABLED to make ice build active, and the following two parameters should be configured:

- Ice_recy (ICE BUILD RECYCLE) indicates whether recycle option is enabled in ice build mode.
- Ice_term (ICE BUILD TERMIN SOURCE) indicates how the ice build is terminated. There are three types: temperature (0), dry contact (1), or combined temperature and dry contact (2).

TIME SCHEDULE

The PIC6 control provides three schedules:

- Local schedule
- Ice build schedule
- Network schedule

Each schedule has 8 time segments. If two time segments overlap, the unoccupied time segment takes priority.

There are 16 holiday time segments. Each holiday time segment is determined by three parameters—month, start date, and holiday days. The controller will be in unoccupied mode when a holiday time segment is active. PIC6 includes a Daylight Savings Time function. Use Broadcast Menu to enable this feature and configure start and end dates.

BLACK BOX

The black box task continuously stores parameters in memory every 5 seconds. Reporting of a chiller operation alarm triggers the controller to generate a collection of data records. Each collection contains up to 180 records that consist of 168 records (corresponding to 14 min.) before the alarm and 12 records (corresponding to 1 min.) after the alarm. Each record is associated with a time stamp. Files are saved as csv files; up to 20 files can be stored.

The black box file can be uploaded with the Carrier Service Tool or directly from the PIC6 controller via the ***System Configuration→USB Logs Export menu***. Once the upload is done, the original files are automatically deleted.

PRESSURE TRANSDUCER CALIBRATION

The HMI pressure readings are displayed in the ***Main Menu → Pressures screen.*** See Fig. 49.

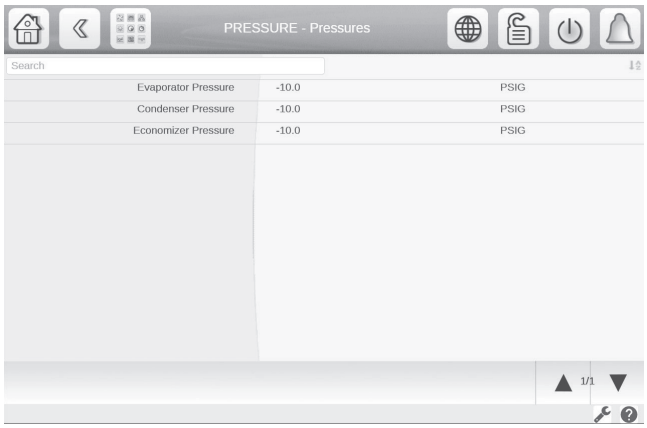


Fig. 49 — Pressures Screen, Page 1

Once a year the pressure transducers should be checked against a pressure gage. Attach a set of accurate refrigeration gages to the transducer being checked and compare the two readings. If there is a difference the transducer can be calibrated as described below. Calibration requires Service level access to the HMI.

NOTE: It is usually not necessary to calibrate at initial start-up unless chiller is at high altitude.

1. Go to ***Main Menu → Maintenance Menu → Pressure Sensor Calib***. See Fig. 50 and 51.
2. Each transducer is supplied with 5 vdc from the IOB. Calibration is done by selecting the appropriate Pressure Sensor option on the Pressure Sensor Calib screen. The screen for the selected option is displayed. Figure 51 shows the Evap Pressure Sensor screen (PRSCAL01 as an example.
3. Set Calibration Enable to Enable.

   Calibration for this sensor is complete and the new slope and intercept will be used for the calibrated transducer in the pressure or temperature tables.
4. With the transducer at atmospheric pressure (zero gage pressure), ensure that “Calib Press1 (0 PSI)” = 0 psig.
5. Pressurize the transducer to a known pressure between 100 and 250 psig, and enter that pressure as read from calibrated gage in the “Calib Press2 (100-250 PSI)” field and press “OK.”
6. Screen will show “Calibration Completed = Yes” upon successful calibration. To exit, use the arrow key or click the Home button.

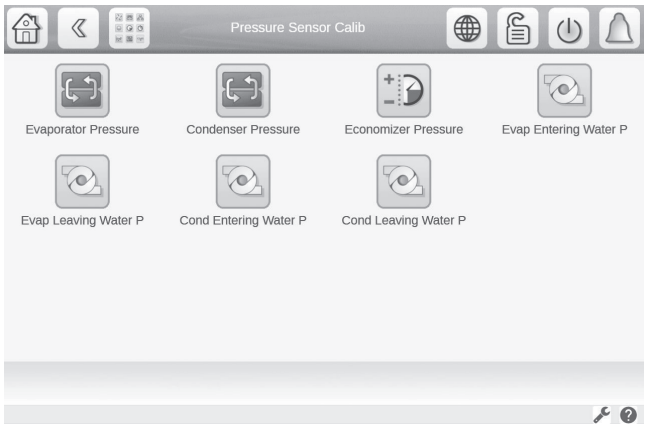


Fig. 50 — Pressure Sensor Calib Screen, Page 1

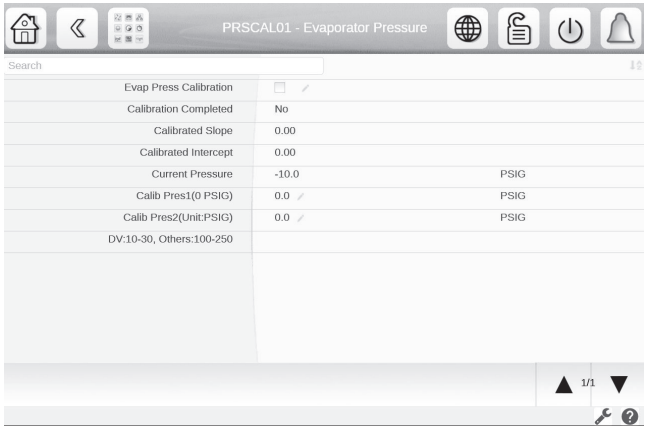


Fig. 51 — Evap Pressure Sensor Screen

TEMPERATURE SENSOR CALIBRATION

The four water temperature sensors can be separately calibrated to have their temperature readings offset by a specified amount. Follow these steps for each sensor:

1. Go to ***Main Menu → Maintenance Menu → Temp Sensor Calib***. See Fig. 50.
2. Place the temperature sensor in a 32°F (0°C) water solution.
3. Read the sensor raw temperature on the Maintenance screen.

4. Calculate the offset to be applied as follows:
   32 – sensor raw temp (°F)

   Example:

   ECW sensor raw temperature reads 32.6°F.

   ECW temperature offset must be set to –0.6°F
   (32 – 32.6 = –0.6)
5. In the Temp Sensor Calib screen, enter the temperature offset for the appropriate sensor as calculated in Step 4. See Fig. 52.

   NOTE: The offset cannot exceed ± 2°F (1.1°C).

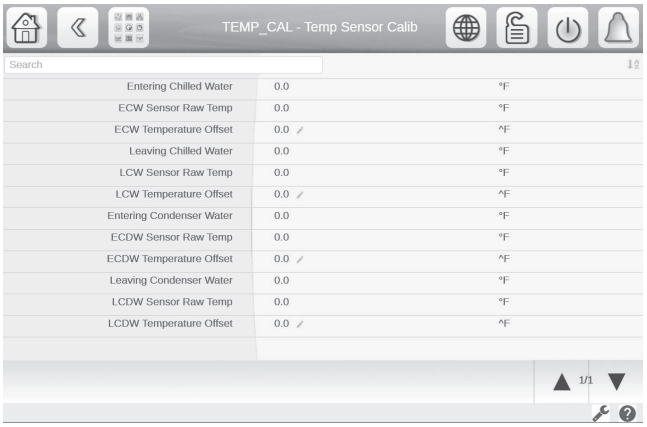


Fig. 52 — Temp Sensor Calib Screen, Page 1

6. Verify that the measured temperature value is the same as the controlled temperature.

ALARM EMAIL

The alarm email function sends automatic email messages to specified service personnel for remote maintenance purposes. This function can be set up from the second page of ***Configuration Menu → E-Mail Configuration*** (EMAILCFG). Subsequently if there is an alarm the function will send an e-mail message. Another message is sent when all alarms return to normal. See Fig. 53 and 54.

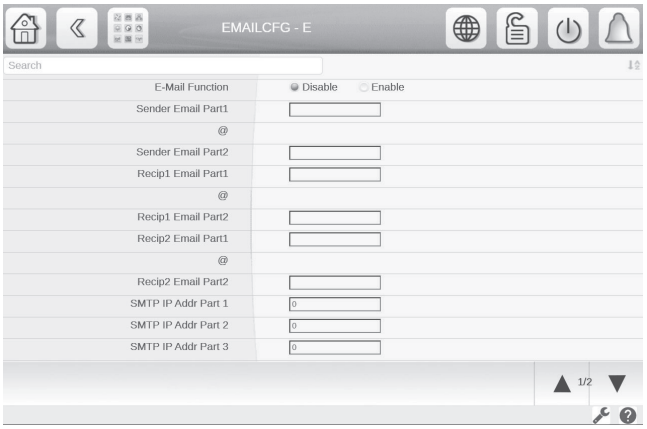


Fig. 53 — E-Mail Configuration Screen, Page 1

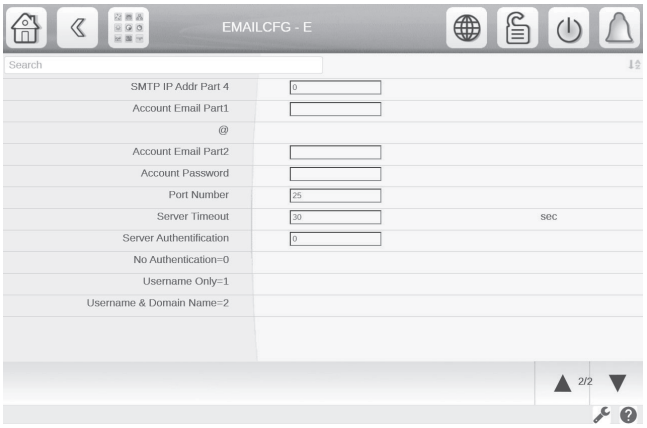


Fig. 54 — E-Mail Configuration Screen, Page 2

The alarm task runs periodically. At each alarm task run time, the status change of each alarm is checked and one email message is sent to each specified recipient when one or more alarms are switched on. When all alarms return to normal, another e-mail message is sent to remote maintenance service personnel.

The e-mail message provides the unit description and location stored in the CTRL_ID table, available from the CONFIGURATION menu. See Fig. 55.

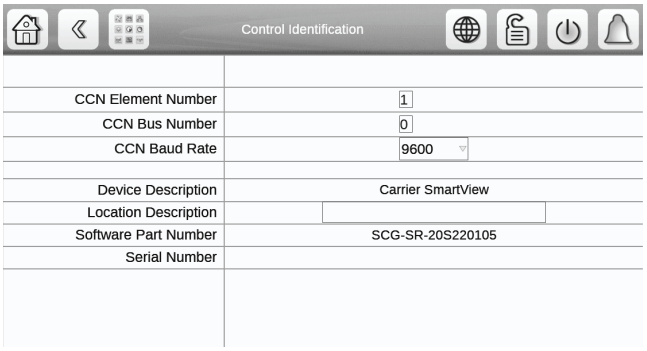


Fig. 55 — Control Identification Screen

PROGNOSTICS

This diagnostic and prognostic function is designed for service and to help resolve problems before they affect operating efficiency and chiller life. The CONF_PRG (Prognostics Config) screen is available from the Configuration Menu. See Fig. 56.

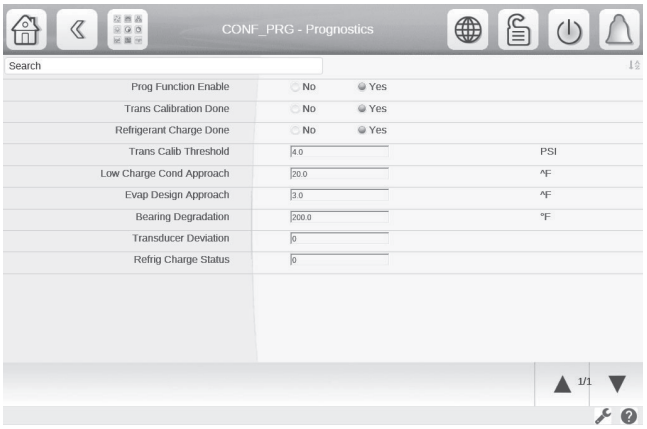


Fig. 56 — Prognostics Config Screen

Refrigerant Transducer Calibration

When the unit is offline for more than 5 minutes, a comparison is made among the evaporator, condenser, and economizer refrigerant pressure transducers. A difference of more than the configurable threshold set in the Trans Calib Threshold option generates an alert 161 that a calibration is required. The comparison is done for all of the transducers.

A value more than the configurable threshold displays the red light in for Refrigerant Transducer Calibration in the Prognostics status screen. A value more than 0.9 times the configurable threshold displays the yellow light in the Prognostics status screen. A value less than 0.9 times the configurable threshold displays the green light in the Prognostics status screen.

When the light is red or yellow, the Trans Calibration Done flag is set to NO by the controller. After transducer re-calibration, the Trans Calibration Done flag should be set to YES manually. The controller then changes the Refrigerant Transducer Calibration light to green.

Refrigerant Charge

This function uses the evaporator approach (Evap Design Approach) setting and compressor discharge temperature (Bearing Degradation) setting in relation to the condenser refrigerant temperature (Low Charge Cond Approach) setting to generate Alert 162 of possible low refrigerant charge and display the red light based on the following conditions:

- compressor is running but not in ramp loading status; and
- condenser approach is greater than 0.9 times the low refrigerant charge condenser approach threshold; and
- evaporator approach is 2°F (1.1°C) greater than design approach (ap_dgap)

The Refrigerant Charge yellow light is displayed under the following conditions:

- compressor is running but not in ramp loading status; and
- condenser approach is greater than low refrigerant charge condenser approach threshold (rch_cath); and
- evaporator approach is 1.8°F (1°C) greater than design approach (ap_dgap)

When light is red or yellow, the Refrigerant Charge Done flag is set to NO by controller. After the refrigerant charge is completed, the Refrigerant Charge Done flag should be set to YES manually. The controller then changes the Refrigerant Charge light to green.

PRIMARY/SECONDARY CONTROL

This control, available from page 2 of the Configuration Menu, provides the capability to operate 2 chillers in primary/secondary mode. The secondary chiller should be set to NETWORK mode and controlled by the primary chiller.

The two chillers can be configured to be in parallel or in series. When they are in series mode, the primary chiller's evaporator must be downstream. The user can configure which condenser (primary or secondary) is downstream. The primary chiller shall monitor all external commands such as start/stop, demand limiting, or setpoint configuration.

The primary/secondary function provides the ability to select a lead chiller from the primary and the secondary chillers. Selection is based on the delta between the primary and the secondary run hours, and tries to optimize the runtime hours. If this function is not set, the lead chiller is always the primary chiller and should be changed to lag in case of failure.

The lead chiller shall always be started first, and the lag chiller shall be maintained at zero percent capacity. When the lead chiller cannot be loaded anymore, then the lag start timer is started. The lag chiller shall always be stopped prior to lead chiller.

If a communication failure is detected between the primary and the secondary chillers, all primary/secondary functions are disabled and chillers return to stand-alone operations until communication is reestablished. If middle sensor is installed, this, among other things, can be configured in the Primary/secondary Config table. Figures 57 and 58 show Primary/Secondary Config options.

Fig. 57 — Primary/secondary Config Screen, Page 1

Fig. 58 — Primary/secondary Config Screen, Page 2

Displaying Data Trends

The PIC6 control system offers the ability to configure and display color-coded system trends without a password. Select ***Main Menu → Trending***.

On the Trending screen (see Fig. 59), check the data to be tracked, and set the beginning and end points for the selected data. To change a data color, select the colored square and choose a new color from the pop-up color bar. To view data trends, select the down arrow at the bottom right of the Trendings screen. The next page displays the selected data in the chosen colors. See Fig. 60-61.

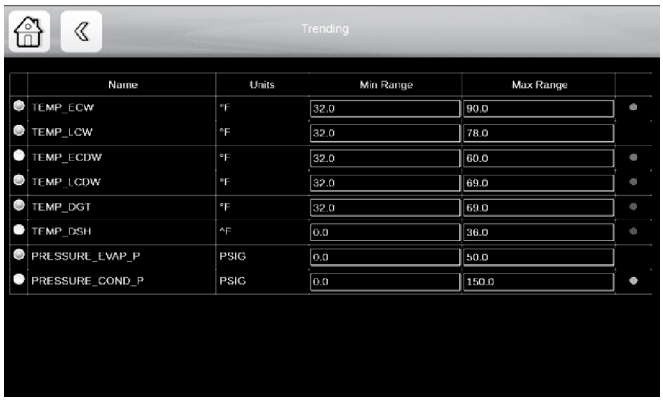


Fig. 59 — Trending Screen Set-Up Page

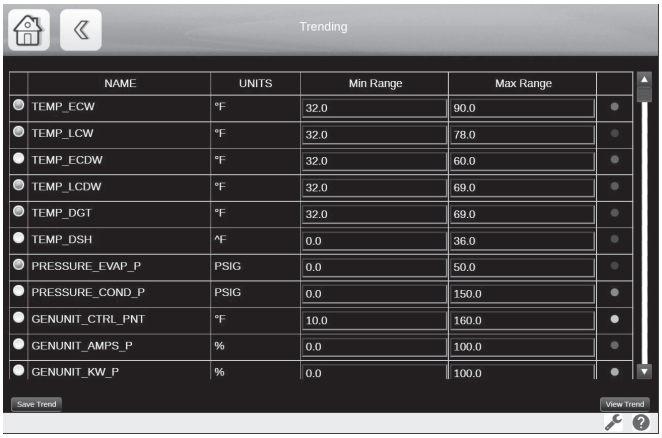


Fig. 60 — Trending Screen

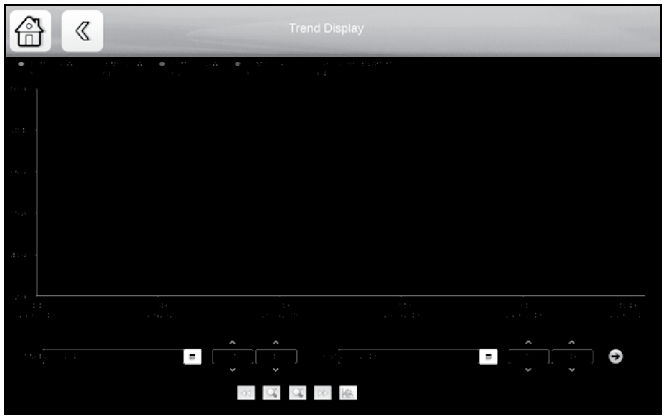


Fig. 61 — Trending Display

Hydraulic Option

With IOB4 board installed and enabled the PIC6 controller can provide information about the heat exchangers pressure drop and water flow. There are several configurable options available which can be configured in the Option 2 table. See Fig. 62.

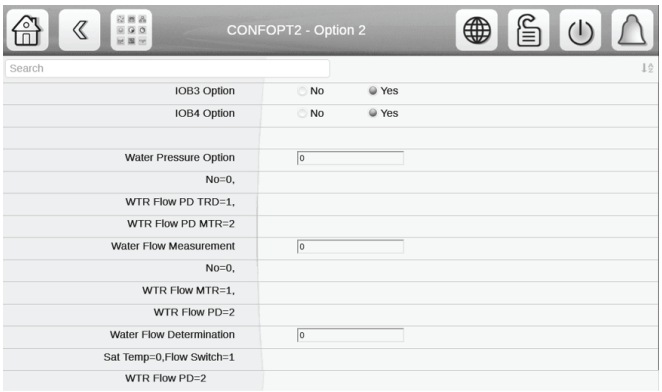


Fig. 62 — Option 2 Table

WATER PRESSURE OPTION

Pressure drop transducer are installed into each waterbox nozzle and wired as per 4IOB schematic for EVAP_EPW and LWP and COND_ENW and LWP.

Water Pressure Option = 1 (WTR Flow PD TRD) – Water flow pressure drop transducer.

Pressure transducers should be installed as shown in Fig. 63.

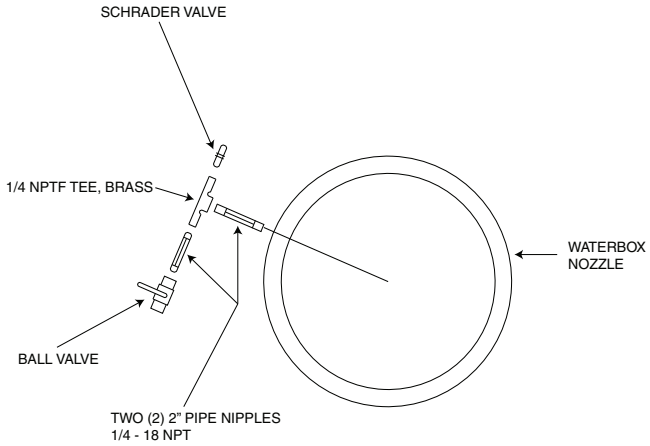


Fig. 63 — Suggested Installation of Pressure Transducers into Water Nozzles Using Flushable Dirt Leg Trap

Water Pressure Option = 2 (WTR Flow PD XMTR) – Water Flow Pressure Differential Transmitter.

Pressure drop is monitored with a 4-20 mA differential pressure meter. For this option the Water Pressure Drop @ 20 mA must be configured in the Option 2 menu and inputs connected to EVAP_FL and COND_FL. See Fig. 64.

Fig. 64 — Water Pressure Drop Measurement

WATER FLOW MEASUREMENTS

Water flow measurements can be done either by pressure differential or 4-20 mA flow meter input. See Fig. 65-70.

Water Flow Measurement = 2 (WTR Flow PD)

For Water Flow Measurement = 2 the Water Pressure Option must be different than 0.

For flow measurement with pressure transducer, a pressure drop and associated flow value have to be configured for the evaporator /condenser. Wire pressure transducers as per 4IOB schematic.

For flow measurement with pressure transmitter, additionally the Water Pressure Drop @ 20 mA will need to be configured and the transmitter wired to EVAP_FL and COND_FL as per IOB4 schematic.

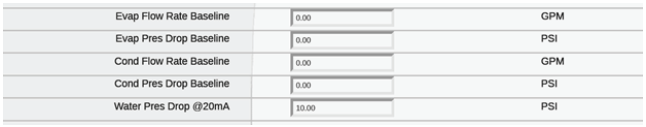


Fig. 65 — Water Flow PD Measurements

For flow measurement with flow meter; i.e., Water Flow Measurement = 1 (WTR Flow Meter) .

Configuring this option allows a flow meter to be installed in accordance with 4IOB Schematic (see Cond_FL and Evap_FL). Once water flow measurement option is configured the following values also require configuration to properly scale the 4-20 mA signal:

Fig. 66 — Water Flow Meter Measurements

WATER FLOW DETERMINATION

Default water flow determination is 0=Saturated Temperature. Flow determination can also be done with either Flow Switches or Water Flow Pressure Drop. For flow switch, a normally open dry contact provides an input to the IOB to confirm water flow as per the wiring schematic.

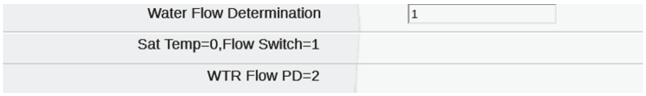


Fig. 67 — Determination with Flow Switches or Water Flow DP

VALIDATE

For any of above selected options user needs to enter the Hydraulic Status menu with pumps running and view the appropriate parameters and validate that they make sense prior to startup.

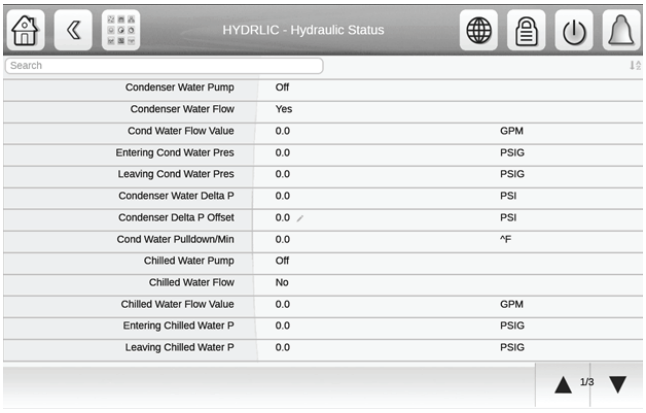


Fig. 68 — Hydraulic Status, Page 1

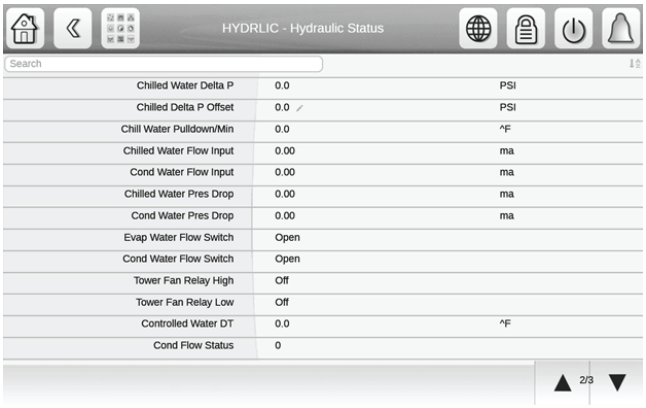


Fig. 69 — Hydraulic Status, Page 2

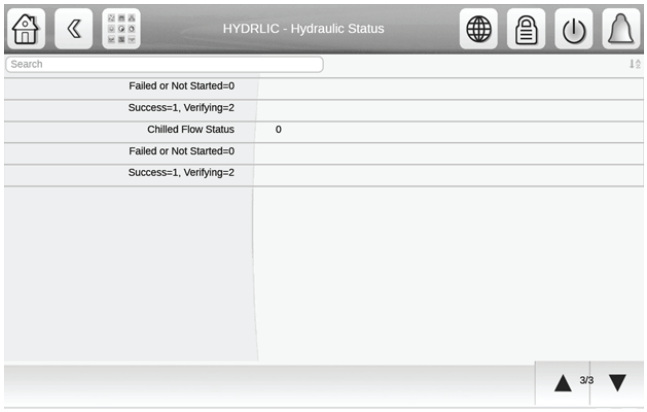


Fig. 70 — Hydraulic Status, Page 3

DIAGNOSTICS AND TROUBLESHOOTING

The 19MV PIC6 control system has many fault tracing aid functions. The local interface and its various menus give access to all unit operating conditions.

If an operating fault is detected, an alarm is activated. The alarm code is displayed in the Alarms menu, sub-menus Reset alarms and Current alarms. The control may record up to 10 current alarms and alerts.

Displaying Alarms

The alarm icon  on the interface (see the section “ICONS” on page 19) indicates unit status as follows:

- A flashing red LED shows that the unit is operating but there is an alert.
- A steady red LED shows that the unit has been shut down due to a fault.

The Reset Alarms option on the main menu displays up to five alarm codes that are active on the unit. Table 15 lists alarm codes.

Resetting Alarms

When the cause of the alarm has been identified and corrected, the alarm can be reset either automatically or manually (depending on the type of alarm). See Table 15 for alarms that are eligible for automatic reset.

In the event of a power supply interrupt, if Auto Restart Option is set to ENABLE in the Option Configuration menu, the unit restarts automatically without the need for an external command. A manual reset must be run from the main menu via the Reset Alarms Feature. Once the alarm has been corrected or reset, all information regarding solved alarms is stored in the Alarm History. Alarm History will store last 50 alarms even after alarms have been corrected or reset.

Alarm/Alert Codes

Table 15 lists PIC6 alarm codes. Table 16 lists PIC6 alert codes. These do not cause machine shutdown and are automatically reset when the situation returns to normal.

Table 15 — PIC6 Alarm Codes

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alm-200	Sensor Fault - Leaving Chilled Water	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if leaving chilled water temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Leaving Chilled Water Temperature Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-201	Sensor Fault - Entering Chilled Water	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if entering chilled water temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Entering Chilled Water Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-202	Sensor Fault - Leaving Cond Water Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, chiller is in heating mode, and entering water temp control is disabled, if leaving condenser water temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Leaving Cond Water Temp Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-203	Sensor Fault - Entering Cond Water Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, chiller is in heating mode, and entering water temp control is enabled, if entering condenser water temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Entering Cond Water Temp Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-204	Sensor Fault - Comp Discharge Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if compressor discharge temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Comp Discharge Temp Sensor and connector. Check for disconnected, grounded, or shorted wiring.
Alm-207	Sensor Fault - Evap Refrig Liquid Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if evap refrigerant liquid temperature is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Evap Refrig Liquid Temp Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-212	Sensor Fault - Comp Motor Winding 1 Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if compressor motor temperature 1 is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Compressor Motor Temp 1 Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-213	Sensor Fault - Comp Motor Winding 2Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if compressor motor temperature 2 is outside range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F.	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Compressor Motor Temp 2 Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-215	Sensor Fault - Condenser Pressure	Tested when compressor is on and run status and communication between Main board and IOBs is ok. If chiller type is 19MV then if the condenser transducer voltage outside range of 0.3V to 4.67V else if the condenser transducer voltage outside range of 0.3V to 4.75V.	Automatic when the voltage reading is inside the range of 0.3V to 4.75V.	Unit shuts down. Alarm relay turns on.	Check condenser pressure transducer wiring. Confirm that 5 V reference signal is available between IOB connector. Check for disconnected, grounded, or shorted wiring. Check for condensation in transducer connector.
Alm-216	Sensor Fault - Evaporator Pressure	Tested when compressor is on and run status and communication between Main board and IOBs is ok. If chiller type is 19MV then if the evaporator transducer voltage outside range of 0.3V to 4.67V ELSE if the evaporator transducer voltage outside range of 0.3V to 4.75V.	Automatic when the voltage reading is inside the range of 0.3V to 4.75V.	Unit shuts down. Alarm relay turns on.	Check Evaporator pressure transducer wiring. Confirm that 5 V reference signal is available between IOB connector. Check for disconnected, grounded, or shorted wiring. Check for condensation in transducer connector.
Alm-217	Sensor Fault - Economizer Pressure	Economizer transducer voltage is outside the range of 0.3V to 4.75V.	Automatic when the voltage reading is inside the range of 0.3v to 4.75V.	Unit shuts down. Alarm relay turns on.	Check communication wires with IOB. Check if the economizer transducer voltage on if it is outside the range 0.3V to 4.75V.
Alm-228	Sensor Fault - Common CHWS Temp	Tested when compressor is on and run status and communication between Main board and IOBs is ok, if CHWS temperature is outside the range of –39.5 to 244.5°F.	Automatic when the temperature reading is inside the range of –39.5 to 244.5°F	Unit shuts down. Alarm relay turns on.	Check sensor resistance. Check for proper wiring between Entering Cond Water Temp Sensor and IOB connector. Check for disconnected, grounded, or shorted wiring.
Alm-231	Prestart Failure - High Motor Temperature	Tested only on prestart condition if all of the motor temperature sensors are in the range AND if COMP MOTOR WINDING TEMP ≥ MOTOR TEMP OVERRIDE – 10°F.	Manual	Unit shuts down. Alarm relay turns on.	Check Comp Motor Wind Temp in Temperature screen. Check motor temperature sensor for wiring and accuracy to IOB connector. Check motor cooling line and isolation valves for proper operation or restrictions. Check refrigerant filter/drier. Check for excessive starts within a short time span. Check Comp Motor Temp Override setting.
Alm-232	Prestart Failure - High Discharge Temp	Tested only on prestart condition, if the compressor discharge temperature sensors are in the range AND if COMP DISCHARGE TEMP ≥ COMP DISCHARGE ALERT – 10°F.	Manual	Unit shuts down. Alarm relay turns on.	Check Comp Discharge Temp in screen. Allow compressor discharge temperature sensor to cool. Check compressor discharge temperature sensor wiring and accuracy to IOB connector. Check for excessive starts. Check Comp Discharge Alert setting.

Table 15 — PIC6 Alarm Codes (cont)

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE

Alm-233	Prestart Failure - Low Refrigerant Temp	Tested only on prestart condition, if Evaporator pressure sensor and temperature sensor are in the range
		AND
		{
		if EVAP_SAT < refrig trip + REFRIG OVERRIDE DELTA T
		OR
		EVAP REFRIG LIQUID TEMP < refrig trip + REFRIG OVERRIDE DELTA T
		}
		refrig trip = 33°F for water and configurable for brine.
			Manual	Unit shuts down. Alarm relay turns on.	Check Evaporator Pressure, Evap Sat Refrig Temp, and Evap Refrig Liquid Temp. Check REFRIG OVERRIDE DELTA T and EVAP REFRIG TRIPPOINT in configuration screen. Check refrigerant charge. Check for low chilled water supply temperatures. Check Evaporator Pressure transducer and Evaporator Refrigerant Liquid Temperature sensor wiring and accuracy.

Alm-234	Prestart Failure - Low Line Voltage	Tested only on prestart condition, if ACTUAL LINE VOLTAGE ≤ UNDERVOLTAGE THRESHOLD NOTE: When VFD OPTION is set to Rockwell or Eaton, this prestart check will be ignored.	Manual	Unit shuts down. Alarm relay turns on.	Check ACTUAL LINE VOLTAGE. Check voltage supply. Check voltage transformers and switch gear. Consult power utility if voltage is low.
Alm-235	Prestart Failure - High Line Voltage	Tested only on prestart condition, if ACTUAL LINE VOLTAGE ≥ OVERVOLTAGE THRESHOLD NOTE: When VFD OPTION is set to Rockwell or Eaton, this prestart check will be ignored.	Manual	Unit shuts down. Alarm relay turns on.	Check ACTUAL LINE VOLTAGE. Check voltage supply. Check voltage transformers and switch gear. Consult power utility if voltage is high.
Alm-236	Guide Vane 1 Calibration Not Completed	Tested on control test mode or prestart check, if Guide vane 1 calibration failed. For over-driven protection, if IGV1 is not calibrated, and chiller is OFF and not in Control Test Mode, IGV1 shall be commanded to close for 5 minutes. After 5 minutes, report alarm.	Manual	Unit shuts down. Alarm relay turns on.	Guide Vane 1 Calibration in Quick Calibration screen. Check guide vane actuator feedback potentiometer and wiring to IOB connector.
Alm-238	Guide Vane 2 Calibration Not Completed	Tested on control test mode or prestart check, if Guide vane 2 calibration failed. For over-driven protection, if IGV2 is not calibrated, and chiller is OFF and not in Control Test Mode, IGV2 will close for 5 minutes. After 5 minutes, report alarm.	Manual	Unit shuts down. Alarm relay turns on.	Guide Vane 2 Calibration in Quick Calibration screen. Check guide vane actuator feedback potentiometer and wiring to IOB connector.
Alm-242	EXCSV Calibration Not Completed	EXCSV input feedback sensor calibration failed	Manual	Startup delayed; compressor will not run	Check Quick calibration menu, position and voltage 0-10V; check wiring to IOB.
Alm-243	Power Panel Over Temperature	Power Panel Temperature Switch is open (0)	Manual	Unit Shuts down. Alarm relay turns on	Check power panel Thermal Switch. Check Power panel Exhaust Fan.
Alm-251	Protective Limit - Low Chilled Water Flow	CHW_FLOW = FALSE and 5 seconds after CHWP =ON and water flow verify time passed.	Manual	Unit shuts down. Alarm relay turns on.	Perform Chilled Water pump test in Quick Test screen. Check Evap Refrig Liquid Temp and Leaving CHILLED WATER temperature sensor accuracy and wiring to IOB. Check chilled water valves, pumps, and strainers. Check EVAP REFRIG TRIPPOINT, EVAP APPROACH ALERT, EVAP FLOW DELTA P CUTOUT, and WATER FLOW VERIFY TIME settings. Check load resistors, optional water flow switches or water flow delta P transducer calibration and wiring to IOB. Check for 5.0 V reference voltage between IOB connectors.
Alm-252	Protective Limit - Low Condenser Water Flow	CDW_FLOW = FALSE and 5 seconds after CDWP = ON and water flow verify time passed.	Manual	Unit shuts down. Alarm relay turns on.	Perform Condenser Water pump test in Quick Test screen. Check CONDENSER PRESSURE transducer and LEAVING CONDENSER WATER temperature sensor accuracy and wiring. Check condenser water valves and strainers. Check COND PRESS OVERRIDE, COND APPROACH ALERT, COND FLOW DELTA P CUTOUT, and WATER FLOW VERIFY TIME settings. Check load resistors, optional water flow switches or water flow delta P transducer calibration and wiring to IOB. Check for 5.0 V reference voltage between IOB connectors.
Alm-253	Protective Limit - High Discharge Temp	If compressor discharge temperature sensor is in the range AND Compressor discharge temp > 167°F (For legacy chiller, this value is 220°F)	Manual	Unit shuts down. Alarm relay turns on.	Check for closed compressor discharge isolation valve. Check if chiller was operating in surge conditions. Check COMP DISCHARGE TEMP sensor resistance or voltage drop. Check for proper wiring to IOB connectors. Check for proper condenser flow and temperature. Check for fouled tubes, plugged water strainers, or non-condensable in the condenser. Check for COMP DISCHARGE TEMP > 220°F. Check for proper inlet guide vane and optional diffuser actuator operation.

Table 15 — PIC6 Alarm Codes (cont)

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alm-254	Protective Limit - Low Evap Refrigerant Temp	If evaporator pressure and temperature sensors are in range and [If EVAP_T OR EVAP_SAT < 33°F (water) AND EVAP_APP > EVAP_AL) OR If EVAP_T OR EVAP_SAT < Evap Refrig Trippoint (brine) AND (EVAP_APP > EVAP_AL)]	Manual	Unit shuts down. Alarm relay turns on.	Check evaporator set point. Check for proper refrigerant charge. Confirm that all isolation valves are open. Check for fouled tubes and division plate bypass. Check Evap Approach Alert setting in the Protective Limit menu.
Alm-255	Protective Limit - High Motor Temperature	If motor temperature sensor is in the range AND If any of the Compressor motor winding temp >220°F	Manual	Unit shuts down. Alarm relay turns on.	Check COMP MOTOR WINDING TEMP accuracy and wiring to IOB.

Alm-257	Protective Limit - High Condenser Pressure	If condenser pressure sensor is in the range
		AND
		{
		COND_P > COND Pressure Cutout
		(it is Cond Press Cutout Low Press for low pressure condenser configuration and Cond Press Cutout High Press for high pressure condenser configuration)
		}
		19MV default Value 160 PSI
			Manual	Unit shuts down. Alarm relay turns on.	Check CONDENSER PRESSURE. Check for high Condenser Water temperatures, low water flow, fouled tubes. Check for division plate/gasket bypass or plugged condenser water strainers. Check for noncondensables in condenser. Check CONDENSER PRESSURE transducer wiring and accuracy to IOB. Configure COND PRESS OVERRIDE in configuration screen. This Alarm is not caused by the High Condenser Pressure Switch.

Alm-258	Protective Limit - Spare Safety Device	Spare safety input in IOB3 goes to CLOSED	Manual	Unit shuts down. Alarm relay turns on.	Spare safety input has been closed.
Alm-259	Protective Limit - Excessive Compressor Surge	If SURGE COUNTS exceed 4 within a SURGE TIME PERIOD on the condition that guide vane and VFD and EXCSV cannot be activated for surge protection OR If SURGE PROTECTION COUNTS exceed 20 within a SURGE TIME PERIOD. If vfd_opt is enabled, then VFD speed should be maximum before tripping this alarm.	Manual	Unit shuts down. Alarm relay turns on.	Five SURGE PROTECTION COUNTS occurred within SURGE TIME PERIOD. VFD Only: Surge prevention alarm declared when ACTUAL VFD SPEED is at least 90%. Check for high condenser water temperatures, low water flow, fouled tubes. Check CONDENSER APPROACH. Check condenser water strainers. Check for division plate/gasket bypass. Check for noncondensables in condenser. Check surge prevention parameters in OPTIONS screen. Compare cooling tower control settings and performance against design/selection temperatures across the entire operating range of the chiller. Check EVAPORATOR APPROACH and chilled water flow.
Alm-260	Protective Limit - Compressor Start Relay Start failure	START_OK is still not TRUE after 2 minute compressor start relay energized	Manual	Unit shuts down. Alarm relay turns on.	Check motor starter 1M contactor wiring Check ISM current sensors

Alm-261	Protective Limit - Evaporator Frozen	If evaporator refrigerant temperature and evaporator pressure sensor is in the range
		AND
		{
		If the lesser of evaporator refrigerant temperature and the saturated temperature is less than evaporator refrigerant trip point plus 1°F
		}
		This alarm is also effective on pumpdown/lockout.
			Manual	Unit shuts down. Alarm relay turns on.	Check CALC EVAP SAT TEMP, EVAP REFRIG LIQUID TEMP, and EVAP REFRIG TRIPPOINT. Check for proper refrigerant charge. Check float valve operation. Confirm that optional refrigerant liquid line isolation valve is open. Check for proper Chilled Water flow and temperature. Confirm that condenser water enters bottom row of condenser tubes first; reversed condenser water flow may cause refrigerant to stack in the condenser. Check EVAPORATOR PRESSURE transducer and EVAP REFRIG LIQUID TEMP sensor. Check for evaporator water box division plate gasket bypass. Check for fouled tubes.

Alm-265	Protective Limit - Refrigerant Leak	REFRIGERANT LEAK OPTION is ENABLED and REFRIGERANT LEAK SENSOR > REFRIG LEAK ALARM mA (leak_ma)	Manual	Unit shuts down. Alarm relay turns on.	REFRIGERANT LEAK OPTION is Enabled and the REFRIGERANT LEAK SENSOR output exceeded REFRIGERANT LEAK ALARM mA. Check for refrigerant leaks. Check leak detector for proper operation. Check REFRIGERANT LEAK ALARM mA setting in the OPTIONS screen. Check 4-20 mA or 1-5 V output from refrigerant leak sensor to IOB J15-5. Confirm that IOB SW2 dip switch 1 is in the correct position.
Alm-266	Protective Limit - IOB Low Voltage	A low voltage flag is set to TRUE (low_volX = true)	Automatic	Unit shuts down. Alarm relay turns on.	Check IOB 24VAC power supply and the transformer output voltage.

Table 15 — PIC6 Alarm Codes (cont)

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alm-267	Protective Limit - Guide Vane 1 Fault	If compressor type is dual stage compressor AND If ACTUAL GUIDE VANE POS is out of range of (gv1stpos+-1.0%) after 4 minutes of action. During Startup, prior to energizing refrigerant pump, guide vanes commanded to Guide Vane Closure at Startup (gv1stpos). For over-driven protection, if IGV1 is calibrated, and chiller is OFF. When 5 minutes expired, if IGV1 feedback is still > 2%, report this alarm.	Manual	Unit shuts down. Alarm relay turns on.	Alarm before start indicates guide vane opening has not closed to less than 4%. Alarm while running indicates guide vane position is < -1% or > 103%. Enter Quick Calibration and conduct Guide Vane Calibration. Check wiring between the guide vane feedback potentiometer and IOB terminals. Check the ohm guide vane position feedback potentiometer or 4-20 mA current.

Alm-270	Protective Limit - High Cond Water Flow	If condenser water sensor option is enabled and condenser water pressure sensors are in the range
		AND
		{
		CDW_PD > COND_VAL for 2 minutes when compressor is running, with cond_alm = enabled
		}
			Manual	Unit shuts down. Alarm relay turns on.	Check condenser water pressure sensor and wiring.

Alm-271	Protective Limit - Emergency Stop	When EMSTOP from NETWOR is changed to TRUE by network command OR Remote emergency stop contact is changed to Closed	Manual	Unit shuts down. Alarm relay turns on.	Check EMSTOP command form network and the remote stop dry contact from IOB.
Alm-273	Protective Limit - Swift Restarts Limit Exceeded	Chiller swift restart counter > 4 in 1 hour	Manual	Unit shuts down. Alarm relay turns on.	Check the reason why swift restart happens so frequently.
Alm-274	Protective Limit –Chiller Lockout	Chiller lockout input in IOB1 goes to CLOSED	Manual	Unit shuts down. Alarm relay turns on.	Check chiller lockout input in IOB.
Alm-275	Protective Limit – Fire Alarm	Fire alarm input in IOB1 goes to CLOSED	Manual	Unit shuts down. Alarm relay turns on.	Check fire alarm input in IOB.
Alm-276	Protective Limit –Stop Override	Stop override (stp_over) is enabled	Manual	Unit shuts down. Alarm relay turns on.	Check stop override point status in GENUNIT Table on page 53.
Alm-278	Protective Limit - VFD Config Conflict	Configurations in configuration table are different from configurations in maintenance table for Carrier LV32 VFD (DCIB board) configurations	Manual	Unit shuts down. Alarm relay turns on.	Reset shall be automatic when communication comes back to normal.
Alm-279	Protective Limit - VFD Config Failure	VFD configuration value on PIC6 exceeds limitation of VFD	Manual	Unit shuts down. Alarm relay turns on.	Check VFD Configurations and save it again.
Alm-280	Protective Limit – High VFD Speed	ACTUAL VFD SPEED is greater than the TARGET VFD SPEED +10% for 75 seconds when chiller has been running for at least 3 minutes.	Manual	Unit shuts down. Alarm relay turns on.	Check VFD actual speed.
Alm-283	Protective Limit - High Pressure Switch	High pressure switch goes to OPEN	Manual	Unit shuts down. Alarm relay turns on.	Check high pressure switch for NGC chiller.
Alm-292	Protective Limit - Guide Vane 2 Fault	Over-driven protection if IGV2 is calibrated and chiller is OFF. After 5 minutes, if IGV2 feedback is still > 2%, report this alarm.	Manual	Unit shuts down. Alarm relay turns on.	Alarm before start indicates guide vane opening has not closed to less than 4%. Alarm while running indicates guide vane position is < –1% or > 103%. Enter Quick Calibration and conduct Guide Vane Calibration. Check wiring between the guide vane feedback potentiometer and IOB terminals. Check the 4-20 mA current.

Alm-296	Protective Limit - High Evaporator Pressure	If evaporator pressure sensor is in the range
		AND
		{
		EVAP_P > High Evap Press Cutout
		}
		(if chiller type is 19DV, use 'Hi Evap Pre Cutout DV' instead)
			Manual	Unit shuts down. Alarm relay turns on.	Check evaporator pressure sensor input; check evaporator pressure cutout configurations.

Alm-297	Protective Limit -High Entering Condenser Water Recycle Shutdown	High Entering Condenser Water Alarm is set if either conditions is met: Condition 1: Maximum motor over speed has been reached and maintained (actual VFD Speed is between 99.9% to 100% for 3 scans) AND jPeak OR kPeak is greater than Shaft Displacement Limit (Shaft Displacement Limit is a configurable parameter in the Service screen with range between 4 and 10 and default value of 6) Condition 2: Maximum motor over speed has been reached and maintained (actual VFD Speed is between 99.5% to 100% for 3 scans) AND Actual DTS > Calculated DTS + DTS High Recycle offset (DTS High Recycle offset: is a configurable parameter in the Service screen with range between 0 and 3 and default value of 1)	Recycle Startup	Unit shuts down. Alarm relay turns ON.	Limits values from Shaft displacement. jPeak, kPeak, and DTS are greater than the calculated value.
Alm-302	Loss of Communication With IOB2	Communication between main controller with IOB2 lost for 10 consecutive seconds OR IOB2 (address 118) is not searched	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Bus installation fault or defective secondary board.

Table 15 — PIC6 Alarm Codes (cont)

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alm-303	Loss of Communication With IOB3	Communication between main controller with IOB3 lost for 10 consecutive seconds OR IOB3 (address 119) is not searched	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Bus installation fault or defective secondary board.
Alm-304	Loss of Communication With IOB4	If IOB 4 is configured AND {Communication between main controller with IOB4 lost for 10 consecutive seconds OR IOB4 (address 120) is not searched}	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Bus installation fault or defective secondary board.
Alm-306	Loss of Communication With SIOB	If SIOB is configured AND {Communication between main controller with SIOB lost for 10 consecutive seconds OR SIOB (address 49) is not searched}	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Bus installation fault or defective secondary board.
Alm-307	LEN Scan Error	LEN communication error and LEN scan has been stopped.	Manual	Unit shuts down. Alarm relay turns on.	Check LEN bus hardware physical wiring and software log.
Alm-311	Loss of Communication With Danfoss VFD	If (vfd_opt = 7) AND {LEN side Communication error with VFD lost for 14 [default, can be configurable] consecutive seconds}	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Check LEN communication cables secondary board defective.
Alm-320	Lost communication with MBC	Communication Drives have not received a valid response in 2 min from MBC	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Check wiring connections, defective MBC board.
Alm-321	Lost communication with UPS	UPS Loss Communication Alarm = TRUE if communication driver does not receive a valid response in 2 min from UPS.	Automatic when communication comes back to normal	Unit shuts down. Alarm relay turns on.	Check wires and connections to UPS.
Alm-455	MBC Fault - SHUT DOWN	MBC Fault indicates that a critical alarm is detected by MBC and the compressor should be stopped.	Manual	Unit shuts down. Alarm relay turns on.	Check wires; MBC board status light; alarms; defective board.
Alm-456	MBC Unable to Levitate	MBC fails to levitate	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-457	MBC J Bearing Coil Temp Fail	MBC J Bearing Temp ≥ 230°F	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-458	MBC H Outboard Bearing Temp Fail	H Outboard Bearing Temp ≥ 230°F	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-459	MBC H Inboard Bearing Temp Fail	H Inboard Bearing Temp ≥ 230°F	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-460	MBC K Bearing Coil Temp Fail	K Bearing Temp ≥ 230°F	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-461	MBC Coldplate Temp Fail	Coldplate Temp ≥ 158°F	Manual	Unit shuts down. Alarm relay turns on.	Check MBC status. Consult Service Engineering.
Alm-462	MBC Calibration Failed	Chiller not charged, MBC or chiller is not off state. calibration process more than 300s, MBC calibration stopped manually, chiller abort at startup of MBC auto calibration process, calibration not enabled during startup.	Manual	Calibrate MBC again.	Sensor shift or damage. Consult Service Engineering.
Alm-464	MBC Speed Signal Alarm	Speed mismatch between MBC and VFD ≥ 10%	Manual	Unit shuts down and goes into Alarm.	If mismatch is determined to be due to MBC sensor the Speed Sensor Option can be disabled in MBC Configuration until repair is possible.
Alm-465	MBC De-Levitated Without Command	Rotor shaft was detected de-levitated without drop command.	Manual	Unit shuts down and goes into Alarm.	Troubleshoot MBC.
Alm-466	MBC Config Unsuccessful	MBC Configuration Status < –1 after MBC Configuration ID sent to MBC	Manual	System waits for MBC to return a non-zero value on MBC Configuration Status and sets this alarm.	Verify system level components and compatibility between PIC6 software and MBC controller software.
Alm-467	MBC Unintentional Shaft Rotation	NOTE: Only checked when chiller is not in startup, shutdown, or quick test process. If MBC is de-levitate status, If VFD target speed percent < 1%, If MBC Speed Signal ≥ 100RPM (or VFD actual speed percent > 3.3 Hz)	Automatic	PIC6 will command MBC to levitate when Alarm is ON, and command MBC to de-levitate when alarm is OFF.	Check each of the criteria for trip to determine cause of shaft rotation. Check MBC speed sensor.
Alm-468	MBC Calibration Fail - Reset MBC Power	MBC calibration failed because of calibration limit faults and has already tried 3 times	Manual	Calibrate MBC again.	Remove all power (including UPC power) and wait until all capacitor power has dissipated prior to turning power back on then retry calibration.
Alm-469	MBC Loss of Speed Sensor Fault	MBC Sensor is enabled and MBC modbus Latchsta03 bit 15 in ON	Automatic	Unit shuts down. Alarm relay turns on.	Check wires, connections, terminals to the MBC board.
Alm-470	MBC Drop Counter Fault	Alarm is on if MBC modbus Latchstat10 bit 7/8/9 is ON.	Manual	Unit shuts down. Alarm relay turns on.	
Alm-471	MBC No Clearance Check Baseline Data	The clearance average radius for ANY bearing has a difference of 7.5% or more in comparison with the Baseline Clearance Check Data.	Automatic		Perform a clearance check again.
Alm-472	MBC Clearance Check Failure (Compare to Baseline)	Alarm is active if the Clearance Average Radius for any bearing has a difference of 7.5% or more in comparison with the baseline Clearance Check data	Automatic		Repeat clearance check procedure. If still in Alarm contact Carrier Service.

Table 15 — PIC6 Alarm Codes (cont)

ALARM CODE	DESCRIPTION OF ALARM TEXT	CRITERION FOR TRIP	ALARM RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alm-480	Multiple Power Failure Alarm	System Power-loss Counter ≥ Multiple Power Failure Threshold (default = 5) within Multiple Power Failure Duration (default = 24 hours)	Automatic	Alarm is triggered to prevent chiller startup.	Verify system power supply.
Alm-481	UPS Battery Replacement Alarm	Time since UPS Battery Replacement Alert was set is greater than 2 weeks.	Manual	Replace battery and reset alarm.	UPS Battery has aged and needs to be replaced.
Alm-482	UPS Battery Low Alarm	UPS Battery Charging Level is below UPS Battery Threshold	Automatic	UPS Battery Low Alarm is triggered; unit shuts down.	Replace UPS battery.
Alm-483	UPS Alarm	UPS Hardware Fault Utility Voltage out of range Utility Frequency out of range Inverter is off Battery Runtime lower than threshold Battery Over Temperature warning is set at 60°C (140°F) and UPS shuts down at 113°C (235°F). Battery not present.	Manual	Chiller Alarm is triggered and cannot be restarted until alarm is cleared.	Verify each of the causes that can cause the alarm to trip.

NOTE: Some alarm codes (identified in the Reset Type column) are eligible for Swift Restart when the Auto Restart option is enabled. The Swift Restart algorithm allows for quicker restart and decreases the normal start-up delays and verification times.

Table 16 — PIC6 Alert Codes

ALERT CODE	DESCRIPTION OF ALERT TEXT	CRITERION FOR TRIP	ALERT RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alt-100	Prestart Alert - Starts Limit Exceeded	Chiller is in prestart process (not in swift restart) and excessive restart are NO, if STARTS IN 12 HOURS > 24.	Automatic when STARTS IN 12 HOURS <8	Alert Relay shall be turned ON, delay to startup	Check STARTS IN 12 HOURS in Run times screen. Enable the “Enable Excessive Starts” option in “service” menu if additional start is required. (Recycle restarts and auto restarts after power failure are not counted.)
Alt-102	Prestart Alert - High Condenser Pressure	For 19MV the default value for Cond pressure override is 160 psig.	Automatic	Alert Relay shall be turned ON, delay to startup	High condenser water temperature.
Alt-103	Prestart Alert - Excessive Recycle Starts	Number of recycle restarts in the last 4 hours is greater than 5 or number of recycle restarts in the last 1 hour is greater than 4 or Frequent Start Option is enabled.	Automatic	Alert Relay shall be turned ON, delay to startup	Chiller load is too low to keep compressor on line and there has been more than 5 starts in 4 hours. Increase chiller load, adjust ecv to open at a higher load, increase recycle RESTART DELTA T in service menu.
Alt-105	MBC Unable to De-Levitate	MBC fails to de-levitate and there are any levitation faults.	Manual when the user resets alert	Alert Relay shall be turned ON, delay to startup	
Alt-106	MBC Alert	The system shall set the MBC Alert if MBC Alert* from MBC is TRUE.	De-levitate	Alert Relay shall be turned ON, delay to startup	Investigate which MBC alerts are present.
Alt-107	MBC J Bearing Temp Warning	MBC J Bearing Temp ≥ 212°F	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	
Alt-108	MBC H Outboard Bearing Temp Warning	H Outboard Bearing Temp ≥ 212°F	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	
Alt-109	MBC H Inboard Bearing Temp Warning	H Inboard Bearing Temp ≥ 212°F	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	
Alt-110	MBC K Bearing Temp Warning	K Bearing Temp ≥ 212°F	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	
Alt-111	MBC Coldplate Temp Warning	Coldplate Temp ≥ 149°F	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	
Alt-112	MBC Speed Signal Alert	Speed mismatch between MBC and VFD ≥ 5%	Automatic Alert criteria are clear	Alert Relay shall be turned ON, delay to startup	Possible MBC speed sensor issue.
Alt-114	Clearance Check Failed	MBC Clearance Check Status unsuccessful.	Automatic		Clearances are not per allowed settings. Consult Carrier Service.
Alt-115	MBC Not Ready to Levitate	A non-commanded shaft rotation is detected.	Automatic	MBC commanded to levitate the shaft; alert set to indicate Unintentional Shaft Rotation.	
Alt-116	MBC Speed Sensor Disabled	MBC Speed Sensor has been disabled in MBC Configuration menu	Automatic	Alert Relay is turned ON	Speed Sensor has been disabled.
Alt-117	UPS Battery Replacement Alert	UPS Battery Discharge Level less than 90% of discharge rate for 4-minute operation	Manual	Alert is set; reset alarm once battery is replaced."	Replace battery.
Alt-120	Sensor Alert - Remote Temperature Out of Range	Tested when compressor is on all of the run status, if Temp Reset Type is set as Remote Temp type AND if remote temp sensor is outside range of –39.5 to 244.5°F	Automatic when the situation comes back to normal	Alert Relay is ON	Type 2 Temperature Reset is Enabled and Remote Temperature Reset sensor is out of range. Check ENABLE RESET TYPE and TEMPERATURE RESET settings in TEMP_CNTL screen. Check Remote Temperature Reset sensor resistance or voltage drop. Check for proper wiring to CCM J4-13 and J4-14.
Alt-121	Sensor Alert - Auto Water Temp Reset	Tested when compressor is on all of the run status, if Temp Reset Type is set as 4-20 mA type AND if auto water temp reset input is less than 2 mA.	Automatic when the situation comes back to normal	Alert Relay is ON	CheckTemp Reset Configuration Confirm that Auto Water Temp Reset Input is between 4 mA and 20 mA. Confirm that wiring to IOB connector is not grounded.

Table 16 — PIC6 Alert Codes (cont)

ALERT CODE	DESCRIPTION OF ALERT TEXT	CRITERION FOR TRIP	ALERT RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alt-122	Sensor Alert - Auto Demand Limit Input	Tested when compressor is on all of the run status, if Demand Limit Type is set as 4-20 mA type AND if auto demand limit input is less than 2 mA.	Automatic when the situation comes back to normal	Alert Relay is ON	20mA DEMAND LIMIT OPT is Enabled, Ice Build is not Active, and Auto Demand Limit Input on IOB is < 2 mA. Check 20 mA DEMAND LIMIT OPT and DEMAND LIMIT AT 20 mA in Service screen. Confirm that Auto Demand Limit Input is between 4 mA and 20 mA. Confirm that wiring to IOB connector is not grounded.
Alt-123	Sensor Alert - VFD Speed Out Of Range	If the ACTUAL VFD SPEED is less than the TARGET VFD SPEED - (TARGET VFD SPEED*10%) for 75 seconds when the chiller has been running for at least 3 minutes OR VFD_ACT sensor is out of range (VFD_IN < 0V Or VFD_IN > 10.5V)	Automatic when the situation comes back to normal	Alert Relay is ON	Check VFD speed feedback input in ISM.
Alt-125	Sensor Alert - Refrigerant Leak Input	Tested when compressor is on all of the run status, If this input channel is enabled AND If refrigerant leak input is less than 2 mA AND Set Refrigerant Leak Option = Enable	Automatic when the situation comes back to normal	Alert Relay is ON	Check refrigerant leak optional input in IOB.
Alt-127	Sensor Alert - VFD Current Input	If VFD load factor is more than 0.1 if the compressor has not been commanded to Turn ON AND Compressor is not running	Automatic when the situation comes back to normal	Alert Relay is ON	Check VFD current input.
Alt-128	Sensor Alert - High Cond Water Pressure	Tested when compressor is running, Water Pressure Option is enabled CDW_PD > COND_VAL for 2 minutes with cond_alm = disabled	Automatic when the situation comes back to normal	Alert Relay is ON	Check optional condenser water pressure sensor. Check condenser water flow.
Alt-129	Sensor Alert - Leaving Cond Water Temp	Tested when compressor is on all of the run status and chiller is in cooling mode, if leaving condenser water temperature is outside range of –39.5 to 244.5°F	Automatic when the situation comes back to normal	Alert Relay is ON	LEAVING CONDENSER WATER temperature sensor reading is out of range. Check LEAVING CONDENSER WATER sensor resistance or voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-130	Sensor Alert - Entering Cond Water Temp	Tested when compressor is on all of the run status and chiller is in cooling mode, if entering condenser water temperature is outside range of –39.5 to 244.5°F	Automatic when the situation comes back to normal	Alert Relay is ON	Entering Condenser Water temperature sensor reading is out of range. Check Entering Condenser Water sensor resistance or voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-131	Sensor Alert - Entering Cond Water Press	Tested when compressor is on all of the run status, If hydraulic system option is enabled AND If Water Pressure Option is enabled, AND If the entering condenser water transducers voltage outside range of 0.3V to 4.75V	Automatic when the situation comes back to normal	Alert Relay is ON	Check Entering Condenser Water pressure sensor voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-132	Sensor Alert - Entering Chilled Water Press	Tested when compressor is on all of the run status, If hydraulic system option is enabled AND If Water Pressure Option is enabled, AND If the entering chilled water transducers voltage outside range of 0.3V to 4.75V	Automatic when the situation comes back to normal	Alert Relay is ON	Check Entering Chilled Water pressure sensor voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-133	Sensor Alert - Leaving Cond Water Press	Tested when compressor is on all of the run status, If hydraulic system option is enabled AND If Water Pressure Option is enabled, AND If the leaving condenser water transducers voltage outside range of 0.3V to 4.75V	Automatic when the situation comes back to normal	Alert Relay is ON	Check Leaving Condenser Water pressure sensor voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-134	Sensor Alert - Leaving Chilled Water Press	Tested when compressor is on all of the run status, If hydraulic system option is enabled AND If Water Pressure Option is enabled, AND If the leaving chilled water transducers voltage outside range of 0.3V to 4.75V	Automatic when the situation comes back to normal	Alert Relay is ON	Check Leaving Chilled Water pressure sensor voltage drop. Check for proper wiring to IOB. Check for grounded sensor leads.
Alt-135	Sensor Alert - Guide Vane 1 Position	Compressor has completed startup and is running and either of the following occurs: a. GV1_ACT value is less than –1.0% b. GV1_ACT is greater than 103.0% c. The difference of GV1_ACT and GV1_TGT is more than 10% and guide vane is not in FORCE d. INPUTS_GV1_OHMS_enum and QCK_CAL_GV1_OHM_enum are not equal	Automatic when the situation comes back to normal	Alert Relay is ON	Check guide vane 1 position feedback.
Alt-136	Configuration Error - Temp Reset	If reset type is temp reset AND If the configured remote temp (full reset) is greater than or equal to the configured remote temp (no reset)	Automatic when the situation comes back to normal	Alert Relay is ON	Check temp reset configurations.

Table 16 — PIC6 Alert Codes (cont)

ALERT CODE	DESCRIPTION OF ALERT TEXT	CRITERION FOR TRIP	ALERT RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alt-137	Configuration Error - Controlled Water Delta T Reset	If reset type is controlled water delta T reset AND If the configured controlled water delta T (full reset) is greater or equal to than the configured controlled water delta T (no reset)	Automatic when the situation comes back to normal	Alert Relay is ON	Check controlled water temp reset configurations.
Alt-138	Configuration Error – Head Pressure	Head Pres Delta P 0% is bigger than Head Pres Delta P 100%	Automatic when the situation comes back to normal	Alert Relay is ON	Check head pressure configurations.
Alt-139	Sensor Alert - Guide Vane 2 Position	Compressor has completed startup and is running and either of the following occurs: a. GV2_ACT value is less than –1.0% b. GV2_ACT is greater than 103.0% c. The difference of GV2_ACT and GV2_TGT is more than 10% and guide vane is not in FORCE	Automatic when the situation comes back to normal	Alert Relay is ON	Check guide vane 2 position feedback.
Alt-140	Sensor Alert - One Compressor Motor Temp Sensor is out-of-range	One or both Compressor Motor Temperature sensors reports out of range temperature	Automatic	System will not prevent operation if only one Compressor Motor Temperature sensor reports out of range temperature.	Check motor thermistors. Verify motor temperature thermistor ohm values.
Alt-141	Sensor Alert - Motor Temp Sensor Diff Exceeds Limit	Difference between two Compressor Motor Temperature sensors > 100°F.	Automatic	Alert Relay is ON	Check motor thermistors.
Alt-144	Process Alert - High Condenser Refrigerant Level	Condenser Liquid Level > Maximum Lev Sensor Value (default = 3.2V) for more than 30 seconds AND Condenser EXV position > 98% (if EXV is trying to control Liquid Level)	Automatic	Alert Relay is ON	Check EXV operation.
Alt-145	Process Alert - Low Condenser Refrigerant Level	Condenser Liquid Level ≤ Minimum Lev Sensor Value (default = 3.2V) for more than 30 seconds AND Condenser EXV position ≤ Main EXV Min Position (default = 30%) + 5% (if EXV is trying to control Liquid Level)	Automatic	Alert Relay is ON	Add refrigerant charge, check EXV operation.
Alt-150	Process Alert - Low Discharge Superheat	If (DSH < DSH REQUIRED - 3.0) OR (DSH < 1.0F) for 60 seconds	Automatic when the situation comes back to normal	Alert Relay is ON	Check for excess refrigerant charge. Check actual SUPERHEAT in Temperature screen.
Alt-151	Process Alert - High Evaporator Approach	EVAP_APP > EVAP_AL AND (10 minutes after START COMPLETED (START_OK = TRUE) until compressor commanded to stop)	Automatic when the situation comes back to normal	Alert Relay is ON	Check EVAP APPROACH ALERT setting. Check Evaporator Water Flow. Check EVAP REFRIG LIQUID TEMP and LEAVING CHILLED WATER temperature sensor resistances and voltage drop. Check EVAP REFRIG LIQUID TEMP and LEAVING CHILLED WATER temperature sensor wiring to the IOB terminal block. Check for non-condensables and low refrigerant charge. Confirm that the optional refrigerant Liquid Line Isolation Valve is open. Check for float valve operation and for refrigerant stacking in the condenser. Check chilled water valves and strainers. Check for air in the evaporator water box or division plate bypass. Check for fouled tubes.
Alt-152	Process Alert - High Condenser Approach	COND_APP > COND_AL AND (10 minutes after START COMPLETED (START_OK = TRUE) until compressor commanded to stop)	Automatic when the situation comes back to normal	Alert Relay is ON	Check COND APPROACH ALERT setting. Check Condenser Water Flow. Check CONDENSER PRESSURE transducer and LEAVING CONDENSER WATER temperature sensor resistance or voltage drop. Check condenser shell temperature against condenser pressure measured with a refrigerant gage for evidence of non-condensable in refrigerant charge. Check for condenser water box division plate bypass. Check CONDENSER PRESSURE transducer and LEAVING CONDENSER WATER sensor wiring to the CCM. Check for air in the condenser water box. Confirm that the condenser tubes are not fouled.
Alt-157	Process Alert - High Condenser Pressure Chiller Off	CONDENSER PRESSURE is greater than or equal to the CONDENSER PRESSURE OVERRIDE threshold AND the ENTERING CONDENSER WATER Temperature is less than 115°F	Automatic when CONDENSER PRESSURE is less than the (CONDENSER PRESSURE OVERRIDE threshold - 3.5 psi) AND the COND_SAT is less than or equal to the (ENTERING CONDENSER WATER Temperature + 3F)	Alert Relay is ON	Check condenser pressure sensor input. Check condenser pressure override configurations.
Alt-158	Process Alert - Prognostic;	One or more prognostic items are abnormal	Automatic	Alert Relay is ON	Review prognostic menu.

Table 16 — PIC6 Alert Codes (cont)

ALERT CODE	DESCRIPTION OF ALERT TEXT	CRITERION FOR TRIP	ALERT RESET METHOD	ACTION TAKEN BY THE CONTROL	POSSIBLE CAUSE
Alt-161	Process Alert – Transducer Calibration	One of the transducer differentials is more than the configurable threshold (refgc_th)	Automatic	Alert Relay is ON	Do the indicated transducer calibration.
Alt-162	Process Alert – Low Refrigerant Charge	Compressor is running but not in ramp loading status AND Condenser approach is greater than low refrigerant charge condenser approach threshold (rch_cath) AND Evaporator approach is 2°F greater than design approach (ap_dgap)	Automatic	Alert Relay is ON	Recharge the refrigerant into chiller.
Alt-166	Process Alert – Condenser Flushing	Condenser water pump has not operated for 7 days	Automatic	Alert Relay is ON	Flush condenser.
Alt-167	Process Alert – Customer Alert	Customer Alert Option is enabled and Customer Alert input contact is open.	Automatic	Alert Relay is ON	Check Customer Alert input contact.
Alt 168	Process Alert - Low Temp/Potential Cond Freeze-up	Condenser pressure sensor is in range AND Condenser Saturated Temp ≤ Condenser Freeze Point	Automatic when Condenser Saturated Temp > Condenser Freeze Point + 5°F (2.8°C)	Alert Relay turns on and condenser pumps are ON	Cold condenser saturated temperature in Ice duty applications.

Alt-169	Process Alert - High Evaporator Pressure	If evaporator pressure sensor is in the range
		AND
		{
		If the EVAPORATOR PRESSURE is greater than or equal to High Evap Press Override
		}
		(if chiller type is 19DV, use 'Hi Evap Pre Override DV' instead)
			Automatic	Alert Relay is ON	Check evaporator pressure sensor input and check evaporator pressure override configurations.

Alt-170	Master Slave Alert - Master Slave Same Address	Primary and secondary units have the same network address.	Manual	Primary and secondary work independent	Check Primary and secondary address configurations.
Alt-171	Master Slave Alert - Conflict SW Version	Primary and secondary units have different application SW version.	Manual	Primary and secondary work independent	Check Primary and secondary SW version number.
Alt-173	Master Slave Alert - Incorrect Slave Control Type	The secondary chiller is in local or remote or Local Schedule control	Manual	Primary and secondary work independent	Check secondary control type.
Alt-174	Master Slave Alert - Slave Tripout	The secondary chiller is down due to fault	Manual. automatic in Primary side	Primary and secondary work independent	Check secondary chiller alarms.
Alt-175	Master Slave Alert - Incorrect Master Control Type	The primary chiller operating type is not Primary	Manual	Primary and secondary work independent	Check primary control type.
Alt-176	Master Slave Alert - No Communication Master / Slave	No communication with secondary.	Primary and secondary work independent	Primary and secondary work independent	Check communication between Primary and secondary, wiring, etc.
Alt-179	Master Slave Alert - Master CCN Write Rejection	CCN command rejected by secondary chiller	Primary and secondary work independent	Primary and secondary work independent	Check CCN communication, hardware and software.
Alt-180	Master Slave Alert - Slave address not slave	Both chillers are configured to primary If secondary chiller address is configured in primary chiller side but it is configured to disabled in secondary chiller side	Manual	Alert Relay is ON	Check Primary and secondary configurations.

* MBC Alert indicates that there are noncritical alerts detected by MBC.

Event States

An event state is a specific set of conditions that the controller may encounter when controlling the chiller. Event states are repeatable and predictable, and represent known states of the control. When the control is in a particular state, a unique message is associated with that state. The event state messages are displayed on the default screen of the control panel and are listed in Table 17.

Table 17 — Event States

EVENT NO.	DESCRIPTION
1	Chiller Off
2	Chiller Tripout
3	Pumpdown/Lockout
4	Terminate Pumpdown/Lockout
5	Guide Vane 1 Calibration
6	Quick Test in Progress
7	Ice Build Done
8	Ice Build In Progress
10	Auto Restart Pending
11	Condenser Flush In Progress
12	Guide Vane 2 Calibration
13	Envelop Control Valve Calibration
16	MBC Calibration
17	UPS is Charging
18	MBC Clearance Checking
20	Startup Inhibited — Loadshed in Effect
21	Prestart Check in Progress
22	Timeout — Delay to Start in XX Min
23	Recycle in Progress
24	Startup in Progress
25	Swift Restart In Progress
30	Ramp Loading — Temperature
31	Ramp Loading — Motor Load
32	Ramp Loading — Capacity Inhibit
39	Demand Limit — Capacity Inhibit
40	Demand Limit — Capacity Decrease
41	Demand Limit — Inhibit Clamp
45	Override — High Condenser Pressure
47	Override — High Motor Temperature
48	Override — Low Evap Refrig Temp
51	Override — Low Discharge Superheat
52	Override — Manual VFD Speed Target
53	Override — High Motor Current
54	Override — High Discharge Temp
55	Override — Low Source Temp
60	Running — Temp Reset by 4-20 mA Signal
61	Running — Temp Reset by Remote Temp Sensor
62	Running — Temp Reset by Water DT
63	Running — Cooling Leaving Chilled Water
64	Running — Cooling Entering Chilled Water
67	Envelope Control Valve — Surge Correction
68	Envelope Control Valve — Acts Before Recycle Shutdown
69	Envelope Control Valve — Low Load Application
70	Envelope Control Valve — Forced
71	Running — VFD Rampdown
72	Running — Guide Vane Position Forced
73	Running — VFD Speed Forced
74	Optimal Operation
75	Surge Prevention
76	Surge Protection
77	Running — VFD Overcurrent
81	Running - Head Pressure Valve Forced
83	Running - Guide Vane 2 Position Forced
88	Main EXV Force
89	Eco EXV Force
90	Shutdown — Normal
91	Shutdown — Alarm
92	EXCSV Forced
93	Shutdown — Recycle
94	Shutdown — Recycle Ice Build
95	Shutdown — Compressor Deenergized
96	Shutdown — Emergency Stop
97	Transducer Calibration in Effect
98	ISM Calibration in Effect
99	EXCSV Calibration

SETTINGS FOR THE CONTROLLER

Controller Ethernet and Gateway/DNS Configuration can be configured by accessing ***Main Menu →System Configuration***.

Unit IP Address

IMPORTANT: Interface: eth1 is used for communication with MBC and UPS through Modbus TCP. Changing this IP Address from 172.16.67.100 should be avoided. Changing the domain or setting an IP Address that is the same as MBC (172.16.67.160) or UPS (172.16.67.150) will result in communication errors with MBC and/or UPS.

On the System Configuration menu, press Ethernet Configuration to display the ethernet parameters. See Fig. 71.

NOTE: You must request an IP address, the subnet mask, and the default gateway from the system administrator before connecting the unit to the local Ethernet network.

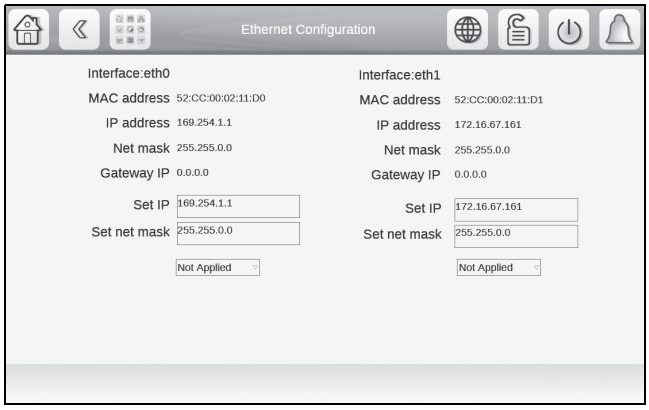


Fig. 71 — Ethernet Configuration Screen

Gateway/DNS Configuration is done in the Gateway/DNS Config Menu. Default gateway is entered into the Gateway/DNS Config Menu. See Fig. 72.

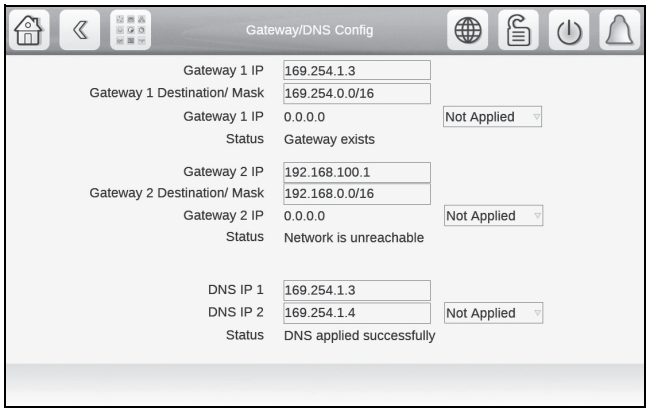


Fig. 72 — TCP/IP/DNS Address Screen

Upon changing a value, select the Not Applied icon and select Apply. The values will change on the screen and are now saved into the controller. See Fig. 73.

If needed, press "Edit Connection." See Fig. 73. Default parameters are shown; to modify, press a specific parameter.

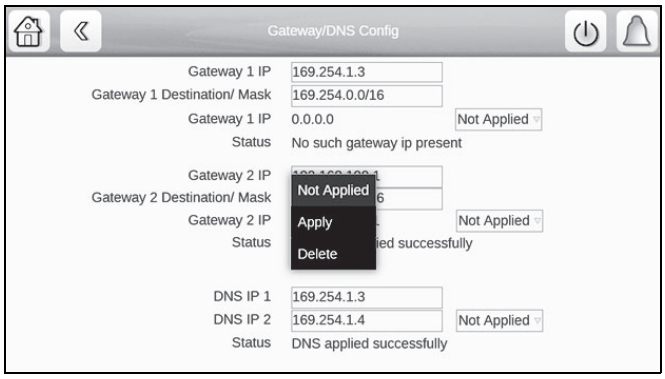


Fig. 73 — Save Changes

TOUCH SCREEN CALIBRATION

Depending on the user and the position of the panel, it may be necessary to calibrate the touch screen if the cursor does not move precisely with the user's touch. To activate the calibration process the user must touch the touch screen in excess of 15 seconds which activates the process where a cross-hair successively appears in various screen positions. Touch the center of the cross-hair sight with a touch pen or similar blunt-ended stylus (do not use a metal object). When the cross-hair sight is touched, it moves to a new position; touch the center of the cross-hairs again. When all positions have been configured, the cross-hairs disappear. This completes the calibration.

Touch Screen Configuration Language and Units

To set the language for touch screen configuration screens, press the Globe on the Main Menu screen. The Language and Unit Selection screen offers the options shown in Fig. 74.

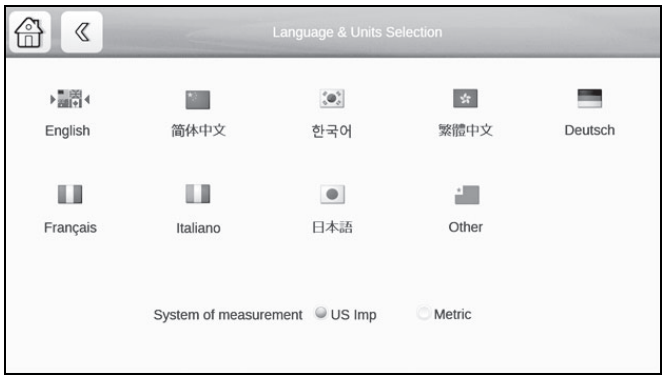


Fig. 74 — Touch Screen Configuration Language

COMMUNICATION PROBLEMS

Hardware Problems

See Table 18 for potential communication issues caused by hardware problems.

Web Interface Problems

See Table 19 for potential communication issues caused by web interface issues. The intranet site of the unit is the IP address.

NOTE: The unit cannot automatically obtain the network parameters via a DHCP server.

Table 18 — Hardware Problems

SYMPTOMS	POSSIBLE CAUSES	CHECKS	SOLUTIONS
The unit does not respond to the instructions sent by the supervision PC on the CCN bus.	Problem at the RS485 converter level of the PC or connection problem on the primary CCN bus.	Check the CCN cable connections. The unit CCN address is 0.1 and the communication speed is 9600 baud by default.	Replace the RS485 connector.
Communication problem when connecting two buses (primary bus and secondary bus).	Electrical problem between 0 v CCN of the primary bus and 0 v CCN of the secondary bus.	Check the connection of the metal part of the interface casing to earth.	Connect the metal part of the interface casing to earth.

Table 19 — Web Interface Problems

SYMPTOMS	POSSIBLE CAUSES	CHECKS	SOLUTIONS
Start-up page loads, then goes to fault state.	Network property details are not valid. Ethernet network is not available.	Check the network parameters. Check to see if the orange LED on the unit is flashing.	Contact your system administrator. Check the Ethernet connection to the local network if the orange LED does not flash.
While accessing the unit via the web browser, the Java platform launches, but remains blocked. No file is loaded.	Proxy server problem in the local network.	Contact your system administrator.	In agreement with the system administrator, open the Runtime Java control panel and select Direct Connection in the system parameters and/or request in the web browser (Tools→Options→ Connection→ System parameters) that no proxy server is used to go to the local addresses. If possible, uncheck “use of an automatic configuration script.” Restart the web browser.
The application has been launched, but the screens are not shown in the web browser.	A proxy server is used to access the unit and this supplies the old screens to the browser. Incorrect configuration of the Java application.	Check that the web browser does not go via a proxy server to access the unit. Check that the Java application does not store the internet files on the PC.	Open the browser and in the system connection parameters add the IP address of the unit in the proxy exceptions. (Tools→Options →Connection→System parameters→“No proxy for”). See the section Java Application Configuration on page 50.

NOTES:
1. The unit cannot automatically obtain the network parameters via a DHCP (Dynamic Host Configuration Protocol) server.
2. The intranet site address of the unit is the IP address.

Ethernet/IP Connection Problems

Use the following methods to troubleshoot:

UNIT IS POINT-TO-POINT CONNECTED TO A PC

Ensure controller is powered on prior to configuration and check Ethernet connection and PC Network Interface Card (NIC).

NOTE: In addition to the following procedure, it may be necessary to check the Ethernet connection and/or configure the PC network board.

In Windows 7, open Network and Sharing Center window and choose Local Area Connection. Select Properties. See Fig. 75.

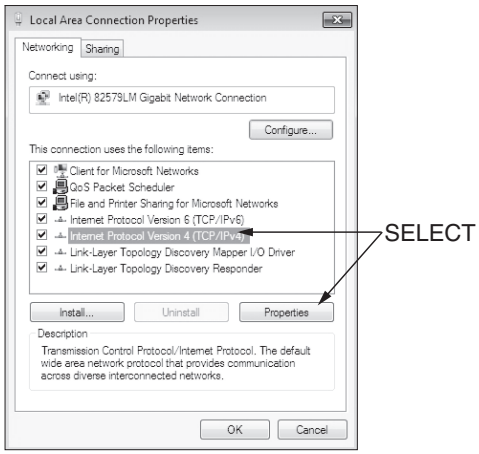


Fig. 75 — Local Area Connection Properties

The Internet Protocol Properties window is displayed.

- If no IP address is configured in the General and Alternative Configuration tabs, the unit IP address must be configured to 169.254.xxx.xxx. Modify the unit IP address and then restart the system.
- If the PC has a fixed IP address configured in one of the two tabs (General and Alternative Configuration), the IP address of the PC and the unit IP address must have the system and sub-system fields in common. The last part of the IP address is the host number and must be unique on the sub-system. For example: Unit address — 172.30.101.11 and PC address — 172.30.101.182. In this example, 172.30 corresponds to the network, and 101 corresponds to the sub-system. Carry out the necessary modifications and try to access the unit again.

In the case of a problem, open a Windows command window (Start, Execute, type cmd and press Enter), then type the command ping, followed by the unit IP address. In the example shown in Fig. 76, the PC receives four positive responses (replies).

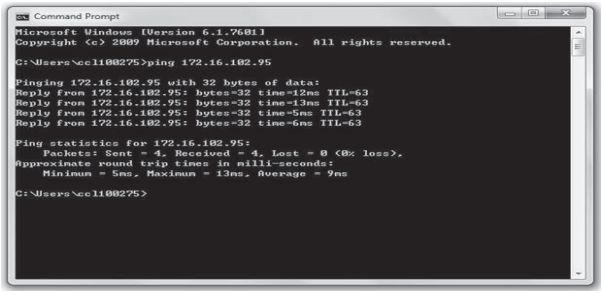


Fig. 76 — Ping — Positive Replies

In the example shown in Fig. 77, the PC receives four negative responses (request timed out).

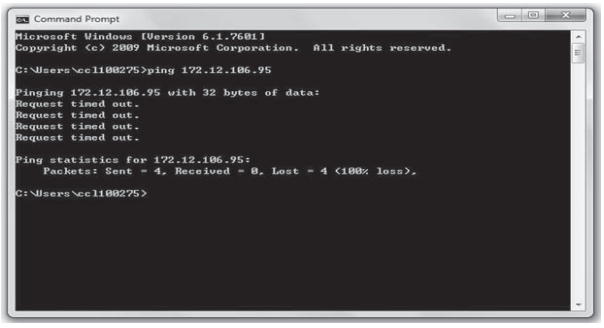


Fig. 77 — Ping — Negative Responses

If the PC receives four negative responses, check the internet browser parameters to determine if a proxy server or an automatic configuration script has been configured. If this is the case:

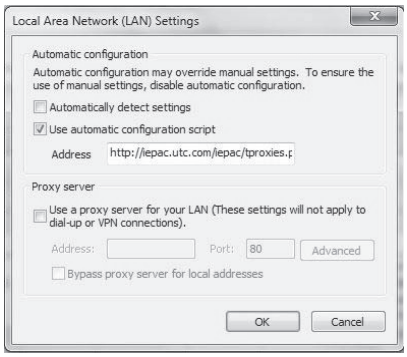
- Deselect the proxy server or the configuration script and restart the browser
- Or refer to the section Java Application Configuration

Try to access the unit again. If the PC still does not receive a response from the unit, restart the unit. Contact your system administrator.

UNIT IS CONNECTED TO THE LOCAL NETWORK

The unit is connected to the local network by an uncrossed cable, and the unit is energized. Open a Windows command window (Start, Execute, type **cmd** and press Enter), then type the command **ping**, followed by the unit IP address.

If the responses are positive (see Fig. 76), the internet browser configuration is faulty. Check the system parameters of the internet browser to determine if a proxy server or an automatic configuration script has been configured (***Tools→ Internet Options→ Connections→ System Parameters)***. See Fig. 78.



LEGEND

1 — Automatic configuration script
2 — Proxy server
3 — Advanced proxy configuration

Fig. 78 — Local Area Network Settings

If a proxy server is used, add unit IP address to the exceptions list of the proxy server (advanced proxy configuration). See Fig. 79.

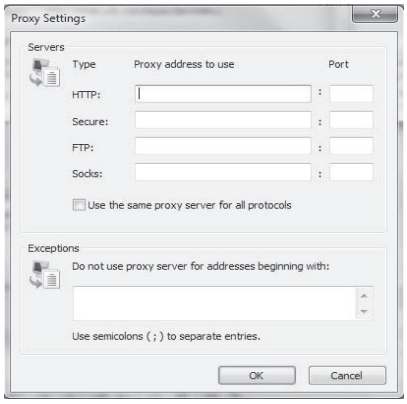


Fig. 79 — Proxy Settings

If a configuration script is used, it is not possible to add the unit IP address to the exceptions list. In this case, see the section Java Application Configuration below.

If the response to the "ping" command is negative, verify the IP address of the PC and the IP address of the unit. They must have the system network and sub-system in common. The last part of the IP address is the host number and must be unique on the sub-system; for example: Unit address — 172.30.101.11 and PC address — 172.30.101.182. In this example, 172.30 corresponds to the system network, and 101 corresponds to the sub-system. The host numbers are 11 and 182 respectively.

ETHERNET CONNECTION ON THE PC

Open the network configuration window of the PC and double-click Network Connections. Find the system interface board and check that no red "X" appears on the icon.

The connection to the local network must be authorized and in the connected status. If this is not the case, check the connections and authorize/repair the network connection.

JAVA APPLICATION CONFIGURATION

Open the Internet configuration window of the PC and double-click the Java application icon. If Java is not installed, a free download is available at http://www.java.com.

If Java has already been installed, check if it is used by other applications. If so, check that these are compatible with the following settings in the Java control panel. See Fig. 80.

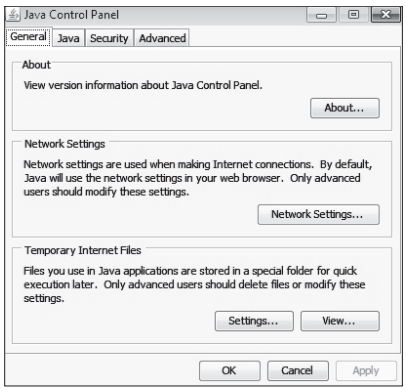


Fig. 80 — Java Control Panel

- Network settings: In the Java Control Panel, click Network Settings. Select a direct connection to bypass the proxy server or select the automatic configuration script. See Fig. 81.

Fig. 81 — Network Settings

- Temporary internet files: In the Java Control Panel, click Settings in the Temporary Internet Files section. Be sure the setting Keep temporary files on my computer is unchecked (clear). See Fig. 82.

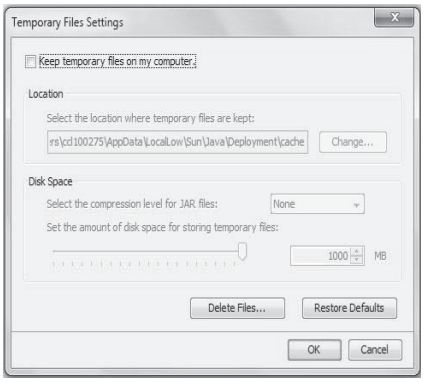


Fig. 82 — Temporary File Settings

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE

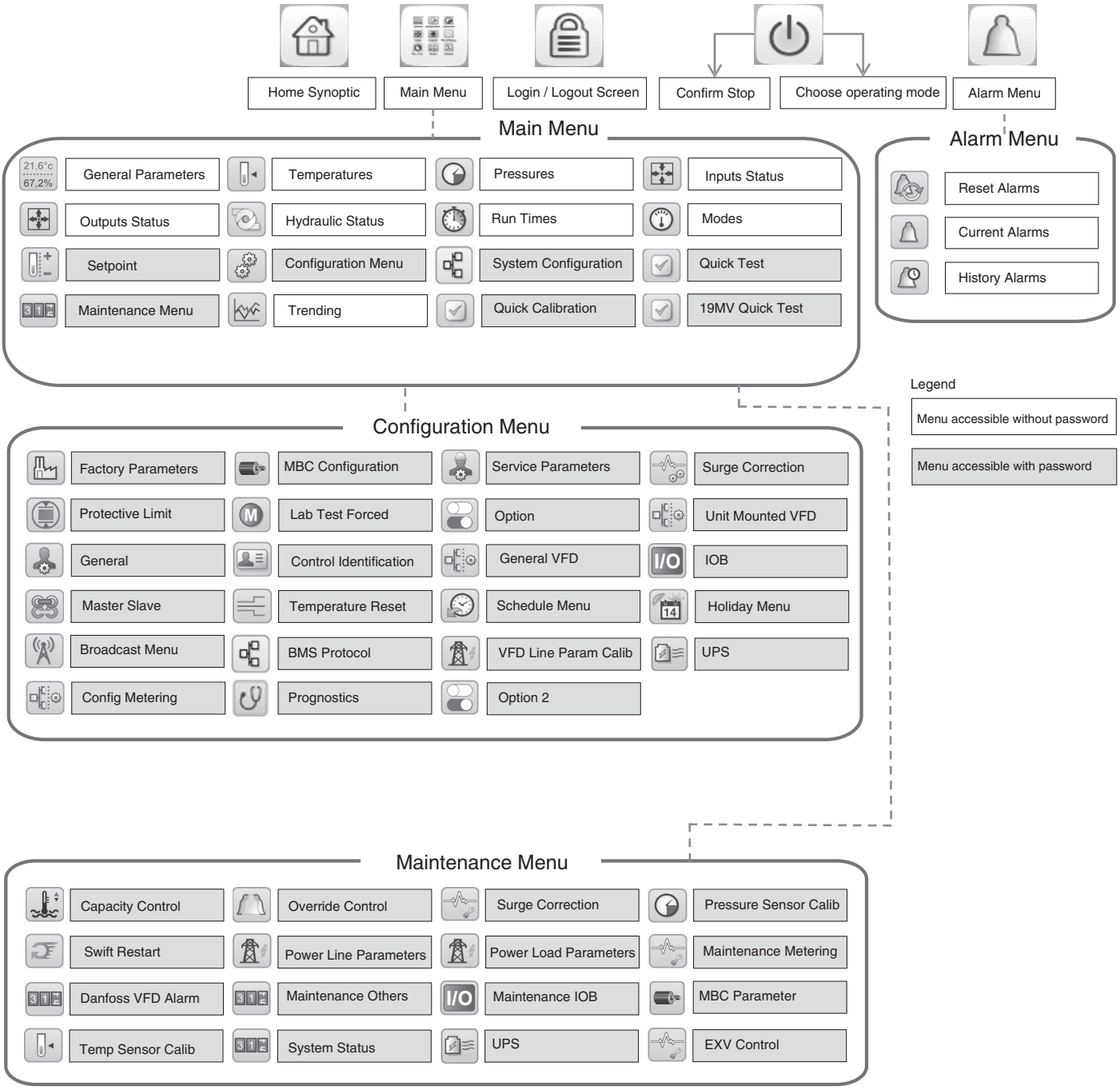


Fig. A — Screen Structure

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Main Menu Description

ICON	DISPLAYED TEXT*	ACCESS	ASSOCIATED TABLE	PAGE NO.
	General Parameters	All	GENUNIT	53
	Temperatures	All	TEMP	54
	Pressures	All	PRESSURE	54
	Inputs Status	All	INPUTS	54
	Outputs Status	All	OUTPUTS	55
	Hydraulic Status	All	HYDRLIC	55
	Run Times	All	RUNTIME	56
	Modes	All	MODES	56
	Setpoint	User	SETPOINT	56
	Configuration Menu	User	CONFIG	57
	Quick Test	Service	QCK_TEST	67
	Maintenance Menu	Service	MAINTAIN	68
	Trending	All	TRENDING	—
	Quick Calibration	Service	QCK_CAL	—
	19MV Quick Test	Service	QCK_EOL	—
	System Configuration	User	System Configuration	—

* Displayed text depends on the selected language (default is English).

NOTE: In most cases User login does not gain access to all configurations screens in a given menu.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

General Parameters

CCN TABLE NAME: GENUNIT

PIC6 PATH: Main Menu → General Parameters

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Control Mode 0 = Local, 1 = Network, 2 = Remote, 3 = Local Sched	ctl_mode	0 to 3	—		RO
2	Compressor1 Run Status	cm_stas1	0 to 16†	—		RO
3	Deter Start Stop Command	stastop		—		RO
4	Network: Cmd Start/Stop	CHIL_S_S	DSABLE/ENABLE	DSABLE		RW**
5	Network: Cmd Occupied	CHIL_OCC	NO/YES	NO		RW**
6	Cooling / Heating Select	HC_SEL	COOL/HEAT	COOL		RW
7	Control Point	CTRL_PNT	10.0 to 160.0	45	°F	RW**
8	Control Point Reset	reset	–30.00 to 30.00	—	°F	RO
9	Actual Setpoint	setpoint	10.0 to 150.0	45	°F	RW
10	Percent Current	AMPS_P	0.0 to 999.0	—	%	RO
11	Motor Percent Kilowatts	KW_P	0 to 100	—	%	RO
12	Calculated Capacity	cal_capa	0 to 100	—	%	RO
13	Actual Demand Limit	DEM_LIM	10.0 to 100.0	100	%	RW**
14	Emergency Stop	EMSTOP	DSABLE/ENABLE	0		RW**
15	Chiller Status Code	ch_state	0 to 500	243		RW
16	Local Schedule Occupied	oc_occ	NO/YES	NO		RW
17	Ice Schedule Occupied	ice_occ	NO/YES	NO		RW
18	Master Slave Start Stop	ms_stsp	STOP/START	—		RO
19	Remote Reset Alarm	REM_RST	NO/YES	NO		RW
20	Stop Override	STP_OVER	NO/YES	NO		RW
21	Start Condenser Flush	CF_START	NO/YES	NO		RW
22	BACnet Occupied	BAC_OCC	NO/YES	NO		RW

LEGEND

RO — Read Only
RW — Read/Write

* Default value is shown only if configurable in this table.

† 0 = OFF
1 = CTLTEST
2 = PUMPDOWN
3 = LOCKOUT
4 = RECYCLE
5 = TRIPOUT
6 = TIMEOUT
7 = PRESTART
8 = STARTUP
9 = AUTORST
10 = RAMPING
11 = RUNNING
12 = OVERRIDE
13 = DEMAND
14 = SHUTDOWN
15 = FREECOOL
16 = CONDFLSH

** RW from network.

Temperatures

CCN TABLE NAME: TEMP

PIC6 PATH: Main Menu → Temperatures

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Entering Chilled Water	ECW	–40.0 to 245	—	°F	RO
2	Leaving Chilled Water	LCW	–40.0 to 245	—	°F	RO
3	Entering Condenser Water	ECDW	–40.0 to 245	—	°F	RO
4	Leaving Condenser Water	LCDW	–40.0 to 245	—	°F	RO
5	Evap Sat Refrig Temp	EVAP_SAT	–40.0 to 245	—	°F	RO
6	Evap Refrig Liquid Temp	EVAP_T	–40.0 to 245	—	°F	RO
7	Evaporator Approach	evap_app	0.0 to 99.0	—	°F	RO
8	Condenser Approach	cond_app	0.0 to 99.0	—	°F	RO
9	Cond Sat Refrig Temp	COND_SAT	–40.0 to 245	—	°F	RO
10	Comp Discharge Temp	DGT	–40.0 to 245	—	°F	RO
11	Discharge Superheat	DSH	–20.0 to 99.0	—	°F	RO
12	Comp Motor Winding 1 Temp	MTRW1	–40.0 to 245	—	°F	RO
13	Comp Motor Winding 2 Temp	MTRW2	–40.0 to 245	—	°F	RO
14	Remote Reset Sensor	R_RESET	–40.0 to 245	—	°F	RO
15	Common CHWS Temp	CHWS_T	–40.0 to 245	—	°F	RO
16	Common CHWR Temp	CHWR_T	–40.0 to 245	—	°F	RO
17	Economizer Gas Temp	ECON_GT	–40.0 to 245	—	°F	RO
18	Economizer Sat Temp	ECO_SAT	–40.0 to 245	—	°F	RO
19	Economizer Superheat	ESH	–40.0 to 245	—	°F	RO

Pressures (Associated Table: PRESSURE)

CCN TABLE NAME: PRESSURE

PIC6 PATH: Main Menu → Pressures

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Evaporator Pressure	EVAP_P	–10 to 420.0	—	psig	RO
2	Condenser Pressure	COND_P	–10 to 420.0	—	psig	RO
3	Economizer Pressure	ECON_P	–10 to 420.0	—	psig	RO

*Default value is shown only if configurable in this table.

Inputs Status

CCN TABLE NAME: INPUTS

PIC6 PATH: Main Menu → Inputs Status

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	High Pressure Switch	HP_SW	OPEN/CLOSE	—		RO
2	Remote Contact	REM_CON	OPEN/CLOSE	—		RO
3	Remote Stop Contact	REM_STOP	OPEN/CLOSE	—		RO
4	Emergency Stop Contact	E_STOP	OPEN/CLOSE	—		RO
5	Ice Build Contact	ICE_CON	OPEN/CLOSE	—		RO
6	Chiller Lockout	REM_LOCK	OPEN/CLOSE	—		RO
7	Spare Safety Input	SAFETY	OPEN/CLOSE	—		RO
8	Starter Fault Feedback	STARTFLT	OPEN/CLOSE	—		RO
9	Fire Security Interlock	FS_LOCK	OPEN/CLOSE	—		RO
10	Guide Vane 1 Actual Pos	GV1_ACT	0 to 100%	—	%	RO
11	Guide Vane 2 Actual Pos	GV2_ACT		—	%	RO
12	Actual VFD Speed Per	VFD_ACT		—	%	RO
13	GV1 Pos Feedback	GV1_MA		—	mA	RO
14	GV2 Pos Feedback	GV2_MA		—	mA	RO
15	Liquid Level Cond	COND_LS		—		RO
16	Actual EXCSV Pos Per	LQBPACTP		—	%	RO
17	Actual EXCSV Pos Volt	LQBPfbV	0 to 10	—	Volts	RO
18	Power Panel Temp Switch	TEMP_SWI	OPEN/CLOSE	—		RO

LEGEND

RO — Read Only

* Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Outputs Status

CCN TABLE NAME: OUTPUTS

PIC6 PATH: Main Menu → Outputs Status

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Guide Vane1 Output	GV1_OUT	0.0 to 20.8	—	mA	RO
2	Guide Vane2 Output	GV2_OUT	0.0 to 20.8	—	mA	RO
3	Chiller Stat Output mA	CHST_OUT	4.0 to 20.0	—	mA	RO
4	Chiller Status (Discrete)	RUN_STAT	OFF/ON	—		RO
5	Alert Relay	ALE	OFF/ON	—	OFF/ON	RO
6	Alarm Relay	ALM	OFF/ON	—	OFF/ON	RO
7	Compressor Start Relay	COMP_SR	OFF/ON	—	OFF/ON	RO
8	Starter Trans Sw Status	TRANS	OFF/ON	—	OFF/ON	RO
9	ECSV Target Pos Per	LQBP_TGT	0.0 to 100	—	%	RO
10	ECSV Target Pos Volt	LQBPtgtV	0.0 to 10	—	V	RO
11	Tower Fan Relay High	TFR_HIGH	OFF/ON	—	OFF/ON	RO
12	Tower Fan Relay Low	TFR_LOW	OFF/ON	—	OFF/ON	RO
13	Danfoss VFD Interlock	vfd_lock	OFF/ON	—		RO
14	Surge Proximity	SURG_P	0	—		RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Hydraulic Status

CCN TABLE NAME: HYDRLIC

PIC6 PATH: Main Menu → Hydraulic Status

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Condenser Water Flow	CDW_FLOW	NO/YES	—		RO
2	Cond Water Flow Value	CDW_FV	0-10,000	0.0	GPM	RW
3	Entering Cond Water Pres	COND_EWP	–6.7 to 420.0	—	psig	RO
4	Leaving Cond Water Pres	COND_LWP	–6.7 to 420.0	—	psig	RO
5	Condenser Water Delta P	cdw_off	–10.0 to 10.0	0.0	psi	RW
6	Condenser Delta P Offset	cdw_off	–10.0 to 10.0	0.0	psig	RW
7	Cond Water Pulldown/Min	cdw_pull	–20 to 20.0	—	°F	RO
8	Condenser Water Pump	CDWP	OFF/ON	—		RO
9	Chilled Water Pump	CHWP	OFF/ON	—		RO
10	Chilled Water Flow	CHW_FLOW	NO/YES	—		RO
11	Chilled Water Flow Value	CHW_FV	–10.0 to 10.0	0.0	psi	RW
12	Entering Chilled Water P	EVAP_EWP	–6.7 to 420.0	—	psig	RO
13	Leaving Chilled Water P	EVAP_LWP	–6.7 to 420.0	—	psig	RO
14	Chilled Water Delta P	chw_pd	–6.7 to 420.0	—	psig	RO
15	Chilled Delta P Offset	chw_off	–10 to 10.00	0.0	psig	RW
16	Chilled Water Pulldown/Min	chw_pull	–20 to 20.0	—	°F	RO
17	Chilled Water Flow Input	CHWF_IN	4 to 20	—	mA	RO
18	Cond Water Flow Input	CDWF_IN	4 to 20	—	mA	RO
19	Chilled Water Pres Drop	CHW_PDMA	4 to 20	—	mA	RO
20	Cond Water Pres Drop	CDW_PDMA	4 to 20	—	mA	RO
21	Evap Water Flow Switch	EVAP_FS	OPEN/CLOSE	—		RO
22	Cond Water Flow Switch	COND_FS	OPEN/CLOSE	—		RO
23	Tower Fan Relay High	TFR_HI	OFF/ON	—		RO
24	Tower Fan Relay Low	TFR_LO	OFF/ON	—		RO
25	Controlled Water DT	ctrlw_dt	–40.0 to 245.0	—	°F	RO
26	Cond Flow Status 0 = Fail or Not Started, 1 = Success, 2 = Verifying	cdw_fl_s	0 to 2	—		RO
27	Chilled Flow Status 0 = Fail or Not Started, 1 = Success, 2 = Verifying	chw_fl_s	0 to 2	—		RO

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Run Times

CCN TABLE NAME: RUNTIME

PIC6 PATH: Main Menu → Run Times

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Starts in 12 Hours	ST_CNT12	0 to 8	—		RO
2	Compressor Starts Num	C_STARTS	0 to 99999	—		RO
3	Compressor Running Hrs	COMP_HRS	0 to 500000.0	—	hr	RO
4	After Service Hrs	SRV_HRS	0 to 500000.0	0.0	hr	RW
5	Stop to Start Timer	spst_tim	1.0 to 15.0	—	min	RO
6	Start to Start Timer	stst_tim	4.0 to 45.0	—	min	RO
7	Recy Startup Counts (within 1 hours)	RCYSTCNT	0 to 6	—		RO
8	Swift Restarts Counts (within 1 hours)	SWIFTCNT	0 to 4	—		RO
9	Controller Uptime	uptime	Day- hour : minute	—		RO

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

NOTE: The displayed runtime is updated every hour. To avoid the loss of data in case of disruption, the values are backed up.

Modes

CCN TABLE NAME: MODES

PIC6 PATH: Main Menu → Modes

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Normal Shutdown	shut_nor	NO/YES	—		RO
2	Recycle Shutdown	shut_rcy	NO/YES	—		RO
3	Alarm Shutdown	shut_alm	NO/YES	—		RO
4	Recycle Startup	str_rcy	NO/YES	—		RO
5	Temperature Ramping	tmp_ramp	NO/YES	—		RO
6	Load Ramping	ld_ramp	NO/YES	—		RO
7	IGV1 Inhibiting	gv1_inh	NO/YES	—		RO
8	Ramp Loading	ramp_act	NO/YES	—		RO
9	Demand Limit	dem_act	NO/YES	—		RO
10	VFD Rampdown	vfdrpact	NO/YES	—		RO
11	Demand Limit Inhibit	dem_inh	NO/YES	—		RO
12	Evaporator Frozen	evapfrze	NO/YES	—		RO
13	Condenser Frozen	condfrze	NO/YES	—		RO
14	Recycle Shutdown Done	rcysh_cm	NO/YES	—		RO
15	NonRecycle Shutdown Done	nrysh_cm	NO/YES	—		RO
16	In Alarm	alm_act	NO/YES	—		RO
17	In Override	over_act	NO/YES	—		RO
18	Comp1 Run State Val	cm_stat1	0 to 13	—		RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Setpoint

CCN TABLE NAME: SETPOINT

PIC6 PATH: Main Menu → Setpoint

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Cooling LCW Setpoint	lcw_sp	10.0 to 120.0	45	°F	RW
2	Base Limit Demand	dem_base	10.0 to 100.0	100.0	%	RW
3	EWT Control Option	EWT_OPT	DSABLE/ENABLE	DSABLE		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Configuration Menu

Navigation: MAIN MENU → CONFIGURATION MENU

ICON	DISPLAYED TEXT	ACCESS	ASSOCIATED TABLE	PAGE NO.
	Factory	Factory	FACTORY	58
	MBC Configuration	Service	MBCCFG	58
	Service Parameters	Service	SERVICE1	59
	Surge Correction	Service	CFGSURGE	59
	Protective Limit	Service	CFGLIMIT	60
	Lab Test Forced	Service	LABONLY	Factory only
	Option	Service	CONF_OPT	60
	Option 2	Service	CONFOPT2	
	Unit Mounted VFD	Service	CFGUMVFD	61
	General	User	GEN_CONF	61
	Control Identification	User	CTRL_ID	Info. only
	General VFD	Service	CFGGEVFD	62
	IOB	Service	CONF_IOB	62
	Master Slave	Service	CONF_MS	62
	Temperature Reset	User	RESETCFG	63
	Schedule Menu	User	SCHEDULE	63
	Holiday Menu	User	HOLIDAY	64
	Broadcast Menu	User	BROADCAST	64
	BMS Protocol	Service	CONNECT - BMS Protocol	
	VFD Line Param Calib	Service	VFD_EFF	66
	UPS	Service	CFG_UPS	66
	Config Metering	Service	CFGMETER	—
	Prognostics	Service	CONF_PRG	67

Factory

CCN TABLE NAME: FACTORY

PIC6 PATH: Main Menu → Configuration Menu → Factory Parameters

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Chiller Type 0 = 19XR6/7, 1 = 19XR2-5/E/D/V, 2 = 19DV, 3 = 19XRF, 4 = 19MV	chil_typ	0 to 4	4		RW
	Lubrication Type 0 = Oil, 1 = Refrigerant, 2 = Mag Bearing	lub_typ	0 to 2	2		RW
2	VFD Option† 0 = No, 1 = FS FVD, 2 = UM VFD, 3 = Rockwell LF2, 4 = EATON, 5 = Rockwell Std Tier, 6 = ABB, 7 = Danfoss, 8 = Benshaw, 9= STEP HV VFD	vfd_opt	0 to 9	7		RW
3	Unit Type 0 = Cool Only, 1 = Heat Machine	unit_typ	0 to 1	0		RW
4	Refrigerant Type (Non 19DV) 0 = R134a, 1 = R513A, 2 = R515B	ref_typ	0 to 1	0		RW
5	Chilled Medium Type	chmedium	WATER/BRINE	WATER		RW
6	Cond Shell Side MAWP 0 = 185 psi, 1 = 300 psi	cond_typ	0 to 1	0		RW
7	Country Code (Country Code = 1 for USA)	coun_cod	0 to 500	86		RW
8	Activate Swift Rst Opt	actswtrs	YES/NO	NO		RW
9	Activate Freq Start Opt	actfreqs	YES/NO	YES		RW

LEGEND

RW — Read/Write

* Default value is shown only if configurable in this table.

† While Benshaw is not a VFD option, the MX3 option (without ISM card) is configured here.

MBC Configuration

CCN TABLE NAME: MBCCFG

PIC6 PATH: Main Menu → Configuration Menu → MBC Configuration

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Calibration on Powerup	calpowup	DSABLE/ENABLE	ENABLE		RW
2	Auto Clearance Check	atclrchk	DSABLE/ENABLE	ENABLE		RW
3	Clearance Chk on Powerup	clrchrpw	DSABLE/ENABLE	ENABLE		RW
4	Clearance Fail Criteria	clrchrpw	0 to 100	7.5	%	RW
5	Auto Levitation	autolevi	YES/NO	YES		RW
6	Shutdown De-Levi Delay	delevdly	60 to 600	60	sec	RW
7	Speed Signal Alarm Delta	spdalm	0 to 100	10	%	RW
8	Speed Signal Alert Delta	spdalt	0 to 100	5.0	%	RW
9	Shaft Displacement Limit	shaftlmt	4 to 10	6		RW
10	Speed Sensor Option	speedsen	DSABLE/ENABLE	ENABLE		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Service Parameters

CCN TABLE NAME: SERVICE1

PIC6 PATH: Main Menu → Configuration Menu → Service Parameters

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Atmospheric Pressure	atom_pre	8 to 15	14.5	psi	RW
2	GV1 Travel Limit	gv1_lim	30 to 100	100	%	RW
3	GV1 Closure at Startup	gv1stpos	0 to 40	40	%	RW
4	IGV2 Travel Limit	gv2_lim	30 to 100	93.6	%	RW
5	IGV2 Minimum Degree	gv2_dmin	0 to 20	2.0	%	RW
6	IGV Full Load Open Deg	gv2_dful	10 to 100	88.0	%	RW
7	IGV2 Actuator Max Deg	gv2_dmax	10 to 100	94.0	%	RW
8	IGV2 Deg @IGV1 20 Deg	gv2_d20	10 to 40	37.0	%	RW
9	IGV2 Deg @IGV1 30 Deg	gv2_d30	10 to 50	45.0	%	RW
10	IGV2 Deg @IGV1 50 Deg	gv2_d50	10 to 80	67.0	%	RW
11	Maximum GV Movement	max_gv	1 to 4	2.0	%	RW
12	Controlled Fluid DB	ctrl_db	0.5 to 2.0	1.0	°F	RW
13	Derivative EWT Gain	ewtdgain	1.0 to 3.0	2.0		RW
14	Proportional Dec Band	gv1decdb	2.0 to 10.0	6.0		RW
15	Proportional Inc Band	gv1incdb	2.0 to 10.0	6.5		RW
16	Demand Limit At 20 mA	dem_20ma	10 to 100	40	%	RW
17	Demand Limit Prop Band	dem_pdb	3.0 to 15.0	10.0	%	RW
18	Amps or KW Ramp per Min	ldramprt	5 to 20	5	%	RW
19	Temp Ramp Rate per Min	tmramprt	1 to 10	3	°F	RW
20	Recycle Shutdown Delta T	rcysh_dt	0.5 to 4.0	1.0	°F	RW
21	Recycle Restart Delta T	rcyst_dt	2.0 to 10.0	5.0	°F	RW
22	Water Flow Verify Time	wflow_t	0.5 to 5.0	5.0	min	RW
23	Enable Excessive Starts	ex_start	YES/NO	NO		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Surge Correction

CCN TABLE NAME: CFGSURGE

PIC6 PATH: Main Menu → Configuration Menu → Surge Correction

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Surge Line Configuration 0 = PR, 1 = Delta T, 2 = Table	sgl_cfg	0 to 2	2		RW
2	Surge Line PR Offset	pr_off	1.5 to 4.5	3.0	%	RW
3	Surge Line PR Lower DB	pr_lbd	0.8 to 4.5	2.5	%	RW
4	Surge Line PR Upper DB	pr_hbd	0.2 to 4.0	2.0	%	RW
5	Surge Delay Time	surg_del	0 to 120	15	sec	RW
6	Surge Time Period	surge_t	7 to 10	8	min	RW
7	Surge Delta Amps %	surge_a	5 to 40	10	%	RW
8	Rampdown Factor	rd_fact	0 to 1	0.10		RW
9	GV1 Close Step Surge	gvstp_sg	1.0 to 3.0	2.0	%	RW
10	VFD Speed Step Surge	vfdstpsg	1.0 to 5.0	1.5	%	RW
11	EC Valve Step Surge	hbpstsg	1.0 to 10.0	4.0	%	RW
12	Surge Profile step	sgl_step	0 to 2.0	0.0	^F	RW
13	Surge Profile Offset	sgl_pro	0.0 to 5.0	0.0	^F	RW
14	High Efficiency Mode	high_eff	DSABLE/ENABLE	ENABLE		RW
15	GV Jumpover Option	gv_skip	DSABLE/ENABLE	DSABLE		RW
16	DTS High Recycle Offset	dts_thr	0 to 3	1.0	^F	RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Protective Limit

CCN TABLE NAME: CFGLIMIT

PIC6 PATH: Main Menu → Configuration Menu → Protective Limit Config

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Evap Approach Alert	evap_al	0.5 to 15	5	°F	RW
2	Cond Approach Alert	cond_al	0.5 to 15	6	°F	RW
3	Cond Press Override Low	cpov_lo	90 to 157	140	psig	RW
4	Cond Press Cutout Low	cpcut_lo	160 to 165	160	psig	RW
5	Evap Override Delta T	ert_ovdt	2 to 5	3	°F	RW
6	Evap Refrig Trippoint	ert_trip	0 to 40	33	°F	RW
7	High Evap Press Override	ep_ov	90 to 157	140	psig	RW
8	High Evap Press Cutout	ep_cut	160 to 170	165	°F	RW
9	Condenser Freeze Point	cdfreeze	–20.0 to 35.0	34.0	°F	RW
10	Comp Discharge Alert	dgt_alrt	125 to 200	200	°F	RW
11	Minimum Brine LWT	bri_min	10 to 34	34	°F	RW
12	Heating LWT Protect Set	lwtp_sp	41 to 50	42.8	°F	RW
13	Evap Flow Delta P Cutout	evap_cut	0.5 to 50	5	psig	RW
14	Cond Flow Delta P Cutout	cond_cut	0.5 to 50	5	psig	RW
15	Cond Hi Flow DP Limit	cond_val	0.5 to 50	50	psig	RW
16	Cond Hi Flow Alarm	cond_alm	DSABLE/ENABLE	DSABLE		RW
17	Cond Liq Level Max (inch)	clql_max	0 to 4	2.0	inches	RW
18	Cond Liq Level Min (inch)	clql_min	0 to 4	1.0	inches	RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Option

CCN TABLE NAME: CONF_OPT

PIC6 PATH: Main Menu → Configuration Menu → Option Configuration

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Frequent Restart Option	freqsopt	DSABLE/ENABLE	ENABLE		RW
2	Common Sensor Option	commsens	DSABLE/ENABLE	DSABLE		RW
3	EXCSV Selection 0 = Disable, 1 = Surge, 2 = Low Load, 3 = Comb	hgbp_sel	0 to 3	1		RW
4	EXCSV Open IGV Position	hgop_gv1	0.5 to 10	5.0	%	RW
5	EXCSV Close Position	hgcl_gv1	1.5 to 20	10.0	%	RW
6	EXCSV Off DT Low Load	hgb_toff	0.5 to 10	4.0	°F	RW
7	EXCSV On DT Low Load	hgb_ton	0.5 to 10	2.0	°F	RW
8	EXCSV Low Load DB	hgbp_ldb	0.5 to 2.0	1.0	°F	RW
9	Head Pres Valve Option	hdpv_opt	DSABLE/ENABLE	DSABLE		RW
10	Tower Fan High set point	tfh_sp	55 to 105	75	°F	RW
11	Refrigerant Leak Option	leak_en	DSABLE/ENABLE	DSABLE		RW
12	Refrig Leakage Alarm mA	exv_opt	4 to 20	20	mA	RW
13	Customer Alert Option	cusa_opt	DSABLE/ENABLE	DSABLE		RW
14	Ice Build Option	ice_opt	DSABLE/ENABLE	DSABLE		RW
15	Evap Liquid Temp Opt	evap_t_o	DSABLE/ENABLE	Enable		RW
16	Evap App Calc Selection 0 = Sat Temp, 1 = Ref Temp	evap_ref	0/1	1		RW
17	Cond Liquid Level Option Gems225 = 0, Gems3125 = 1, SPORLAN = 2	clql_opt	0 to 2	1		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Option2

CCN TABLE NAME: CONFOPT2 - Option 2

PIC6 PATH: Main Menu → Configuration Menu → Option

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	IOB3 Option	iob3_opt	No/Yes	No		RW
2	IOB4 Option	iob4_opt	No/Yes	No		RW
3	Water Flow Determination 0 = Sat Temp, 1 = Flow Switch	fs_opt	0 to 1	0		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Unit Mounted VFD

CCN TABLE NAME: CFGUMVFD

PIC6 PATH: Main Menu → Configuration Menu → General VFD Config

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Compressor Speed 100%	comp_hz	47 to 110	50	Hz	RW
2	Rated Line Voltage	rlv_i	200 to 13800	460	V	RW
3	Motor Nameplate Current	rla	10 to 1500	200	amp	RW
4	Motor Rated Load Current	rla_load	10 to 2000	200	amp	RW
5	Motor Nameplate RPM	rpm	1500 to 3600	3000	rpm	RW
6	Motor Rated Torque (NM)	rt_torq	0.1 to 10000	200	Nm	RW
7	Motor Nameplate KW	rlkw	0 to 5600	1500	kW	RW
8	Increase Ramp Time	ramp_inc	5 to 120	30	sec	RW
9	Decrease Ramp Time	ramp_dec	5 to 120	30	sec	RW
10	Switch Frequency (kHz)	pwm_freq	0 to 16	5		RW
11	PM Motor Data Download	autoconf	DSABLE/ENABLE	DSABLE		RW
12	Stator Resistance (Rs)	stat_res	0.001 to 140	0.001		RW
13	d-axis Inductance (Ld)	daxisind	0.01 to 1000	0.010		RW
14	q-axis Inductance (Lq)	qaxisind	0.01 to 1000	0.010		RW
15	Back EMF at 1000 RPM	bak_emf	1 to 9000	10		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

General

CCN TABLE NAME: GEN_CONF

PIC6 PATH: Main Menu → Configuration Menu → General Configuration

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Stop to Start Delay	min_off	0 to 15	1	min	RW
2	Start to Start Delay	strt_dly	0 to 45	1	min	RW
3	Demand Limit Type 0 = Base Demand, 1 = 4 to 20 mA	dem_sel	0 to 1	0		RW
4	Pulldown Ramp Type 0 = Temp, 1= Load	rampslct	0 to 1	1		RW
5	Demand Limit Source 0 = amps, 1 = kW	DEM_SLCT	0 to 1	0		RW
6	Reboot PIC6	reboot	YES/NO	NO		RW

LEGEND

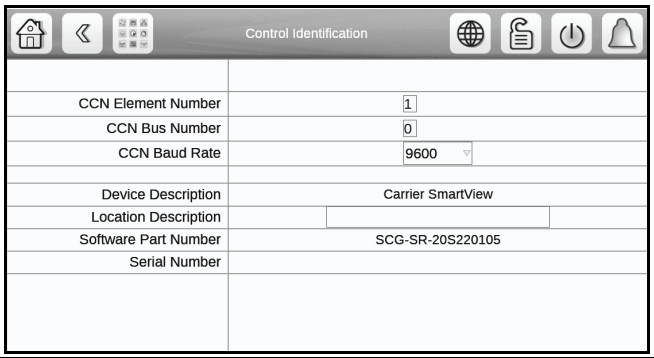
RW — Read/Write

*Default value is shown only if configurable in this table.

Control Identification

CCN TABLE NAME:

PIC6 PATH: Main Menu → Configuration Menu → Control Identification



APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

General VFD

Freestanding VFD

CCN TABLE NAME: CFGGEVFD

PIC6 PATH: Main Menu → Configuration Menu → General VFD Config

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	VFD Gain	vfd_gain	0.10 to 1.50	0.75		RW
2	VFD Max Speed Per	vfd_max	90.0 to 110.0	100.0	%	RW
3	VFD Min Speed Per	vfd_min	65.0 to 100.0	70.0	%	RW
4	VFD Start Speed Per	vfd_str	65.0 to 100.0	100.0	%	RW
5	VFD Current Limit	vfdculm	0.0 to 99999.0	250	amp	RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

IOB Configuration

CCN TABLE NAME: CONF_IOB

PIC6 PATH: Main Menu → Configuration Menu → IOB Configuration

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	MV Pressure Sensor type Normal = 0, Precision = 1 (Evap, Cond, Eco Only)	psen_opt	0 to 1	1		RW
2	AI Sensor Type Option 0 = Disable, 1 = Volt, 2 - mA, 3 = 10k Therm 4 = 5k Therm, 5 = Resistance, 6 = RTD					RW
3	ECW Sensor Type	typ_ai11	0 to 6	4		RW
4	LCW Sensor Type	typ_ai12	0 to 6	4		RW
5	ECDW Sensor Type	typ_ai13	0 to 6	4		RW
6	LCDW Sensor Type	typ_ai14	0 to 6	4		RW
7	MTRW1 Sensor Type	typ_ai21	0 to 6	4		RW
8	MTRW2 Sensor Type	typ_ai22	0 to 6	4		RW
9	Ref Leak Sensor Type	typ_ai29	0 to 6	2		RW
10	ISM Input Enable	ismin_en	DSABLE/ENABLE	DSABLE		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Primary/Secondary Configuration

CCN TABLE NAME: CONF_MS

PIC6 PATH: Main Menu → Configuration Menu → Master Slave Config

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Slave Address	slv_addr	1 to 236	2		RW
2	Master/Slave Select 0 = Disable, 1 = Master, 2 = Slave	msl_sel	0 to 2	0		RW
3	Chiller Connection Type 0 = Parallel, 1 = Series	ms_type	0 to 1	0		RW
4	Middle Sensor Option	mids_opt	YES/NO	YES		RW
5	Master Lead/Lag Select 0 = Lead change to Lag Once Failed, 1 = Runtime Balance	lead_sel	0 to 1	0		RW
6	Series Counter Flow	serct_fl	YES/NO	NO		RW
7	Take Over On Comm Los	toocl	DSABLE/ENABLE	DSABLE		RW
8	Master Per Capacity	ms_per	25 to 75	50	%	RW
9	LAG Shutdown Threshold	lag_shut	25 to 75	45	%	RW
10	Prestart Fault Time	pref_tim	2 to 30	5	min	RW
11	Lead Unload Threshold	un_th	50 to 100	100	%	RW
12	Lead/Lag Balance Delta	ll_bal_d	40 to 400	168	hr	RW
13	Lag Start Time	lstr_tim	2 to 30	10	min	RW
14	Lag Stop Time	lstp_tim	2 to 30	10	min	RW
15	Lead Pulldown Time	lead_pul	0 to 60	0	min	RW
16	Lag Minimum Run Time	lag_mini	0 to 150	0	min	RW
17	Lag Run Delta T	lagrundt	0 to 10.0	3.0	^F	RW
18	Lag Off Delta T	lagoffdt	0 to 10.0	1.8	^F	RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Temperature Reset

CCN TABLE NAME: RESETCFG

PIC6 PATH: Main Menu → Configuration Menu → Reset Configuration

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Temp Reset Type 0 = No, 1 = 4 to 20 mA, 2 = Remote Temp, 3 = Water DT [delta temperature]	res_sel	0 to 3	0		RW
2	Degrees Reset At 20 mA	der_20ma	–30.0 to 30.0	10.0	°F	RW
3	Maximum Deg Temp Reset	deg_rset	–30.0 to 30.0	10.0	°F	RW
4	Remote Temp Full Reset	remtm_fu	–40.0 to 245.0	65.0	°F	RW
5	Remote Temp No Reset	remtm_no	–40.0 to 245.0	85.0	°F	RW
6	Deg Reset Water DT Full	drwdt_fu	–30.0 to 30.0	10.0	°F	RW
7	Controlled DT Full Reset	ctldt_fu	0.0 to 15.0	0.0	°F	RW
8	Controlled DT No Reset	ctldt_no	0.0 to 15.0	10.0	°F	RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Schedule Menu

Navigation: **MAIN MENU → CONFIGURATION MENU → SCHEDULE MENU**

ICON	DISPLAYED TEXT	ACCESS	ASSOCIATED TABLE
	Local Schedule	User	
	Ice Build Schedule	User	
	Network Schedule	User	

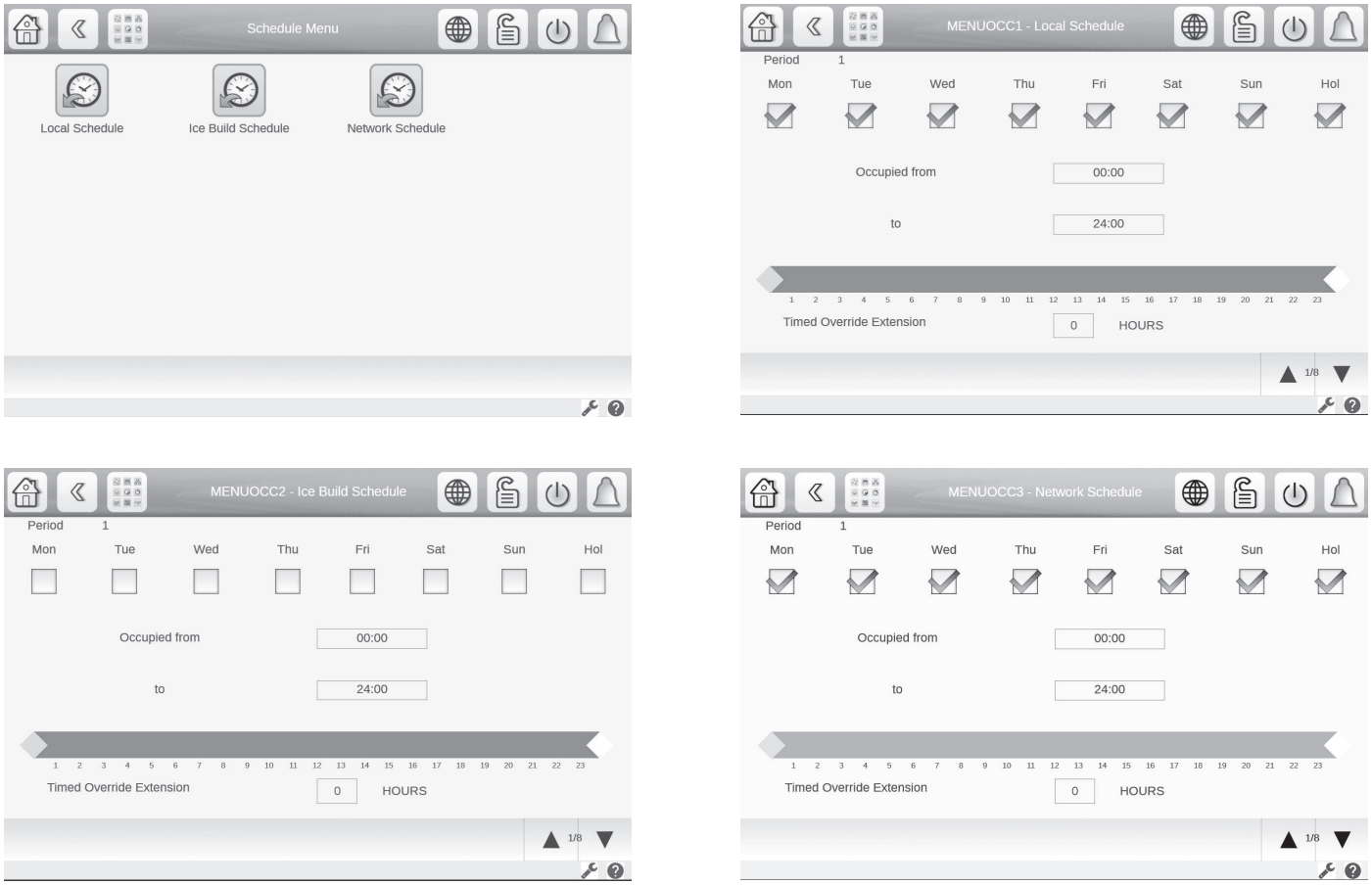


Fig. B — Schedule Menu and Submenus

Holiday Menu

Navigation: **MAIN MENU → CONFIGURATION MENU → HOLIDAY MENU**

The Holiday Menu has 16 submenus (HOLDY-01 to HOLDY_16), so it is possible to set 16 different holiday periods. For more information about holiday periods, see the Time Schedule section on page 33. Figure C below shows the Holiday Menu and a sample submenu.

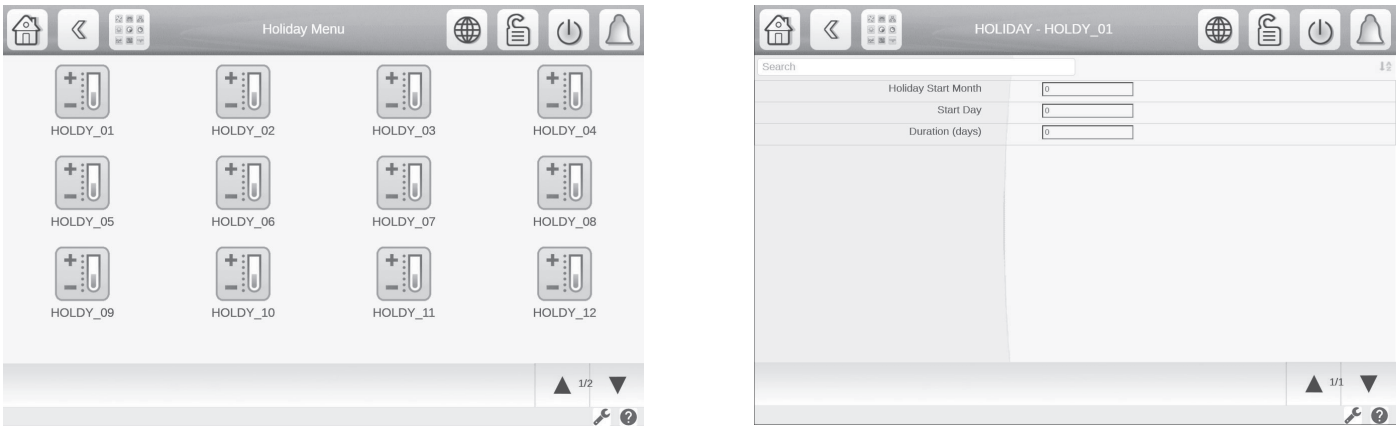


Fig. C — Holiday Menu and Submenu

Broadcast Menu

Navigation: **MAIN MENU → CONFIGURATION MENU → BROADCAST MENU**

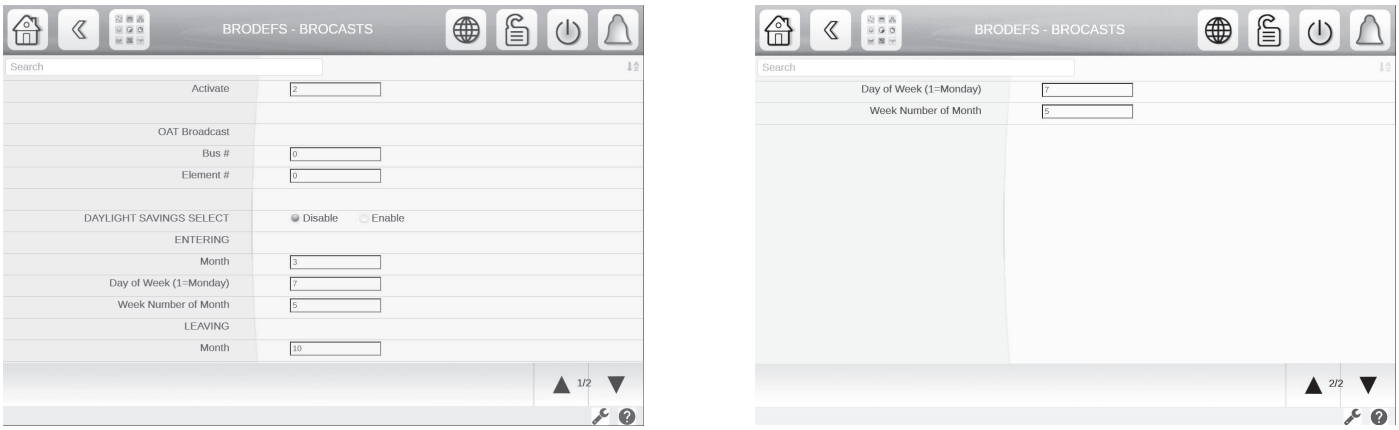


Fig. D — Broadcast Menu, Page 1 and 2

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

BMS Protocol

CCN TABLE NAME: CONNECT

PIC6 PATH: Main Menu → Configuration Menu → CONNECT

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Port J8 Option 0 = None, 1 = BACnet MS/TP, 2 = Modbus RTU	j8_opt	0 to 2	0		RW
	Modbus Configuration					
2	Modbus TCP Enable	mip_opt	DSABLE/ENABLE	DSABLE		RW
3	Modbus TCP Port Number	port_nbr	0 to 1024	502		RW
4	Modbus Server UID	ser_UID	1 to 255	1		RW
5	Modbus Metric Unit	metric	NO/YES	NO		RW
6	Modbus RTU Parity Option 0 = No, 1 = Odd, 2 = Even, 3 = Low, 4 = High	parity	0 to 4	0		RW
7	Modbus RTU Stop Bit 1 = 1 Bit, 2 = 2 Bits	stop_bit	0 to 2	2		RW
8	Modbus RTU Baudrate 0 = 9600, 1 = 19200, 2 = 38400	baudrate	0 to 2	0		RW
9	Modbus Litte Endian	swap_b	NO/YES	NO		RW
10	Modbus Real Type	real_typ	NO/YES	NO		RW
	BACnet Configuration					
11	BACnet Enable	bacena	DSABLE/ENABLE	DSABLE		RW
12	BACnet Metric Unit	bacunit	NO/YES	NO		RW
13	BACnet Network	network	1 to 9999	1600		RW
14	BACnet Identifier	Ident	0 to 9999999	1600001		RW
15	BACnet Schedule Enable	bacschen	DSABLE/ENABLE	DSABLE		RW
16	MS/TP Mac address	mstpaddr	1 to 127	1		RW
17	MS/TP Baud Rate 0 = 9600, 1 = 19200, 2 = 38400, 3 = 57600, 4 = 76800, 5 = 115200	mstpbaud	0 to 5	2		RW
18	MS/TP Max Master	maxmastr	0 to 127	3		RW
19	MS/TP Max Info Frames	maxinfof	1 to 255	5		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

NOTES:
1. The BACnet network and the device object identifier can be modified. The default identifier has been chosen to easily recognize the chiller on a BACnet network. The first two digits are the BACnet CARRIER vendor number (16). These parameters must be unique on the BACnet network. They must be modified if more than one Carrier chiller is connected to the BACnet network.
2. Changing one of these BACnet parameters will cause a reboot of the board after 1 minute.
3. Changing IP address from the PIC6 SETUP menu will require a manual reboot or power cycle of the PIC6 controller to re-build the BACnet stack.
4. For more information, see “PROTOCOL Configuration” on page 83.

VFD Line Param Calib

CCN TABLE NAME: VFD_EFF

PIC6 PATH: Main Menu → Configuration Menu → VFD_EFF

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE	READ/WRITE
1	VFD Speed 100%, Load 100%	S100L100	85 to 100	96.6	RW
2	VFD Speed 100%, Load 70%	S100L70	85 to 100	95.4	RW
3	VFD Speed 100%, Load 50%	S100L50	85 to 100	94.6	RW
4	VFD Speed 100%, Load 30%	S100L30	85 to 100	93.6	RW
5	VFD Speed 100%, Load 10%	S100L10	85 to 100	92.2	RW
6	VFD Speed 92%, Load 100%	S92L100	85 to 100	95.3	RW
7	VFD Speed 92%, Load 70%	S92L70	85 to 100	94.6	RW
8	VFD Speed 92%, Load 50%	S92L50	85 to 100	94.1	RW
9	VFD Speed 92%, Load 30%	S92L30	85 to 100	92.8	RW
10	VFD Speed 92%, Load 10%	S92L10	85 to 100	91.4	RW
11	VFD Speed 83%, Load 100%	S83L100	85 to 100	95.1	RW
12	VFD Speed 83%, Load 70%	S83L70	85 to 100	94.5	RW
13	VFD Speed 83%, Load 50%	S83L50	85 to 100	93.3	RW
14	VFD Speed 83%, Load 30%	S83L30	85 to 100	92.0	RW
15	VFD Speed 83%, Load 10%	S83L10	85 to 100	89.9	RW
16	VFD Speed 70%, Load 100%	S70L100	85 to 100	94.8	RW
17	VFD Speed 70%, Load 70%	S70L70	85 to 100	94.0	RW
18	VFD Speed 70%, Load 50%	S70L50	85 to 100	92.7	RW
19	VFD Speed 70%, Load 30%	S70L30	85 to 100	91.0	RW
20	VFD Speed 70%, Load 10%	S70L10	85 to 100	88.6	RW
21	Calc Voltage Factor Stop	volfacts	0.5 to 1.5	1.0	RW
22	Calc Voltage Factor Run	volfactr	0.5 to 1.5	1.0	RW

UPS

CCN TABLE NAME: CFG_UPS - UPS

PIC6 PATH: Main Menu → Configuration Menu → UPS

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	UPS Option	ups_opt	DSABLE/ENABLE	ENABLE		RW
2	Battery Replace Done	bat_rplc	No/Yes	Yes		RW
3	Battery Threshold	bat_thrh	0 to 100	70	%	RW
4	Battery Minimum Runtime	bat_m_r	0 to 600	240	sec	RW
5	Battery Test Duration	bat_t_d	10 to 600	240	sec	RW
6	Power Failure Max Number	po_fa_lm	0 to 100	10		RW
7	Over Temp Duration	over_t_t	0 to 600	60	sec	RW

Config Metering

CCN TABLE NAME: CFGMETER - Config Metering

PIC6 PATH: Main Menu → Configuration Menu → Config Metering

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Cond Liquid Level Deter 0 = Capacity Precent, 1 = Setpoint	condll_de	0/1	0		RW
2	Liquid level SP - CAP 0%	lbpca0	0-real	0.5		RW
3	Liquid level SP - Cap 25%	lbpca25	0-real	1.0		RW
4	Liquid level SP - Cap 50%	lbpca50	0-real	1.5		RW
5	Liquid level SP - Cap 75%	lbpca75	0-real	2.0		RW
6	Liquid level SP - Cap 100%	lbpca100	0-real	2.1		RW
7	Low SST Set Point	sstl_sp	0-real	34.0	°F	RW
8	Eco EXV Option	eex_en	DSABLE/ENABLE	ENABLE		RW
9	Eco EXV Active	Thresholdeexv_thr	0 to 100	0	%	RW
10	Eco Superheat SP	ecpsj_sp		10		RW
11	EXCSV Option	lbp_en	DSABLE/ENABLE	ENABLE		RW
12	EXCSV Activate Thre	lbon_th	0 to 100	95.0	%	RW
13	EXCSV Deactivate Thre	lboff_th	0 to 100	15.0	%	RW
14	EXCSV Open Time	incrTime		60.0		RW
15	EXCSV Close Time	decrTime		120		RW
16	EXCSV Open Step	incrStep		5.0		RW
17	EXCSV Close Step	decrStep		5.0		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Prognostics

CCN TABLE NAME: CONF_PRG

PIC6 PATH: Main Menu → Configuration Menu → Prognostics Config

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Prog Function Enable	prog_en	YES/NO	YES		RW
2	Trans Calibration Done	tracl_cm	YES/NO	YES		RW
3	Refrigerant Charge Done	refch_cm	YES/NO	YES		RW
4	Trans Calib Threshold	refgc_th	0 to 5	2	psig	RW
5	Low Charge Cond Approach	rch_cath	20 to 40	20	°F	RW
6	Evap Design Approach	ep_dgap	0 to 10	3	°F	RW
7	Bearing Degradation	beart_th	100 to 230	200	°F	RW
8	Transducer Deviation	tran_dev	0 to 2	0		RW
9	Refrig Charge Status	ref_chg	0 to 2	0		RW

LEGEND

RW — Read/Write

*Default value is shown only if configurable in this table.

Quick Test

CCN TABLE NAME: QCK_TEST

PIC6 PATH: Main Menu → Quick Test

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Quick Test Enable	QCK_TEST	DSABLE/ENABLE	DSABLE		RW
2	Quick Test Main EXV	Q_MEXV	0 to 100	0	%	RW
3	Quick Test ECO EXV	Q_EEXV	0 to 100	0	%	RW
4	Quick Test Chiller Stat	Q_CHST	4.0 to 20	4.0	mA	RW
5	Quick Test Run Status	Q_RUN_ST	OFF/ON	OFF		RW
6	Guide Vane 1 Tested Pos	Q_GV1POS	0 to 100	0	%	RW
7	Guide Vane 1 Actual Pos	Q_GV1ACT	—	—	%	RO
8	Guide Vane 2 Tested Pos	Q_GV2POS	0 to 100	0	%	RW
9	Guide Vane 1 Actual Pos	Q_GV2ACT	—	—	%	RO
10	Quick Test Alarm Output	Q_ALM	OFF/ON	OFF		RW
11	Quick Test Alert Output	Q_ALE	OFF/ON	OFF		RW
12	Quick Test Cond Pump	Q_CDWP	OFF/ON	OFF		RW
13	Condenser Water Flow	CDW_FLOW	YES/NO	YES		RW
14	Condenser Water Delta T	CDW_DT	—	—	^F	RO
15	Quick Test Chilled Pump	Q_CHWP	OFF/ON	OFF		RW
16	Chilled Water Flow	CHW_FLOW	YES/NO	NO		RW
17	Chilled Water Delta T	CHW_DT	—	—	^F	RO
18	Danfoss VFD Interlock	QVFDLOCK	OFF/ON	OFF		RW
19	Quick Test EXCSV Pos	Q_LQBP	0 to 100	0	%	RW
20	Quick Test Lo Tower Fan	Q_LOWFAN	OFF/ON	Off		RW
21	Quick Test Hi Tower Fan	Q_HIFAN	OFF/ON	Off		RW
22	Shut Trip Relay	Q_TRIPR	OFF/ON	Off		RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Maintenance Menu

Navigation: **MAIN MENU** → **MAINTENANCE MENU**

ICON	DISPLAYED TEXT*	ACCESS	ASSOCIATED TABLE	PAGE NO.
	Capacity Control	Service	CAPACTRL	69
	Override Control	Service	OVERRIDE	69
	Surge Correction	Service	MAISURGE	70
	Swift Restart	Service	MAISWRST	70
	Master Slave	Service	MAIN_MS	71
	Power Line Parameters	Service	POWER_I	71
	Power Load Parameters	Service	POWER_O	72
	Danfoss VFD Alarm	Service	DANFOSS	73
	Maintenance Others	Service	MAIOTHER	74
	Maintenance IOB	Service	MAIIOB	75
	Pressure Sensor Calib	Service	PRES_CAL	76
	Temp Sensor Calib	Service	TEMP_CAL	79
	System Status	Service	SYS_STAT	79
	UPS	Service	MAIN_UPS	79
	Maintenance Metering	Service	MAIMETER	—
	EXV Control	Service	EXVCTRL	—
	MBC Parameter	Service		—

*Displayed text depends on the selected language (default is English).

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Capacity Control

CCN TABLE NAME: CAPACTRL

PIC6 PATH: Main Menu → Maintenance Menu → Capacity Control

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Total Error + Resets	tot_err			^F	RO
2	Control Point Error	ctrl_err			^F	RO
3	Controlled Water Temp	ctrl_wt			°F	RO
4	Control Point	ctrl_pnt			°F	RO
5	Actual Setpoint	setpoint			°F	RO
6	Entering Water Change DT	ewt_dt			^F	RO
7	Enter Water Temp Reset	ewt_res			^F	RO
8	Leaving Water Temp Reset	lwt_res			^F	RO
9	Discharge Gas Temp Reset	dgt_res			^F	RO
10	Capacity Delta	capa_dlt			%	RO
11	Target GV1 Pos	gv1_tgt			%	RO
12	GV1 Pos Change Delta	gv1delta			%	RO
13	Target GV2 Pos	gv2_tgt			%	RO
14	GV1 Change Flag Stop = 0, Change = 1, Cont = 2	gv1_chg				RO
15	VFD Speed Change Flag Stop = 0, Change = 1, Cont = 2	vfd_chg				RO
16	Target VFD Speed Per	vfd_tgt			%	RO
17	VFD Speed Change Delta	vfd_dlta			%	RO
18	Capacity Inhibit Flag	cap_inh				RO
19	Capacity Decrease Flag	cap_dec				RO
20	Condenser Water Delta T	cdw_dt			^F	RO
21	Chilled Water Delta T	chw_dt			^F	RO
22	Pulldown Set Point	pull_set			°F	RO
23	Demand Limit Inh Clamp	deinhclm			%	RO
24	Ramping Demand Limit Val	ramp_dem			%	RO
25	Compressor is Running	comp_run				RO
26	Comp1 Run State Val	cm_stat1				RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Override Control

CCN TABLE NAME: OVERRIDE

PIC6 PATH: Main Menu → Maintenance Menu → Override Control

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Capacity Inhibit	cap_inho	NO/YES			RO
2	Capacity Decrease	cap_deco	NO/YES			RO
3	High Condenser Pressure	cpov_fl	NO/YES			RO
4	Low Discharge Superheat	dshov_fl	NO/YES			RO
5	Low Suction Sat Temp	sstov_fl	NO/YES			RO
6	High Motor Temp	mtov_fl	NO/YES			RO
7	High Bearing Temp	tbov_fl	NO/YES			RO
8	Low Source Temp	lstov_fl	NO/YES			RO
9	High Discharge Temp	dgtov_fl	NO/YES			RO
10	High Motor Current	ampov_fl	NO/YES			RO
11	Required DSH	dsh_req		2.0	°F	RW
12	Evap Sat Override Temp	ert_over		36.0	°F	RW
13	IGV Step DSH Increase	dshinstp			%	RO
14	IGV Step DSH Decrease	dshdestp			%	RO
15	Cond Press Trip Value	cp_trip		160	psig	RW
16	Cond P Override Value	cp_ov		140	psig	RW

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Surge Correction

CCN TABLE NAME: MAISURGE

PIC6 PATH: Main Menu → Maintenance Menu → Surge Correction

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Surge Region 0 = No, 1 = Low, 2 = High, 3 = Deadband, 4 = Noise	act_reg	0 to 2			RO
2	Actual PR	pr_act		1.000000		RW
3	Calc Ref PR	pr_cal		1.192923		RW
4	Calc PR High Offset	pr_h_off		1.217520		RW
5	Calc PR Low Offset	pr_l_off		1.162178		RW
6	Amps Change Surge Prot	amps_dta			%	RO
7	Max Amps Change Value	amch_max			%	RO
8	Surge Counts	sc				RO
9	Surge Protection Counts	spc				RO
10	Surge Prevention Active	surg_act	NO/YES			RO
11	Surge Protection Active	surg_pro	NO/YES			RO
12	EC Valve Change Flag 0 = Close, 1 = Hold, 2 = Open	hgbp_chg	0 to 2			RO

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Swift Restart

CCN TABLE NAME: MAISWRST

PIC6 PATH: Main Menu → Maintenance Menu → Swift Restart

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	SRD Position @Shutdown	srd_shut	0 to 100		%	RO
2	VFD Speed @Shutdown	vfd_shut	0 to 100		%	RO
3	GV1 Position @Shutdown	gv1_shut	0 to 100		%	RO
4	Main EXV @Shutdown	mexv_sht	0 to 100		%	RO
5	Evap Sat Temp @Shutdown	est_shut	–40 to 280		°F	RO
6	Power Recovery Duration	pd_dur	0 to 65535		min	RO
7	Power Down Active	power_dn	NO/YES			RO
8	Auto Restart Active	auto_rst	NO/YES			RO
9	Swift Restart Active	sw_rst	NO/YES			RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Primary/Secondary

CCN TABLE NAME: MAIN_MS

PIC6 PATH: Main Menu → Maintenance Menu → Master Slave

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Unit is Lead or Lag 0 = Disable, 1 = Lead, 2 = Lag	lead_lag	0 to 2			RO
2	Master Control Type 0 = Local, 1 = Network, 2 = Remote, 3 = Local Sched	ms_ctrl	0 to 3			RO
3	Slave Control Type 0 = Local, 1 = Network, 2 = Remote, 3 = Local Sched	sl_ctrl	0 to 3			RO
4	Lead Lag Communication	ll_comm	TRUE/FALSE			RO
5	Master Slave Fault 0 = No Fault, 1 = Master, 2 = Slave, 3 = Both	ll_fault	0 to 3			RO
6	Slave Run Status	lagstat	0 to 14			RO
7	Slave Start/Stop	lag_s_s	START/STOP			RO
8	Capacity Decrease	CAP_DECL	NO/YES	NO		RW
9	Capacity Inhibit	CAP_INHL	NO/YES	NO		RW
10	Master Chiller Running	MST_RUN	NO/YES	NO		RW
11	Local Surge Status	LCL_SRG	0 to 3			RO
12	Remote Surge Status	RMT_SRG	0 to 3			RO
13	EWT Control Option	EWT_OPT	DSABLE/ENABLE	DSABLE		RW
14	Demand Limit Source 0 = Amps, 1 = KW	DEM_SLCT	0 to 1			RO
15	Lag Start Timer	lagstart	0 to 60		min	RO
16	Lag Stop Timer	lagstop	0 to 60		min	RO
17	Prestart Fault Timer	prefIt	0 to 30		min	RO
18	Pulldown Timer	pulltime	0 to 30		min	RO
19	Pulldown: Delta T / Min	pull_dt	0 to 100		°F	RO
20	Lead/Lag Hours Delta	ll_hr_d	–99999 to 99999		hours	RO
21	Overrid Control Point	ctrpntov	10 to 160.0	45	°F	RW
22	Overrid Act Demand Limit	demlimov	10 to 100.0	100	%	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Power Line Parameters

CCN TABLE NAME: POWER_I

PIC6 PATH: Main Menu → Maintenance Menu → Power Line Parameters

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Line Current Phase 1	LN_AMPS1			amp	RO
2	Line Current Phase 2	LN_AMPS2			amp	RO
3	Line Current Phase 3	LN_AMPS3			amp	RO
4	Actual Line Current	AMPS_A			amp	RO
5	Percent Line Current	AMPS_P			%	RO
6	Ground Fault Phase 1	GRFT_1			amp	RO
7	Ground Fault Phase 2	GRFT_2			amp	RO
8	Ground Fault Phase 3	GRFT_3			amp	RO
9	Line Voltage Phase 1	LN_VOLT1			V	RO
10	Line Voltage Phase 2	LN_VOLT2			V	RO
11	Line Voltage Phase 3	LN_VOLT3			V	RO
12	Actual Line Voltage	VOLT_A			V	RO
13	Percent Line Voltage	VOLT_P			%	RO
14	Line Kilowatts	KW			kW	RO
15	Line Kilowatts Hours	KWH			kW	RO
16	Line Power Factor	POW_FACT				RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Power Load Parameters

CCN TABLE NAME: POWER_O

PIC6 PATH: Main Menu → Maintenance Menu → Power Load Parameters

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	VLF Load Current	VFD_LOAD			amp	RO
2	Percent VFD Load Current	amps_p_o			%	RO
3	Motor Actual Frequency	MOT_FREQ			Hz	RO
4	Motor RPM	MOT_RPM			rpm	RO
5	Motor Target Frequency	tgt_freq			Hz	RO
6	Actual VFD Speed Per	vfd_act			%	RO
7	DC Bus Voltage	bus_volt			V	RO
8	Motor Kilowatts	motor_kw			kW	RO
9	Heatsink Temperature	hs_temp			°F	RO
10	Control Card Temperature	cct_temp			°F	RO
11	Shunt Trip Relay Status	tripr	0 to 1			RO
12	VFD Load Factor	VFD_FACT				RO
13	VFD Alarm Code	alm_code				RO
14	VFD Status Word	stat_wd				RO
15	VFD Command Word	cmd_wd				RO
16	High VFD Current	VFDC_HI	NO/YES			RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Danfoss VFD Alarm

CCN TABLE NAME: DANFOSS

PIC6 PATH: Main Menu → Maintenance Menu → Danfoss VFD Alarm

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Danfoss Alarm Word 1	alarm 1				RO
2	Danfoss Alarm Word 2	alarm2				RO
3	VFD Alarm Code	vfd_code				RO
4	Brake Check	bc_00				RO
5	Power Card Over Temp	pcot_01				RO
6	Earth Fault	ef_02				RO
7	Ctrl Card Over Temp	ccot_03				RO
8	Control Word Timeout	cwt_04				RO
9	Over Current	oc_05				RO
10	Torque Limit	tl_06				RO
11	Motor Therm Over Temp	mtot_07				RO
12	Motor Etr Over Temp	meot_08				RO
13	Inverter Overload	io_09				RO
14	DC Link Under Voltage	dluv_10				RO
15	DC Link Over Voltage	dlov_11				RO
16	Short Circuit	sc_12				RO
17	Inrush Fault	if_13				RO
18	Mains Phase Loss	mpl_14				RO
19	AMA Not OK	ano_15				RO
20	Live Zero Error	lze_16				RO
21	Internal Fault	if_17				RO
22	Brake Overload	bo_18				RO
23	Motor Phase U Missing	mpum_19				RO
24	Motor Phase V Missing	mpvm_20				RO
25	Motor Phase W Missing	mpwm_21				RO
26	FieldBus Fault	ff_22				RO
27	24V Supply Fault	vsf_23				RO
28	Mains Failure	mf_24				RO
29	1.8V Supply Fault	sf_25				RO
30	Brake Res Short Cir	brsc_26				RO
31	Brake IGBT Fault	bif_27				RO
32	Option Change	oc_28				RO
33	Drive Initialized	di_29				RO
34	Safe Stop	ss_30				RO
35	Service Trip, Typecode	st_02				RO
36	End of Curve	eco_07				RO
37	Broken Belt	bb_08				RO
38	Fan Error	fe_18				RO
39	PTC1 Safe Stop	pps_30				RO
40	Dangerous Failure	df_31				RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Maintenance Others

CCN TABLE NAME: MAIOTHER

PIC6 PATH: Main Menu → Maintenance Menu → Maintenance Others

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	5V Sensor Power Monitor	tran_v			V	RO
2	Evap Pres Trans Volts	evapp_v			V	RO
3	Cond Pres Trans Volts	condp_v			V	RO
4	Econ Pres Trans Volts	econp_v			V	RO
5	Diffuser Pres Tran Volts	diffp_v			V	RO
6	Oil Sump Pres Tran Volts	opsmp_v			V	RO
7	Oil Sup Pres Trans Volts	opdis_v			V	RO
8	Evap Enter Water Volts	evewp_v			V	RO
9	Evap Leave Water Volts	evlwp_v			V	RO
10	Cond Enter Water Volts	cdewp_v			V	RO
11	Cond Leave Water Volts	cdlwp_v			V	RO
12	Bearing In Trans Volt,	brgip_v			V	RO
13	Bearing Out Trans Volt,	brgop_v			V	RO
14	Pump Output Trans Volt,	pumpo_v			V	RO
15	Pump Input Trans Volt,	pumpi_v			V	RO
16	Last Cond Pump Run Time	last_cpt				RO
17	Prestart Check Status	pre_chck	NO/YES			RO
18	GV1 Pos at Startup OK	gvpos_ok	NO/YES			RO
19	Pump PD at Startup OK	oilpd_ok	NO/YES			RO
20	ECV Pos at Startup OK	hgbp_ok	NO/YES			RO
21	Damper Pos at Startup OK	dmp_ok	NO/YES			RO
22	Oil Pump Req Oil Heater	op_heat	NO/YES			RO
23	Oil Pump Req Prestart	op_prest	NO/YES			RO
24	Pump Req Startup	op_start	NO/YES			RO
25	Pump Req Shutdown	op_shut	NO/YES			RO
26	Pump Req Swift Rst	op_srst	NO/YES			RO
27	Evap Pump Req Startup	ep_start	NO/YES			RO
28	Evap Pump Req Diagnostic	ep_diag	NO/YES			RO
29	Evap Pump Req Frozen	ep_freze	NO/YES			RO
30	Evap Pump Req Shutdown	ep_shut	NO/YES			RO
31	Evap Pump Req Pumpdown	ep_pdown	NO/YES			RO
32	Cond Pump Req Prestart	cp_prest	NO/YES			RO
33	Cond Pump Req Startup	cp_start	NO/YES			RO
34	Cond Pump Req Override	cp_overr	NO/YES			RO
35	Cond Pump Req Shutdown	cp_shut	NO/YES			RO
36	Cond Pump Req Tower	cp_tower	NO/YES			RO
37	Cond Pump Req Diagnostic	co_diag	NO/YES			RO
38	Cond Pump Req Frozen	cp_freze	NO/YES			RO
39	Cond Pump Req Pumpdown	cp_pdown	NO/YES			RO
40	Capacity Inhibit Ramping	cap_inhr	NO/YES			RO
41	Capacity Inhibit Demand	cap_inhd	NO/YES			RO
42	Capacity Decrease Demand	cap_decd	NO/YES			RO
43	Guide Vane Inh Surge	gv1_inhs	NO/YES			RO
44	Capacity Decrease Surge	cap_decs	NO/YES			RO
45	Capacity Inh Low SST	capinhst	NO/YES			RO
46	Capacity Dec Low SST	capdecst	NO/YES			RO
47	Capacity Inh Cond Pres	capinhcp	NO/YES			RO
48	Capacity Dec Cond Pres	capdeccp	NO/YES			RO
49	Capacity Inh Motor Temp	capinhmt	NO/YES			RO
50	Capacity Dec Motor Temp	capdecmt	NO/YES			RO
51	Capacity Inh Hi Current	capinham	NO/YES			RO
52	Capacity Dec Hi Current	capdecam	NO/YES			RO
53	Capacity Dec Low Temp	capdecls	NO/YES			RO
54	GV2 Pos at Startup OK	gv2posok	NO/YES			RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Maintenance IOB

CCN TABLE NAME: MAIIOB

PIC6 PATH: Main Menu → Maintenance Menu → Maintenance IOB

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	IOB1 Power Supply Volt	vol_iob1			V	RO
2	IOB1 Num Peak Prev Sec	nm_peak1				RO
3	IOB1 Low Voltage Flag	low_vol1	NO/YES			RO
4	IOB1 24VAC Fuse Status	fusstat1	CLOSE/OPEN			RO
5	IOB2 Power Supply Volt	vol_iob2			V	RO
6	IOB2 Num Peak Prev Sec	nm_peak2				RO
7	IOB2 Low Voltage Flag	low_vol2	NO/YES			RO
8	IOB2 24VAC Fuse Status	fusstat2	CLOSE/OPEN			RO
9	IOB3 Power Supply Volt	vol_iob3			V	RO
10	IOB3 Num Peak Prev Sec	nm_peak3				RO
11	IOB3 Low Voltage Flag	low_vol3	NO/YES			RO
12	IOB3 24VAC Fuse Status	fusstat3	CLOSE/OPEN			RO
13	IOB4 Power Supply Volt	vol_iob4			V	RO
14	IOB4 Num Peak Prev Sec	nm_peak4				RO
15	IOB4 Low Voltage Flag	low_vol4	NO/YES			RO
16	IOB4 24VAC Fuse Status	fusstat4	CLOSE/OPEN			RO
17	IOB5 Power Supply Volt	vol_iob5			V	RO
18	IOB5 Num Peak Prev Sec	nm_peak5				RO
19	IOB5 Low Voltage Flag	low_vol5	NO/YES			RO
20	IOB5 24VAC Fuse Status	fusstat5	CLOSE/OPEN			RO
21	IOB6 Power Supply Volt	vol_iob6			V	RO
22	IOB6 Num Peak Prev Sec	nm_peak6				RO
23	IOB6 Low Voltage Flag	low_vol6	NO/YES			RO
24	IOB6 24VAC Fuse Status	fusstat6	CLOSE/OPEN			RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Pressure Sensor Calib (PRES_CAL) Menu Description

Navigation: **MAIN MENU → MAINTENANCE MENU → PRESSURE SENSOR CALIB**

ICON	DISPLAYED TEXT	ACCESS	ASSOCIATED TABLE	PAGE NO.
	Evap Pressure Sensor	Service	PRSCAL01	77
	Cond Pressure Sensor	Service	PRSCAL02	77
	Eco Pressure Sensor	Service	PRSCAL03	77
	Evap Entering Water P	Service	PRSCAL07	78
	Evap Leaving Water P	Service	PRSCAL08	78
	Cond Entering Water P	Service	PRSCAL09	78
	Cond Leaving Water P	Service	PRSCAL10	78

APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Evap Pressure Sensor

CCN TABLE NAME: PRSCAL01

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Evap Pressure Sensor

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Evap Pressure Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1 (0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-200 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Cond Pressure Sensor

CCN TABLE NAME: PRSCAL02

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Cond Pressure Sensor

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Cond Pressure Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1 (0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-200 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Eco Pressure Sensor

CCN TABLE NAME: PRSCAL03

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Eco Pressure Sensor

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Eco Pressure Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1 (0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-200 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Evap Entering Water P

CCN TABLE NAME: PRSCAL07

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Evap Entering Water P

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	ECW Press Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1 (0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-200 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Evap Leaving Water P

CCN TABLE NAME: PRSCAL08

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Evap Leaving Water P

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	LWC Press Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1 (0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-250 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Cond Entering Water P

CCN TABLE NAME: PRSCAL09

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Cond Entering Water P

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	ECDW Press Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1(0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-250 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Cond Leaving Water P

CCN TABLE NAME: PRSCAL10

PIC6 PATH: Main Menu → Maintenance Menu → Pressure Sensor Calib → Cond Leaving Water P

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	LCDW Press Calibration	cal_en	DSABLE/ENABLE	DSABLE		RW
2	Calibration Completed	cal_st	NO/YES	NO		RW
3	Calibrated Slope	cal_s				RO
4	Calibrated Intercept	cal_i				RO
5	Current Pressure	cur_pres			psig	RO
6	Calib Press1(0 PSI)	cal_p1	9 digit numeric string	0	psig	RW
7	Calib Press2 (100-250 PSI)	cal_p2	9 digit numeric string	0	psig	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

Temp Sensor Calib

CCN TABLE NAME: TEMP_CAL

PIC6 PATH: Main Menu → Maintenance Menu → Temp Sensor Calib

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULTVALUE*	UNIT	READ/WRITE
1	Entering Chilled Water	ECW			°F	RO
2	ECW Sensor Raw Temp	ECW_RAW			°F	RO
3	ECW Temperature Offset	ECW_OFF	–2.0 to 2.0	0	^F	RW
4	Leaving Chilled Water	LCW			°F	RO
5	LCW Sensor Raw Temp	LCW_RAW			°F	RO
6	LCW Temperature Offset	LCW_OFF	–2.0 to 2.0	0	^F	RW
7	Entering Condenser Water	ECDW			°F	RO
8	ECDW Sensor Raw Temp	ECDW_RAW			°F	RO
9	ECDW Temperature Offset	ECDW_OFF	–2.0 to 2.0	0	^F	RW
10	Leaving Condenser Water	LCDW			°F	RO
11	LCDW Sensor Raw Temp	LCDW_RAW			°F	RO
12	LCDW Temperature Offset	LCDW_OFF	–2.0 to 2.0	0	^F	RW

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

System Status

CCN TABLE NAME: SYS_STAT

PIC6 PATH: Main Menu → Maintenance Menu → System Status

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULTVALUE*	UNIT	READ/WRITE
1	System Control Mode	sys_ctlm				RO
2	System Status	sys_stat				RO
3	Master Run Status	mas_stat				RO
4	Slave Run Status	sla_stat				RO
5	System Percent Load	sys_perl			%	RO
6	System KW	sys_kw			kW	RO
7	System Control Point	sys_stlp			°F	RO
8	System Demand Limit	sys_dem			%	RO
9	Supply Liquid Temp	sys_supt				RO
10	Return Liquid Temp	sys_rent				RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

UPS

CCN TABLE NAME: MAIN_UPS

PIC6 PATH: Main Menu → Maintenance Menu → UPS

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULTVALUE*	UNIT	READ/WRITE
1	Discharge Test Status 0 = Pass, 1 = Fail, 2 = Proc	tst_stat	0 to 2			RO
2	On Battery	on_bat	YES/NO			RO
3	Battery Charging	charging	YES/NO			RO
4	Battery Fully Charged	bat_full	YES/NO			RO
5	Battery Charge Level	chg_lvl	0 to 100%			RO
6	Hardware Fault	hard_flt	—			RO
7	Volt Out of Range	vol_outr	—			RO
8	Freq Out of Range	feq_outr	—			RO
9	Battery Runtime Low	bat_low	—			RO
10	Battery Over Temp	overtemp	—			RO
11	Battery Not Present	batnotpr	—			RO
12	UPS FW Version	ups_ver	—			RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

Maintenance Metering

CCN TABLE NAME: MAINMETER - Maintenance Metering

PIC6 PATH: Main Menu → Maintenance Menu → Maintenance Metering

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Main EXV Actual Position	MEXV_POS	0 to 100		%	RO
2	Actual Cond Liquid Level	COND_LL				RO
3	Main EXV Mode	ME_MODE	0 to 6			RO
4	Main EXV State	ME_STAT	0 to 7			RO
5	Main EXV Control Mode	ME_CMODE	0 to 7			RO
6	Main EXV Tgt Position	MEXV_TGT	0 to 100			RO
7	Main EXV Mode SP	MECM_SP				RO
8	Calc Cond Level SP	CMECONDL				RO
9	Calc Low SST SP	CMELSST				RO
10	Eco EXV Actual Position	EEXV_POS	0 to 100		%	RO
11	Eco EXV Mode	EE_MODE	0 to 6			RO
12	Eco EXV State	EE_STAT	0 to 7			RO
13	Eco EXV Tgt Position	EEXV_TGT	0 to 100		%	RO
14	Eco EXV Control Mode	EE_CMODE	0 to 6			RO
15	Eco Activated Mode SP	EECM_SP				RO
16	Calc Eco Superheat SP	CESH_SP				RO
17	EXCSV Control Mode	excsvmod	0 to 2			RO
18	Actual EXCSV Position	LQBP_POS	0 to 100		%	RO
19	EXCSV Surge Pro Target	excsvsug	0 to 100		%	RO

LEGEND

RO — Read Only

*Default value is shown only if configurable in this table.

EXV Control

CCN TABLE NAME: EXVCTRL - EXV Control

PIC6 PATH: Main Menu → Maintenance Menu → EXV Control

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULTVALUE*	UNIT	READ/WRITE
1	Main EXV Position Cmd	me_cmd	0 to 100		%	RO
2	Main EXV Pos Feedback	me_pfb	0 to 100		%	RO
3	ECO EXV Position Cmd	ee_cmd	0 to 100		%	RO
4	ECO EXV Pos Feedback	ee_pfb	0 to 100		%	RO

LEGEND

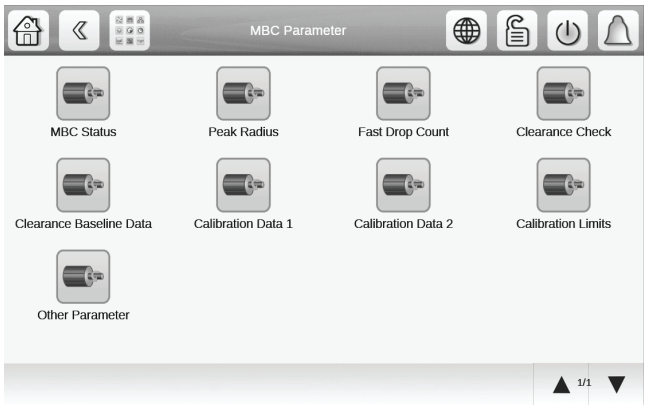
RO — Read Only

*Default value is shown only if configurable in this table.

MBC Parameter

CCN TABLE NAME: MBC Parameter

PIC6 PATH: Main Menu → Maintenance Menu → MBC Parameter



APPENDIX A — PIC6 SCREEN AND TABLE STRUCTURE (cont)

Alarms Menu Description

ICON	DISPLAYED TEXT	ACCESS	ASSOCIATED TABLE	PAGE NO.
	Reset Alarms	All	ALARMRST	81
	Current Alarms	All	CUR_ALM	—
	History Alarms	All	ALMHIST1	—

Alarm Reset

CCN TABLE NAME: ALARMRST

PIC6 PATH: Main Menu → Alarm Menu → Alarm Reset

LINE	PIC6 DESCRIPTION	CCN NAME	RANGE	DEFAULT VALUE*	UNIT	READ/WRITE
1	Alarm Reset	RST_ALM	NO/YES	NO		RW
2	Alarm State	ALM_STAT				RO
3	Current Alarm 1	alarm_1c				RO
4	Current Alarm 2	alarm_2c				RO
5	Current Alarm 3	alarm_3c				RO
6	Current Alarm 4	alarm_4c				RO
7	Current Alarm 5	alarm_5c				RO

LEGEND

RO — Read Only
RW — Read/Write

*Default value is shown only if configurable in this table.

NOTE: For more information about viewing and resetting alarms, see the Diagnostics and Troubleshooting section on page 37.

APPENDIX B — CONTROL PANEL PCB BOARD STATUS INDICATORS

Input/Output Board (IOB)

All IOB control boards have LED indicators that show control board and communication status.

A red LED on each control module operates in the following manner:

- Power not present or power supply failure: LED is off
- Power present but microprocessor in Reset: LED is off
- Microprocessor operational but not communicating: LED flashes 3 seconds on, 3 seconds off
- Microprocessor operational and communicating with control system: LED flashes at 0.5 Hz rate (1 second on, 1 second off) in sync (±100 ms) with all other new control modules on the same communication bus
- Microprocessor in boot mode: LED flashes at 0.2 seconds on, 0.2 seconds off

Each independent communication port has a green status LED. The green LED is on when data is being transmitted by the board.

All RS485 ports have a green LED.

SIOB Board

For diagnostic purposes the SIOB can visually be checked as follows:

- While data is transmitted on the LEN bus a green LED will flash
- If no data is transmitted on the LEN bus the green LED will be OFF

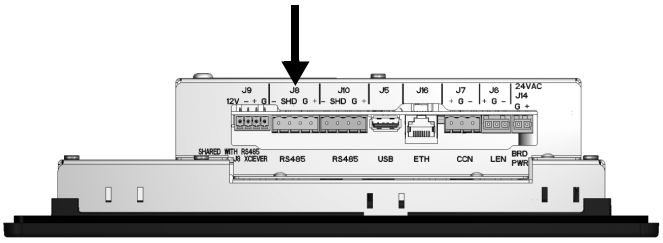
APPENDIX C — PROTOCOL CONFIGURATION

General: Protocol Configuration

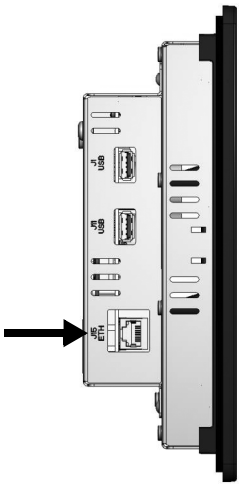
PIC6 port J8 can be configured for either BACnet MS/TP or Modbus RTU. Selection is made in ***Main Menu → Configuration Menu → Protocol Configuration***.

Upon a changed protocol configuration the PIC6 module will reboot automatically to save the change.

For BACnet/IP or Modbus TCP/IP use port J15 (Ethernet port 0, default IP: 169.254.0.1, mask: 255.255.0.0). See Fig. E for J15 locations. See Fig. F-H for the three-page Connect – Protocol Configuration Menu.



PIC6 BOTTOM VIEW



PIC6 SIDE VIEW

Fig. E — Location of J15 on PIC6 HMI

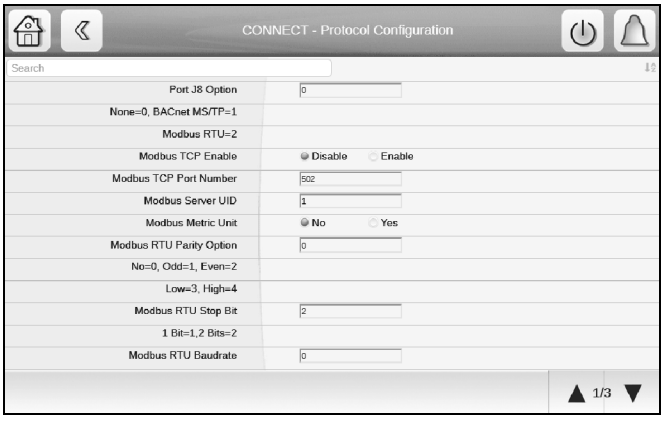


Fig. F — Connect – Protocol Configuration Menu, Page 1

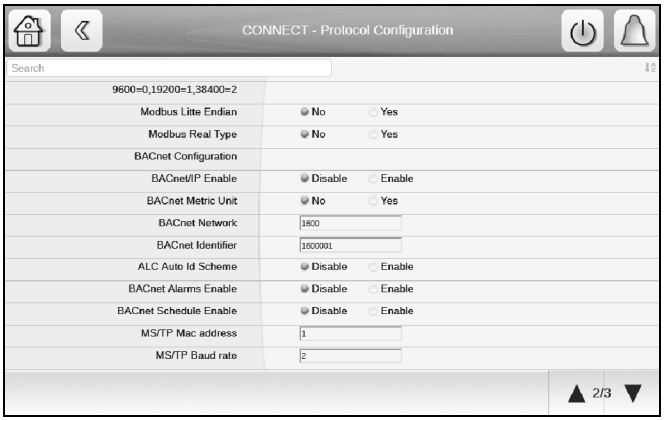


Fig. G — Connect – Protocol Configuration Menu, Page 2

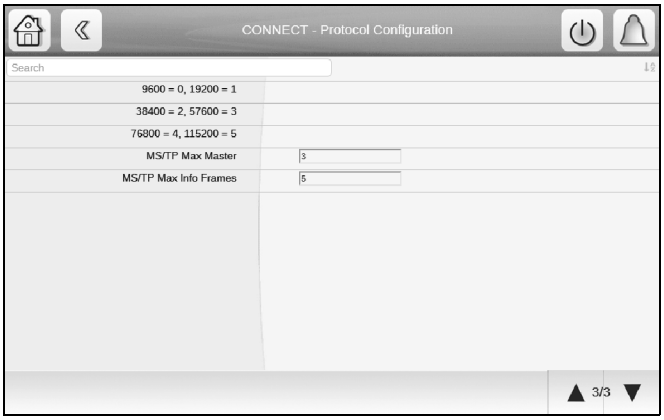


Fig. H — Connect – Protocol Configuration Menu, Page 3

Note that for PIC6 BACnet MS/TP and Modbus RTU cannot be selected at the same time. Similarly BACnet MS/TP and BACnet IP as well as Modbus RTU and Modbus TCP/IP are mutually exclusive.

BACnet/IP

The 19XR PIC6 controller supports the BACnet protocol as B-ASC BACnet equipment over IP. In addition, BACnet on the PIC6 controller supports the following features:

- Optional properties such as Change of Value (COV), Intrinsic Reporting, and Commandable properties on some objects
- The generation of limited alarm and event notifications and the ability to direct them to recipients
- The tracking of acknowledgments of alarms from human operators
- The adjustment of alarm parameters
- Read/write property for many objects

BACnet Settings

BACnet settings are available on the ***Main Menu → Configuration Menu → Protocol Configuration.*** The menu requires the Service password for access.

BACnet Objects

The 19XR PIC6 contains up to 500 BACnet objects. They can be of ANALOG_VALUE (AV) or BINARY_VALUE (BV) type. Objects name are assigned by concatenating the CCN table name and CCN point name. This enables easy identification and recognition of the points. For a detailed list, see the BACnet Object table beginning on page 85.

In general, the equipment configuration parameters are available as Read Only. Setpoint parameters can be read and written (Read-Write).

Compressor status is ASCII-coded. In order to obtain the status from BACnet, statuses are assigned a BACnet code as shown in Table A.

Table A — Equipment Status

BACNET CODE	TEXT
1	Off
2	Control Test
3	Pumpdown
4	Lockout
5	Recycle
6	Tripout
7	Timeout
8	Prestart
9	Startup
10	Autorst
11	Ramping
12	Running
13	Override
14	Demand
15	Shutdown
16	Freecool
17	Condflsh

Alarm states are coded as shown in Table B.

Table B — Alarm States

BACNET CODE	CCN CODE
0	Normal
1	Partial (Alert)
2	Shutdown (Alarm)

Modifying the Unit IP Address

Note that changing IP address from the PIC6 SETUP menu will require a manual reboot or power cycle of the PIC6 controller in order to re-build the BACnet stack. For detailed instructions, see the Unit IP Address section on page 48.

BACnet IP Communication Problems

If the unit does not respond to the building management system, possible causes include the following:

- The Ethernet cable is not correctly connected.
- Network parameters are not correct. (See Main Menu, System Configuration for Ethernet configuration and Main Menu, Configuration Menu, Protocol Configuration for appropriate selections.)
- There is an IP router between the equipment and the building management system.
- On the Ethernet connector, verify that the green LED is ON and the orange LED is blinking.
- Use the Windows ping utility to ping the IP address of the controller.
- Open 19XR PIC6 Configuration Menu (Service password required) and check BACnet parameters.
- Use the free software called BDT (BACnet Discovery Tool) available on the internet (search *bacnet bdt*) and install it on the PC. All equipment connected to the BACnet network will respond to the “Who Is” command sent by this tool. Find the equipment configured with the BACnet device instance (1600001 default for Carrier equipment).

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table C — BACnet Object Table

Object Name	Type	Instance	Option	COVInc	PV Access	Description
ALARMRST_alarm_1	AV	85	Type 6	0	RO	Jbus Current Alarm 1
ALARMRST_alarm_2	AV	86	Type 6	0	RO	Jbus Current Alarm 2
ALARMRST_alarm_3	AV	87	Type 6	0	RO	Jbus Current Alarm 3
ALARMRST_alarm_4	AV	88	Type 6	0	RO	Jbus Current Alarm 4
ALARMRST_alarm_5	AV	89	Type 6	0	RO	Jbus Current Alarm 5
BACnet_COLOR	MV	8	Type 5	0	RO	Operation Status Color
BACnet_PRIME_V	AV	150	Type 6	0	RO	Value of Prime variable
CAPACTRL_cm_stat1	AV	95	Type 6	0	RO	Comp1 Run State Val
CAPACTRL_ctrl_wt	AV	90	Type 6	0	RO	Controlled Water Temp
CAPACTRL_gv1_tgt	AV	91	Type 6	0	RO	Target GV1 Pos
CAPACTRL_gv2_tgt	AV	92	Type 6	0	RO	Target GV2 Pos
CAPACTRL_hgbp_tp	AV	94	Type 6	0	RO	EXCSV Surge Pro Target
CAPACTRL_vfd_tgt	AV	93	Type 6	0	RO	Target VFD Speed Per
CFGSURGE_gv1_pful	AV	127	Type 6	0	RO	IGV1 Full Load Position
CFGSURGE_gv1_pmin	AV	126	Type 6	0	RO	IGV1 Minimum Position
CFGSURGE_sgl_hoff	AV	130	Type 6	0	RO	Surge Line Upper DB
CFGSURGE_sgl_loff	AV	129	Type 6	0	RO	Surge Line Lower DB
CFGSURGE_sgl_off	AV	128	Type 6	0	RO	Surge Line Offset
CFGSURGE_sgl_pro	AV	134	Type 6	0	RO	Surge Profile Offset
CFGSURGE_sgl_shfh	AV	131	Type 6	0	RO	Surge Line Shape Factor
CFGSURGE_sgl_shfl	AV	132	Type 6	0	RO	Sound Line Shape Factor
CFGSURGE_sgl_spdf	AV	133	Type 6	0	RO	Surge Line Speed Factor
CONF_OPT_hgbp_opt	MV	6	Type 5	0	RO	EXVSV Valve Option
CONF_OPT_hgbp_sel	MV	7	Type 5	0	RO	EXVSV Selection
CONF_PRG_oil_flt	AV	136	Type 6	0	RO	Oil Filter Failure
CONF_PRG_oil_qly	AV	135	Type 6	0	RO	Oil Quality
CONF_PRG_ref_chg	AV	138	Type 6	0	RO	Refrig Charge Status
CONF_PRG_tran_dev	AV	137	Type 6	0	RO	Transducer Deviation
CONNECT_bac_id	AV	140	Type 6	0	RO	BACnet Identifier
CONNECT_bacena	BV	63	Type 4	0	RO	BACnet/IP Enable
CONNECT_bacunit	BV	64	Type 4	0	RO	BACnet Metric Unit
CONNECT_network	AV	139	Type 6	0	RO	BACnet Network
EXVCTRL_EEXV_CMD	AV	163	Type 6	0	RO	ECO EXV Position Cmd
EXVCTRL_MEXV_CMD	AV	162	Type 6	0	RO	Main EXV Position Cmd
FACTORY_chil_typ	MV	4	Type 5	0	RO	Chiller Type
FACTORY_lub_typ	MV	11	Type 5	0	RO	Lubrication Type
FACTORY_vfd_opt	MV	5	Type 5	0	RO	VFD/Starter Option
GENUNIT_AMPS_P	AV	4	Type 6	0	RO	Percent Current
GENUNIT_BAC_OCC	BV	9	Type 4	0	RO	BACnet Occupied
GENUNIT_ch_state	AV	7	Type 6	0	RO	Chiller Status Code
GENUNIT_CHIL_OCC_rd	BV	3	Type 4	0	RO	Network:Cmd Occupied
GENUNIT_CHIL_OCC_wr	BV	68	Type 1	0	RW	Chiller Occupied?
GENUNIT_CHIL_S_S_rd	BV	2	Type 4	0	RO	Network:Cmd Start/Stop
GENUNIT_CHIL_S_S_wr	BV	66	Type 1	0	RW	Chiller Start/Stop
GENUNIT_ctl_mode	MV	1	Type 5	0	RO	Control Mode
GENUNIT_CTRL_PNT_rd	AV	1	Type 6	0	RO	Control Point
GENUNIT_CTRL_PNT_wr	AV	147	Type 2	0	RW	Control Point
GENUNIT_DEM_LIM_rd	AV	6	Type 6	0	RO	Actual Demand Limit
GENUNIT_DEM_LIM_wr	AV	148	Type 2	0	RW	Demand Limit
GENUNIT_EMSTOP_rd	BV	5	Type 4	0	RO	Emergency Stop
GENUNIT_EMSTOP_wr	BV	67	Type 1	0	RW	Emergency Stop
GENUNIT_FC_START_rd	BV	8	Type 4	0	RO	Start Free Cooling
GENUNIT_FC_START_wr	BV	69	Type 1	0	RW	Start Free Cooling
GENUNIT_HC_SEL_rd	BV	4	Type 4	0	RO	Cooling/Heating Select
GENUNIT_HC_SEL_wr	AV	149	Type 2	0	RW	Heatcool Select
GENUNIT_ice_occ	BV	7	Type 4	0	RO	Ice Schedule Occupied
GENUNIT_KW_P	AV	5	Type 6	0	RO	Motor Percent Kilowatts
GENUNIT_loc_occ	BV	6	Type 4	0	RO	Local Schedule Occupied
GENUNIT_reset	AV	2	Type 6	0	RO	Control Point Reset
GENUNIT_setpoint	AV	3	Type 6	0	RO	Actual Setpoint
GENUNIT_statstop	BV	1	Type 4	0	RO	Deter Start Stop Command

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table C — BACnet Object Table (cont)

Object Name	Type	Instance	Option	COVInc	PV Access	Description
HYDRLIC_CDW_FLOW	BV	50	Type 4	0	RO	Condenser Water Flow
HYDRLIC_CDW_FV	AV	58	Type 6	0	RO	Cond Water Flow Value
HYDRLIC_cdw_pd	AV	59	Type 6	0	RO	Condenser Water Delta P
HYDRLIC_CDWP	BV	49	Type 4	0	RO	Condenser Water Pump
HYDRLIC_CHW_FLOW	BV	52	Type 4	0	RO	Chilled Water Flow
HYDRLIC_CHW_FV	AV	60	Type 6	0	RO	Chilled Water Flow Value
HYDRLIC_chw_pd	AV	61	Type 6	0	RO	Chilled Water Delta P
HYDRLIC_CHWP	BV	51	Type 4	0	RO	Chilled Water Pump
HYDRLIC_ctrlw_dt	AV	62	Type 6	0	RO	Controlled Water DT
INPUTS_COND_LS	AV	160	Type 6	0	RO	Liquid Level Cond
INPUTS_DIFF_ACT	AV	47	Type 6	0	RO	Diffuser Actual Pos
INPUTS_DMP_ACT	MV	2	Type 5	0	RO	Damper Valve Status
INPUTS_E_STOP	BV	13	Type 4	0	RO	Emergency Stop Contact
INPUTS_FS_LOCK	BV	18	Type 4	0	RO	Fire Security Interlock
INPUTS_GV1_ACT	AV	44	Type 6	0	RO	Guide Vane 1 Actual Pos
INPUTS_GV2_ACT	AV	45	Type 6	0	RO	Guide Vane 2 Actual Pos
INPUTS_HF_LS	BV	23	Type 4	0	RO	Liquid Level Switch
INPUTS_HGBP_ACT	MV	3	Type 5	0	RO	EC Valve Status
INPUTS_HGBPACTP	AV	48	Type 6	0	RO	Actual ECV Pos Per
INPUTS_HP_SW	BV	11	Type 4	0	RO	High Pressure Switch
INPUTS_ICE_CON	BV	14	Type 4	0	RO	Ice Build Contact
INPUTS_PGLE_HI	BV	22	Type 4	0	RO	Purge Level Switch High
INPUTS_PGLE_LO	BV	21	Type 4	0	RO	Purge Level Switch Low
INPUTS_REM_CON	BV	12	Type 4	0	RO	Remote Contact
INPUTS_REM_LOCK	BV	15	Type 4	0	RO	Chiller Lockout
INPUTS_SAFETY	BV	16	Type 4	0	RO	Spare Safety Input
INPUTS_STAR_AUX	BV	10	Type 4	0	RO	Compressor Start Contact
INPUTS_STARTFLT	BV	17	Type 4	0	RO	Starter Fault Feedback
INPUTS_TRIPR	BV	19	Type 4	0	RO	ISM Trip Relay Status
INPUTS_VFD_ACT	AV	46	Type 6	0	RO	Actual VFD Speed Per
LABONLY_gv1_fc	BV	61	Type 4	0	RO	GV1 Forced
LABONLY_gv2_fc	BV	62	Type 4	0	RO	GV2 Forced
MAIMETER_CMECONDL	AV	218	Type 6	0	RO	Calc Cond Level SP
MAIMETER_EEXV_TGT	AV	220	Type 6	0	RO	Eco EXV Tgt Position
MAIMETER_MEXV_TGT	AV	219	Type 6	0	RO	Main EXV Tgt Position
MAIN_MS_lag_s_s	BV	60	Type 4	0	RO	Slave Start/Stop
MAIN_MS_lagstart	AV	121	Type 6	0	RO	Lag Start Timer
MAIN_MS_lagstat	AV	120	Type 6	0	RO	Slave Run Status
MAIN_MS_lagstop	AV	122	Type 6	0	RO	Lag Stop Timer
MAIN_MS_lead_lag	AV	116	Type 6	0	RO	Unit is Lead or Lag
MAIN_MS_ll_comm	BV	59	Type 4	0	RO	Lead Lag Communication
MAIN_MS_ll_fault	AV	119	Type 6	0	RO	Master Slave Fault
MAIN_MS_ll_hr_d	AV	125	Type 6	0	RO	Lead/Lag Hours Delta
MAIN_MS_ms_ctrl	AV	117	Type 6	0	RO	Master Control Type
MAIN_MS_preflt	AV	123	Type 6	0	RO	Prestart Fault Timer
MAIN_MS_pulltime	AV	124	Type 6	0	RO	Pulldown Timer
MAIN_MS_sl_ctrl	AV	118	Type 6	0	RO	Slave Control Type
MAIN_SRD_diff_alm	BV	58	Type 4	0	RO	SRD Rotating Stall Alarm
MAIN_SRD_diff_tgt	AV	112	Type 6	0	RO	Diffuser Target Pos
MAIN_SRD_diffault	BV	57	Type 4	0	RO	Diffuser Fault
MAIN_SRD_lift_1	AV	114	Type 6	0	RO	VDO High Lift Load Line
MAIN_SRD_lift_2	AV	115	Type 6	0	RO	VDO Low Lift Load Line
MAIN_SRD_lift_a	AV	113	Type 6	0	RO	Actual Lift
MAIN_UPS_bat_full	BV	78	Type 4	0	RO	Battery Fully Charged
MAIN_UPS_charging	BV	77	Type 4	0	RO	Battery Charging
MAIN_UPS_chg_lvl	AV	217	Type 6	0	RO	Battery Charge Level
MAISURGE_act_reg	AV	96	Type 6	0	RO	Surge Region
MAISURGE_dts_act	AV	97	Type 6	0	RO	Actual Delta Tsat
MAISURGE_dts_cal	AV	98	Type 6	0	RO	Calc Ref Delta Tsat
MAISURGE_dts_maxc	AV	103	Type 6	0	RO	Cal Surge Delta Tsmax
MAISURGE_dts_medc	AV	105	Type 6	0	RO	Cal Surge Delta Tsmed

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table C — BACnet Object Table (cont)

Object Name	Type	Instance	Option	COVInc	PV Access	Description
MAISURGE_dts_minc	AV	104	Type 6	0	RO	Cal Surge Delta Tsmin
MAISURGE_enlp_opt	AV	109	Type 6	0	RO	Envelope Line Optimized
MAISURGE_gv1_sful	AV	106	Type 6	0	RO	IGV1 Full Load Position
MAISURGE_gv1_smed	AV	108	Type 6	0	RO	Opti-Sound IGV1 Position
MAISURGE_gv1_smin	AV	107	Type 6	0	RO	IGV1 Minimum Position
MAISURGE_sc	AV	99	Type 6	0	RO	Surge Counts
MAISURGE_spc	AV	100	Type 6	0	RO	Surge Protection Counts
MAISURGE_surg_act	AV	101	Type 6	0	RO	Surge Prevention Active
MAISURGE_surg_pro	AV	102	Type 6	0	RO	Surge Protection Active
MBC_Alarm	BV	76	Type 4	0	RO	General Alarm for MBC
MBC_Alert	BV	75	Type 4	0	RO	General Alert for MBC
MBC_flags0	MV	10	Type 5	0	RO	MBC Levitate Status
MBC_h1meas	AV	188	Type 6	0	RO	H1 Coil Current
MBC_h2meas	AV	189	Type 6	0	RO	H2 Coil Current
MBC_hAvGpChg	AV	168	Type 6	0	RO	H Average Gap Change
MBC_hzAvg	AV	172	Type 6	0	RO	H Average Position
MBC_j1Imeas	AV	180	Type 6	0	RO	J1 Coil Current
MBC_j2Imeas	AV	181	Type 6	0	RO	J2 Coil Current
MBC_j3Imeas	AV	182	Type 6	0	RO	J3 Coil Current
MBC_j4Imeas	AV	183	Type 6	0	RO	J4 Coil Current
MBC_jAvGpChg	AV	167	Type 6	0	RO	J Average Gap Change
MBC_jxAvg	AV	170	Type 6	0	RO	J Average Position X
MBC_jyAvg	AV	171	Type 6	0	RO	J Average Position Y
MBC_k1Imeas	AV	184	Type 6	0	RO	K1 Coil Current
MBC_k2Imeas	AV	185	Type 6	0	RO	K2 Coil Current
MBC_k3Imeas	AV	186	Type 6	0	RO	K3 Coil Current
MBC_k4Imeas	AV	187	Type 6	0	RO	K4 Coil Current
MBC_kAvGpChg	AV	169	Type 6	0	RO	K Average Gap Change
MBC_kxAvg	AV	173	Type 6	0	RO	K Average Position X
MBC_kyAvg	AV	174	Type 6	0	RO	K Average Position Y
MBC_RPM	AV	165	Type 6	0	RO	Rotational Shaft Speed
MBC_SpeedHZ0	AV	166	Type 6	0	RO	Sync Speen (Hz)
MBC_tempC01	AV	175	Type 6	0	RO	J Bearing Coil Temp
MBC_tempC02	AV	176	Type 6	0	RO	H Outboard Coil Temp
MBC_tempC03	AV	177	Type 6	0	RO	H Inboard Coil Temp
MBC_tempC04	AV	178	Type 6	0	RO	K Bearing Coil Temp
MBC_tempC05	AV	179	Type 6	0	RO	Coldplate Temp
MBC3_hFDC_cur	AV	211	Type 6	0	RO	H Fast Drop Count Now
MBC3_hFDC_lim	AV	214	Type 6	0	RO	H Fast Drop Count Limit
MBC3_jFDC_cur	AV	210	Type 6	0	RO	J Fast Drop Count Now
MBC3_jFDC_lim	AV	213	Type 6	0	RO	J Fast Drop Count Limit
MBC3_kFDC_cur	AV	212	Type 6	0	RO	K Fast Drop Count Now
MBC3_kFDC_lim	AV	215	Type 6	0	RO	K Fast Drop Count Limit
MBC5_h1R0	AV	206	Type 6	0	RO	H Coil 1 R0
MBC5_h2R0	AV	207	Type 6	0	RO	H Coil 2 R0
MBC5_hSCal1	AV	208	Type 6	0	RO	H Sensor Gap S1
MBC5_hSCal2	AV	209	Type 6	0	RO	H Sensor Gap S2
MBC5_j1R0	AV	190	Type 6	0	RO	J Coil 1 R0
MBC5_j2R0	AV	191	Type 6	0	RO	J Coil 2 R0
MBC5_j3R0	AV	192	Type 6	0	RO	J Coil 3 R0
MBC5_j4R0	AV	193	Type 6	0	RO	J Coil 4 R0
MBC5_jSCal1	AV	194	Type 6	0	RO	J Sensor Gap S1
MBC5_jSCal2	AV	196	Type 6	0	RO	J Sensor Gap S2
MBC5_jTCal1	AV	195	Type 6	0	RO	J Sensor Gap T1
MBC5_jTCal2	AV	197	Type 6	0	RO	J Sensor Gap T2
MBC5_k1R0	AV	198	Type 6	0	RO	K Coil 1 R0
MBC5_k2R0	AV	199	Type 6	0	RO	K Coil 2 R0
MBC5_k3R0	AV	200	Type 6	0	RO	K Coil 3 R0
MBC5_k4R0	AV	201	Type 6	0	RO	K Coil 4 R0
MBC5_kSCal1	AV	202	Type 6	0	RO	K Sensor Gap S1
MBC5_kSCal2	AV	204	Type 6	0	RO	K Sensor Gap S2

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table C — BACnet Object Table (cont)

Object Name	Type	Instance	Option	COVInc	PV Access	Description
MBC5_kTCal1	AV	203	Type 6	0	RO	K Sensor Gap T1
MBC5_kTCal2	AV	205	Type 6	0	RO	K Sensor Gap T2
MODES_cm_stat1	MV	9	Type 5	0	RO	Comp1 Run State Val
OUTPUTS_ALE	BV	25	Type 4	0	RO	Alert Relay
OUTPUTS_ALM	BV	24	Type 4	0	RO	Alarm Relay
OUTPUTS_CHST_OUT	AV	51	Type 6	0	RO	Chiller Stat Output mA
OUTPUTS_COMP_PSV	BV	39	Type 4	0	RO	Purge Comp Valve
OUTPUTS_COMP_SR	BV	26	Type 4	0	RO	Compressor Start Relay
OUTPUTS_COND_CV	BV	34	Type 4	0	RO	Condenser Control Valve
OUTPUTS_COND_DCV	BV	37	Type 4	0	RO	Condenser Drain Valve
OUTPUTS_COND_FCV	BV	48	Type 4	0	RO	Condenser Filling Valve
OUTPUTS_COND_PSV	BV	38	Type 4	0	RO	Purge Cond Valve
OUTPUTS_DIFF_OUT	AV	49	Type 6	0	RO	Diffuser Output mA
OUTPUTS_DIS_PSV	BV	42	Type 4	0	RO	Purge Discharge Valve
OUTPUTS_DRASVON	BV	40	Type 4	0	RO	Purge Drainage Valve
OUTPUTS_ECON_IV	BV	33	Type 4	0	RO	Economizer Isolation VLV
OUTPUTS_EVAP_CV	BV	35	Type 4	0	RO	Evaporator Control Valve
OUTPUTS_EVAP_DCV	BV	36	Type 4	0	RO	Evaporator Drain Valve
OUTPUTS_EXV_OUT	AV	53	Type 6	0	RO	Oil EXV Output mA
OUTPUTS_FC_VALVE	BV	47	Type 4	0	RO	Free Cooling Valve
OUTPUTS_GV1_DEC	BV	27	Type 4	0	RO	Guide Vane 1 Decrease
OUTPUTS_GV1_INC	BV	28	Type 4	0	RO	Guide Vane 1 Increase
OUTPUTS_GV1_OUT	AV	56	Type 6	0	RO	Guide Vane1 Output
OUTPUTS_GV2_OUT	AV	57	Type 6	0	RO	Guide Vane2 Output
OUTPUTS_HDPV_OUT	AV	50	Type 6	0	RO	Head Pres Output mA
OUTPUTS_llc_exvt	AV	54	Type 6	0	RO	Liquid Level EXV Target
OUTPUTS_LQBP_TGT	AV	221	Type 6	0	RO	EXCSV Target Pos Per
OUTPUTS_LQBPtgtV	AV	161	Type 6	0	RO	EXCSV Target Pos volt
OUTPUTS_OIL_HEAT	BV	29	Type 4	0	RO	Oil Heater Relay
OUTPUTS_OIL_PUMP	BV	30	Type 4	0	RO	Oil Pump Relay
OUTPUTS_op_vfd_t	AV	55	Type 6	0	RO	Oil Pump VFD Target
OUTPUTS_PG_COMP	BV	44	Type 4	0	RO	Purge Compressor
OUTPUTS_PG_HEAT	BV	45	Type 4	0	RO	Purge Heater
OUTPUTS_PGAPUMP	BV	43	Type 4	0	RO	Purge Vacuum Pump
OUTPUTS_REG_PSV	BV	41	Type 4	0	RO	Purge Regeneration Valve
OUTPUTS_RUN_STAT	BV	70	Type 4	0	RO	Chiller Status(Discrete)
OUTPUTS_TFR_HIGH	BV	31	Type 4	0	RO	Tower Fan Relay High
OUTPUTS_TFR_LOW	BV	32	Type 4	0	RO	Tower Fan Relay Low
OUTPUTS_VFD_OUT	AV	52	Type 6	0	RO	VFD Speed Output mA
OUTPUTS_VS_SV	BV	46	Type 4	0	RO	Vapor Source SV
POWER_I_AMPS_A_I	AV	66	Type 6	0	RO	Actual Line Current
POWER_I_AMPS_P_I	AV	67	Type 6	0	RO	Percent Line Current
POWER_I_KW	AV	70	Type 6	0	RO	Line Kilowatts
POWER_I_ln_imb_i	AV	152	Type 6	0	RO	Line Current Imbalance%
POWER_I_ln_imb_v	AV	72	Type 6	0	RO	Line Voltage Imbalance%
POWER_I_POW_FACT	AV	71	Type 6	0	RO	Line Power Factor
POWER_I_VOLT_A	AV	68	Type 6	0	RO	Actual Line Voltage
POWER_I_VOLT_P	AV	69	Type 6	0	RO	Percent Line Voltage
POWER_O_alm_code	AV	84	Type 6	0	RO	VFD Alarm Code
POWER_O_amps_p_o	AV	74	Type 6	0	RO	Percent VFD Load Current
POWER_O_bus_volt	AV	76	Type 6	0	RO	DC Bus Voltage
POWER_O_enc_temp	AV	81	Type 6	0	RO	VFD Enclosure Temp
POWER_O_inv_temp	AV	82	Type 6	0	RO	Inverter Temperature
POWER_O_lrtem_sw	BV	54	Type 4	0	RO	LR Temp Switch
POWER_O_MOT_FREQ	AV	75	Type 6	0	RO	Motor Actual Frequency
POWER_O_motor_kw	AV	79	Type 6	0	RO	Motor Kilowatts
POWER_O_motor_pf	AV	78	Type 6	0	RO	Motor Power Factor
POWER_O_motorkwh	AV	80	Type 6	0	RO	Motor Kilowatt-Hours
POWER_O_prech_fd	BV	53	Type 4	0	RO	Precharge Feedback
POWER_O_rec_temp	AV	83	Type 6	0	RO	Rectifier Temperature
POWER_O_spd_fd	BV	55	Type 4	0	RO	SPD Feedback

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table C — BACnet Object Table (cont)

Object Name	Type	Instance	Option	COVInc	PV Access	Description
POWER_O_vfd_act	AV	77	Type 6	0	RO	Actual VFD Speed Per
POWER_O_VFD_LOAD	AV	73	Type 6	0	RO	VFD Load Current
POWER_O_VFDC_HI	BV	56	Type 4	0	RO	High VFD Current
PRESSURE_COND_P	AV	37	Type 6	0	RO	Condenser Pressure
PRESSURE_DIFF_P	AV	40	Type 6	0	RO	Diffuser Pressure
PRESSURE_ECON_P	AV	38	Type 6	0	RO	Economizer Pressure
PRESSURE_EVAP_P	AV	36	Type 6	0	RO	Evaporator Pressure
PRESSURE_HEAD_P	AV	41	Type 6	0	RO	Head Pressure Reference
PRESSURE_OIL_PD	AV	39	Type 6	0	RO	Oil Pump Delta P
PRESSURE_PUMP_PD	AV	43	Type 6	0	RO	Ref Pump Delta P
PRESSURE_REF_PD	AV	42	Type 6	0	RO	Bearing Delta P
QCK_EOL_cfgidst	AV	216	Type 6	0	RO	MBC ID Status Value
QCK_TEST_Q_DIFTGT	AV	111	Type 6	0	RO	Diffuser Target Pos
QCK_TEST_Q_GV1ACT	AV	110	Type 6	0	RO	Guide Vane 1 Actual Pos
RUNTIME_C_STARTS	AV	63	Type 6	0	RO	Compressor Starts Num
RUNTIME_COMP_HRS	AV	64	Type 6	0	RO	Compressor Running Hrs
RUNTIME_PGP_NO	AV	153	Type 6	0	RO	Total Pumpout Numbers
RUNTIME_PGP_TM	AV	154	Type 6	0	RO	Total Pumpout Time
RUNTIME_pgp_tm_w	AV	155	Type 6	0	RO	Avg Daily Purge in 7 Day
RUNTIME_SRV_HRS	AV	65	Type 6	0	RO	After Service Hrs
RUNTIME_ST_CNT12	AV	151	Type 6	0	RO	Starts Num in 12 Hours
SETPOINT_dem_base	AV	146	Type 6	0	RW	Base Demand Limit
SETPOINT_ecdw_sp	AV	143	Type 6	0	RW	Heating ECDW Setpoint
SETPOINT_ecw_sp	AV	141	Type 6	0	RW	Cooling ECW Setpoint
SETPOINT_EWT_OPT	BV	65	Type 4	0	RW	EWT Control Option
SETPOINT_ice_sp	AV	145	Type 6	0	RW	Ice Build Setpoint
SETPOINT_lcdw_sp	AV	144	Type 6	0	RW	Heating LCDW Setpoint
SETPOINT_lcw_sp	AV	142	Type 6	0	RW	Cooling LCW Setpoint
TEMP_CBH1_T	AV	33	Type 6	0	RO	1st Stage Bearing Temp
TEMP_CBH2_T	AV	34	Type 6	0	RO	2nd Stage Bearing Temp
TEMP_cond_app	AV	17	Type 6	0	RO	Condenser Approach
TEMP_COND_SAT	AV	18	Type 6	0	RO	Cond Sat Refrig Temp
TEMP_DGT	AV	19	Type 6	0	RO	Comp Discharge Temp
TEMP_DSH	AV	20	Type 6	0	RO	Discharge Superheat
TEMP_ECDW	AV	10	Type 6	0	RO	Entering Condenser Water
TEMP_ECW	AV	8	Type 6	0	RO	Entering Chilled Water
TEMP_evap_app	AV	16	Type 6	0	RO	Evaporator Approach
TEMP_EVAP_SAT	AV	14	Type 6	0	RO	Evap Sat Refrig Temp
TEMP_EVAP_T	AV	15	Type 6	0	RO	Evap Refrig Liquid Temp
TEMP_HR_EWT	AV	12	Type 6	0	RO	Heat Recl Entering Temp
TEMP_HR_LWT	AV	13	Type 6	0	RO	Heat Recl Leaving Temp
TEMP_LCDW	AV	11	Type 6	0	RO	Leaving Condenser Water
TEMP_LCW	AV	9	Type 6	0	RO	Leaving Chilled Water
TEMP_MTRB	AV	22	Type 6	0	RO	Thrust Bearing Temp
TEMP_MTRB_OIL	AV	21	Type 6	0	RO	Thrust Bearing Oil Temp
TEMP_MTRB1	AV	23	Type 6	0	RO	Low Speed ME Brg Temp
TEMP_MTRB2	AV	24	Type 6	0	RO	Low Speed CE Brg Temp
TEMP_MTRB3	AV	25	Type 6	0	RO	High Speed ME Brg Temp
TEMP_MTRB4	AV	26	Type 6	0	RO	High Speed CE Brg Temp
TEMP_MTRW1	AV	27	Type 6	0	RO	Motor Winding 1 Temp
TEMP_MTRW2	AV	28	Type 6	0	RO	Motor Winding 2 Temp
TEMP_MTRW3	AV	29	Type 6	0	RO	Motor Winding 3 Temp
TEMP_OILT_DIS	AV	31	Type 6	0	RO	Oil Supply Temp
TEMP_OILT_SMP	AV	30	Type 6	0	RO	Oil Sump Temp
TEMP_PGC_SUCT	AV	32	Type 6	0	RO	Purge Comp Suction Temp

LEGEND
AV — Analog Value
BV — Binary Value
CMD — Commandable
COV — Change of Value
IR — Intrinsic Reporting
RO — Read Only
RW — Read/Write

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table D — Modbus Object Table

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX	DEC							MIN.	MAX.	DEFAULT
0x0FA0	4000	2	GENUNIT_ctl_mode	Control Mode	32bits UINT	IR		0	3	0
0x07D0	2000	1	GENUNIT_statstop	Deter Start Stop Command	1bit BOOL	DI		0	1	0
0x07D1	2001	1	GENUNIT_CHIL_S_S	Network:Cmd Start/Stop	1bit BOOL	DI		0	1	0
0x07D2	2002	1	GENUNIT_CHIL_OCC	Network:Cmd Occupied	1bit BOOL	DI		0	1	0
0x0FA2	4002	2	GENUNIT_HC_SEL	Cooling/Heating Select	32bits UINT	IR		0	1	0
0x0FA4	4004	2	GENUNIT_CTRL_PNT	Control Point	32bits FLOAT	IR	°F	10	160	10
							°C	-12.222222	71.111118	-12.222222
0x0FA6	4006	2	GENUNIT_AMPS_P	Percent Current	32bits FLOAT	IR	%			0
0x0FA8	4008	2	GENUNIT_KW_P	Motor Percent Kilowatts	32bits FLOAT	IR	%			0
0x0FAA	4010	2	GENUNIT_DEM_LIM	Actual Demand Limit	32bits FLOAT	IR	%	10	100	10
0x07D3	2003	1	GENUNIT_EMSTOP	Emergency Stop	1bit BOOL	DI		0	1	0
0x07D4	2004	1	GENUNIT_FC_START	Start Free Cooling	1bit BOOL	DI		0	1	0
0x0FAC	4012	2	GENUNIT_ch_state	Chiller Status Code	32bits UINT	IR				0
0x07D5	2005	1	GENUNIT_loc_occ	Local Schedule Occupied	1bit BOOL	DI		0	1	0
0x07D6	2006	1	GENUNIT_ice_occ	Ice Schedule Occupied	1bit BOOL	DI		0	1	0
0x0FAE	4014	2	TEMP_ECW	Entering Chilled Water	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FB0	4016	2	TEMP_LCW	Leaving Chilled Water	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FB2	4018	2	TEMP_ECDW	Entering Condenser Water	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FB4	4020	2	TEMP_LCDW	Leaving Condenser Water	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x109C	4252	2	TEMP_HR_EWT	Heat Recl Entering Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x109E	4254	2	TEMP_HR_LWT	Heat Recl Leaving Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FB6	4022	2	TEMP_EVAP_SAT	Evap Sat Refrig Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FB8	4024	2	TEMP_EVAP_T	Evap Refrig Liquid Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FBA	4026	2	TEMP_evap_app	Evaporator Approach	32bits FLOAT	IR	°F			0
							°C			0
0x0FBC	4028	2	TEMP_cond_app	Condenser Approach	32bits FLOAT	IR	°F			0
							°C			0
0x0FBE	4030	2	TEMP_COND_SAT	Cond Sat Refrig Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FC0	4032	2	TEMP_DGT	Comp Discharge Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FC2	4034	2	TEMP_DSH	Discharge Superheat	32bits FLOAT	IR	^F			0
							^C			0
0x0FC4	4036	2	TEMP_MTRB_OIL	Thrust Bearing Oil Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FC6	4038	2	TEMP_MTRB	Thrust Bearing Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FC8	4040	2	TEMP_MTRB1	Low Speed ME Brg Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FCA	4042	2	TEMP_MTRB2	Low Speed CE Brg Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FCC	4044	2	TEMP_MTRB3	High Speed ME Brg Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FCE	4046	2	TEMP_MTRB4	High Speed CE Brg Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FD0	4048	2	TEMP_MTRW1	Motor Winding 1 Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FD2	4050	2	TEMP_MTRW2	Motor Winding 2 Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FD4	4052	2	TEMP_MTRW3	Motor Winding 3 Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FD6	4054	2	TEMP_CBH1_T	1st Stage Bearing Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FD8	4056	2	TEMP_CBH2_T	2nd Stage Bearing Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FDC	4060	2	TEMP_OILT_SMP	Oil Sump Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FDE	4062	2	TEMP_OILT_DIS	Oil Supply Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x0FE0	4064	2	TEMP_PGC_SUCT	Purge Comp Suction Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table D — Modbus Object Table (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX	DEC							MIN.	MAX.	DEFAULT
0x0FE4	4068	2	PRESSURE_EVAP_P	Evaporator Pressure	32bits FLOAT	IR	psig			0
							kPa			0
0x0FE6	4070	2	PRESSURE_COND_P	Condenser Pressure	32bits FLOAT	IR	psig			0
							kPa			0
0x0FE8	4072	2	PRESSURE_ECON_P	Economizer Pressure	32bits FLOAT	IR	psig			0
							kPa			0
0x0FEA	4074	2	PRESSURE_OIL_PD	Oil Pump Delta P	32bits FLOAT	IR	psi			0
							kPa			0
0x0FEC	4076	2	PRESSURE_REF_PD	Bearing Delta P	32bits FLOAT	IR	psi			0
							kPa			0
0x0FEE	4078	2	PRESSURE_PUMP_PD	Ref Pump Delta P	32bits FLOAT	IR	psi			0
							kPa			0
0x0FF0	4080	2	PRESSURE_DIFF_P	Diffuser Pressure	32bits FLOAT	IR	psig			0
							kPa			0
0x0FF2	4082	2	PRESSURE_HEAD_P	Head Pressure Reference	32bits FLOAT	IR	psi			0
							kPa			0
0x07D7	2007	1	INPUTS_STAR_AUX	Compressor Start Contact	1bit BOOL	DI		0	1	0
0x0FF4	4084	2	INPUTS_DMP_ACT	Damper Valve Status	32bits UINT	IR				0
0x0FF6	4086	2	INPUTS_HGBP_ACT	EC Valve Status	32bits UINT	IR				0
0x07D8	2008	1	INPUTS_HP_SW	High Pressure Switch	1bit BOOL	DI		0	1	0
0x07D9	2009	1	INPUTS_REM_CON	Remote Contact	1bit BOOL	DI		0	1	0
0x07DA	2010	1	INPUTS_E_STOP	Emergency Stop Contact	1bit BOOL	DI		0	1	0
0x07DB	2011	1	INPUTS_ICE_CON	Ice Build Contact	1bit BOOL	DI		0	1	0
0x07DC	2012	1	INPUTS_REM_LOCK	Chiller Lockout	1bit BOOL	DI		0	1	0
0x07DD	2013	1	INPUTS_SAFETY	Spare Safety Input	1bit BOOL	DI		0	1	0
0x07DE	2014	1	INPUTS_STARTFLT	Starter Fault Feedback	1bit BOOL	DI		0	1	0
0x07DF	2015	1	INPUTS_FS_LOCK	Fire Security Interlock	1bit BOOL	DI		0	1	0
0x0FF8	4088	2	INPUTS_HGBPACTP	Actual ECV Pos Per	32bits FLOAT	IR	%			0
0x0FFC	4092	2	INPUTS_GV1_ACT	Guide Vane 1 Actual Pos	32bits FLOAT	IR	%			0
0x0FFE	4094	2	INPUTS_GV2_ACT	Guide Vane 2 Actual Pos	32bits FLOAT	IR	%			0
0x1000	4096	2	INPUTS_VFD_ACT	Actual VFD Speed Per	32bits FLOAT	IR	%			0
0x07E2	2018	1	INPUTS_TRIPR	ISM Trip Relay Status	1bit BOOL	DI		0	1	0
0x1002	4098	2	OUTPUTS_CHST_OUT	Chiller Stat Output mA	32bits FLOAT	IR	mA			0
0x1004	4100	2	OUTPUTS_exv_tgt	Oil EXV Target	32bits FLOAT	IR	%			0
0x1008	4104	2	OUTPUTS_hdpv_tgt	Head Pres Valve Tgt Pos	32bits FLOAT	IR	%			0
0x07E3	2019	1	OUTPUTS_ALM	Alarm Relay	1bit BOOL	DI		0	1	0
0x07E4	2020	1	OUTPUTS_ALE	Alert Relay	1bit BOOL	DI		0	1	0
0x07E5	2021	1	OUTPUTS_COMP_SR	Compressor Start Relay	1bit BOOL	DI		0	1	0
0x07E6	2022	1	OUTPUTS_GV1_DEC	Guide Vane 1 Decrease	1bit BOOL	DI		0	1	0
0x07E7	2023	1	OUTPUTS_GV1_INC	Guide Vane 1 Increase	1bit BOOL	DI		0	1	0
0x07E8	2024	1	OUTPUTS_OIL_HEAT	Oil Heater Relay	1bit BOOL	DI		0	1	0
0x07E9	2025	1	OUTPUTS_OIL_PUMP	Oil Pump Relay	1bit BOOL	DI		0	1	0
0x07EA	2026	1	OUTPUTS_TFR_HIGH	Tower Fan Relay High	1bit BOOL	DI		0	1	0
0x07EB	2027	1	OUTPUTS_TFR_LOW	Tower Fan Relay Low	1bit BOOL	DI		0	1	0
0x07EF	2031	1	OUTPUTS_COND_PSV	Purge Cond Valve	1bit BOOL	DI		0	1	0
0x07F0	2032	1	OUTPUTS_COMP_PSV	Purge Comp Valve	1bit BOOL	DI		0	1	0
0x07F1	2033	1	OUTPUTS_PUMP_PSV	Purge Pumpout Valve	1bit BOOL	DI		0	1	0
0x07F3	2035	1	OUTPUTS_REG_PSV	Purge Regeneration Valve	1bit BOOL	DI		0	1	0
0x07F4	2036	1	OUTPUTS_DIS_PSV	Purge Discharge Valve	1bit BOOL	DI		0	1	0
0x07F5	2037	1	OUTPUTS_PGAPUMP	Purge Vacuum Pump	1bit BOOL	DI		0	1	0
0x07F6	2038	1	OUTPUTS_PG_COMP	Purge Compressor	1bit BOOL	DI		0	1	0
0x07F7	2039	1	OUTPUTS_PG_HEAT	Purge Heater	1bit BOOL	DI		0	1	0
0x100A	4106	2	OUTPUTS_llc_exvt	Liquid Level EXV Target	32bits FLOAT	IR	%			0
0x07F8	2040	1	OUTPUTS_FC_VALVE	Free Cooling Valve	1bit BOOL	DI		0	1	0
0x100E	4110	2	OUTPUTS_HGBP_OUT	EC Valve Output mA	32bits FLOAT	IR	mA			0
0x07F9	2041	1	HYDRLIC_CDWP	Condenser Water Pump	1bit BOOL	DI		0	1	0
0x1010	4112	2	HYDRLIC_cdw_pd	Condenser Water Delta P	32bits FLOAT	IR	psi			0
							kPa			0
0x07FA	2042	1	HYDRLIC_CHWP	Chilled Water Pump	1bit BOOL	DI		0	1	0
0x1012	4114	2	HYDRLIC_chw_pd	Chilled Water Delta P	32bits FLOAT	IR	psi			0
							kPa			0
0x1014	4116	2	HYDRLIC_CDW_FV	Cond Water Flow Value	32bits FLOAT	IR	gpm			0
							l/min			0
0x1016	4118	2	HYDRLIC_CHW_FV	Chilled Water Flow Value	32bits FLOAT	IR	gpm			0
							l/min			0
0x1018	4120	2	RUNTIME_C_STARTS	Compressor Starts Num	32bits UINT	IR				0
0x101A	4122	2	RUNTIME_SRV_HRS	After Service Hrs	32bits FLOAT	IR	hr	0	500000	0
0x1096	4246	2	RUNTIME_ST_CNT12	Starts Num in 12 Hours	32bits UINT	IR				0
0x1090	4240	2	RUNTIME_PGP_NO	Total Pumpout Numbers	32bits UINT	IR				0
0x1092	4242	2	RUNTIME_PGP_TM	Total Pumpout Time	32bits UINT	IR	min			0

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table D — Modbus Object Table (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX	DEC							MIN.	MAX.	DEFAULT
0x1094	4244	2	RUNTIME_pgp_tm_w	Avg Daily Purge in 7 Day	32bits FLOAT	IR	min			0
0x101C	4124	2	ALARMRST_alarm_1	Jbus Current Alarm 1	32bits UINT	IR				0
0x101E	4126	2	ALARMRST_alarm_2	Jbus Current Alarm 2	32bits UINT	IR				0
0x1020	4128	2	ALARMRST_alarm_3	Jbus Current Alarm 3	32bits UINT	IR				0
0x1022	4130	2	ALARMRST_alarm_4	Jbus Current Alarm 4	32bits UINT	IR				0
0x1024	4132	2	ALARMRST_alarm_5	Jbus Current Alarm 5	32bits UINT	IR				0
0x1026	4134	2	CAPACTRL_ctrl_wt	Controlled Water Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x1028	4136	2	CAPACTRL_cm_stat1	Comp1 Run State Val	32bits UINT	IR				0
0x102A	4138	2	CAPACTRL_vfd_tgt	Target VFD Speed Per	32bits FLOAT	IR	%			0
0x102C	4140	2	CAPACTRL_gv1_tgt	Target GV1 Pos	32bits FLOAT	IR	%			0
0x102E	4142	2	CAPACTRL_gv2_tgt	Target GV2 Pos	32bits FLOAT	IR	%			0
0x1030	4144	2	CAPACTRL_hgbp_tp	EXCSV Surge Pro Target	32bits FLOAT	IR	%			0
0x1032	4146	2	MAISURGE_act_reg	Surge Region	32bits UINT	IR				0
0x1034	4148	2	MAISURGE_sc	Surge Counts	32bits UINT	IR				0
0x1036	4150	2	MAISURGE_surg_act	Surge Prevention Active	32bits UINT	IR		0	1	0
0x1038	4152	2	MAISURGE_spc	Surge Protection Counts	32bits UINT	IR				0
0x103A	4154	2	MAISURGE_surg_pro	Surge Protection Active	32bits UINT	IR		0	1	0
0x103C	4156	2	MAISURGE_dts_act	Actual Delta Tsat	32bits FLOAT	IR	^F			0
							^C			0
0x103E	4158	2	MAISURGE_dts_cal	Calc Ref Delta Tsat	32bits FLOAT	IR	^F			0
							^C			0
0x1040	4160	2	MAIN_SRD_diff_tgt	Diffuser Target Pos	32bits FLOAT	IR	%			0
0x07FB	2043	1	MAIN_SRD_diffault	Diffuser Fault	1bit BOOL	DI		0	1	0
0x07FC	2044	1	MAIN_SRD_diff_alm	SRD Rotating Stall Alarm	1bit BOOL	DI		0	1	0
0x1042	4162	2	MAIN_SRD_lift_a	Actual Lift	32bits FLOAT	IR	^F			0
							^C			0
0x1044	4164	2	MAIN_SRD_lift_1	VDO High Lift Load Line	32bits FLOAT	IR	^F			0
							^C			0
0x1046	4166	2	MAIN_SRD_lift_2	VDO Low Lift Load Line	32bits FLOAT	IR	^F			0
							^C			0
0x1048	4168	2	POWER_I_AMPS_A_I	Actual Line Current	32bits FLOAT	IR	A			0
0x104A	4170	2	POWER_I_AMPS_P_I	Percent Line Current	32bits FLOAT	IR	%			0
0x104C	4172	2	POWER_I_VOLT_A	Actual Line Voltage	32bits FLOAT	IR	V			0
0x104E	4174	2	POWER_I_VOLT_P	Percent Line Voltage	32bits FLOAT	IR	%			0
0x1050	4176	2	POWER_I_KW	Line Kilowatts	32bits FLOAT	IR	KW			0
0x1052	4178	2	POWER_I_POW_FACT	Line Power Factor	32bits FLOAT	IR				0
0x1098	4248	2	POWER_I_ln_imb_v	Line Voltage Imbalance%	32bits FLOAT	IR	%			0
0x109A	4250	2	POWER_I_ln_imb_i	Line Current Imbalance%	32bits FLOAT	IR	%			0
0x1054	4180	2	POWER_O_MOT_FREQ	Motor Actual Frequency	32bits FLOAT	IR	Hz			0
0x1056	4182	2	POWER_O_VFD_LOAD	VFD Load Current	32bits FLOAT	IR	A			0
0x1058	4184	2	POWER_O_amps_p_o	Percent VFD Load Current	32bits FLOAT	IR	%			0
0x105A	4186	2	POWER_O_bus_volt	DC Bus Voltage	32bits FLOAT	IR	V			0
0x105C	4188	2	POWER_O_vfd_act	Actual VFD Speed Per	32bits FLOAT	IR	%			0
0x105E	4190	2	POWER_O_motor_pf	Motor Power Factor	32bits FLOAT	IR				0
0x1060	4192	2	POWER_O_motor_kw	Motor Kilowatts	32bits FLOAT	IR	KW			0
0x1062	4194	2	POWER_O_motorkwh	Motor Kilowatt-Hours	32bits FLOAT	IR	KWH			0
0x1064	4196	2	POWER_O_enc_temp	VFD Enclosure Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x1066	4198	2	POWER_O_inv_temp	Inverter Temperature	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x1068	4200	2	POWER_O_rec_temp	Rectifier Temperature	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x07FD	2045	1	POWER_O_VFDC_HI	High VFD Current	1bit BOOL	DI		0	1	0
0x07FE	2046	1	POWER_O_prech_fd	Precharge Feedback	1bit BOOL	DI		0	1	0
0x07FF	2047	1	POWER_O_lrtem_sw	LR Temp Switch	1bit BOOL	DI		0	1	0
0x106A	4202	2	POWER_O_alm_code	VFD Alarm Code	32bits UINT	IR				0
0x0800	2048	1	POWER_O_spd_fd	SPD Feedback	1bit BOOL	DI		0	1	0
0x0801	2049	1	LABONLY_gv1_fc	GV1 Forced	1bit BOOL	DI		0	1	0
0x0802	2050	1	LABONLY_gv2_fc	GV2 Forced	1bit BOOL	DI		0	1	0
0x106C	4204	2	MAIN_MS_lead_lag	Unit is Lead or Lag	32bits UINT	IR		0	2	0
0x0803	2051	1	MAIN_MS_ll_comm	Lead Lag Communication	1bit BOOL	DI		0	1	0
0x106E	4206	2	MAIN_MS_ll_fault	Master Slave Fault	32bits UINT	IR		0	3	0
0x1070	4208	2	MAIN_MS_lagstat	Slave Run Status	32bits UINT	IR		0	14	0
0x0804	2052	1	MAIN_MS_lag_s_s	Slave Start/Stop	1bit BOOL	DI		0	1	0
0x1072	4210	2	MAIN_MS_lagstart	Lag Start Timer	32bits FLOAT	IR	min	0	60	0
0x1074	4212	2	MAIN_MS_lagstop	Lag Stop Timer	32bits FLOAT	IR	min	0	60	0
0x1076	4214	2	MAIN_MS_preflt	Prestart Fault Timer	32bits FLOAT	IR	min	0	30	0
0x1078	4216	2	MAIN_MS_pulltime	Pulldown Timer	32bits FLOAT	IR	min	0	30	0
0x107A	4218	2	MAIN_MS_ll_hr_d	Lead/Lag Hours Delta	32bits FLOAT	IR	hr	-99999	99999	0

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table D — Modbus Object Table (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX	DEC							MIN.	MAX.	DEFAULT
0x107C	4220	2	CONF_OPT_hgbp_opt	EXCSV Valve Option	32bits UINT	IR		3	3	3
0x107E	4222	2	CONF_OPT_hgbp_sel	EXCSV Selection	32bits UINT	IR		0	3	1
0x0805	2053	1	CONNECT_bacena	BACnet/IP Enable	1bit BOOL	DI		0	1	0
0x0806	2054	1	CONNECT_bacunit	BACnet Metric Unit	1bit BOOL	DI		0	1	0
0x1080	4224	2	CONNECT_network	BACnet Network	32bits FLOAT	IR		1	9999	1600
0x1082	4226	2	CONNECT_bac_id	BACnet Identifier	32bits FLOAT	IR		0	9999999	1600001
0x1088	4232	2	CONF_PRG_oil_qly	Oil Quality	32bits UINT	IR		0	2	0
0x108A	4234	2	CONF_PRG_oil_flt	Oil Filter Failure	32bits UINT	IR		0	2	0
0x108C	4236	2	CONF_PRG_tran_dev	Transducer Deviation	32bits UINT	IR		0	2	0
0x108E	4238	2	CONF_PRG_ref_chg	Refrig Charge Status	32bits UINT	IR		0	2	0
0x0BB8	3000	2	SETPOINT_ecdw_sp	Heating ECDW Setpoint	32bits FLOAT	HR	°F	63	150	104
							°C	17.2222248	65.555562	40.0000044
0x0BBA	3002	2	SETPOINT_ecw_sp	Cooling ECW Setpoint	32bits FLOAT	HR	°F	15	120	60
							°C	-9.444444	48.888894	15.555558
0x0BBC	3004	2	SETPOINT_ice_sp	Ice Build Setpoint	32bits FLOAT	HR	°F	15	60	40
							°C	-9.444444	15.555558	4.444446
0x0BBE	3006	2	SETPOINT_lcdw_sp	Heating LCDW Setpoint	32bits FLOAT	HR	°F	68	150	113
							°C	20.0000028	65.555562	45.0000048
0x0BC0	3008	2	SETPOINT_lcw_sp	Cooling LCW Setpoint	32bits FLOAT	HR	°F	10	120	45
							°C	-12.222222	48.888894	7.222224
0x0BC2	3010	2	SETPOINT_dem_base	Base Demand Limit	32bits FLOAT	HR	%	10	100	100
0x0BC4	3012	2	SETPOINT_EWT_OPT	EWT Control Option	32bits UINT	HR		0	1	0
0x0BC6	3014	2	PROTOCOL_CHIL_S_S	Chiller Start/Stop	32bits UINT	HR		0	1	0
0x0BC8	3016	2	PROTOCOL_CTRL_PNT	Control Point	32bits FLOAT	HR	°F	10	160	50
							°C	-12.222222	71.111118	10.000002
0x0BCA	3018	2	PROTOCOL_DEM_LIM	Demand Limit	32bits FLOAT	HR	%	10	100	10
0x0BCC	3020	2	PROTOCOL_EMSTOP	Emergency Stop	32bits UINT	HR		0	1	0
0x0BCE	3022	2	PROTOCOL_HC_SEL	Heatcool Select	32bits UINT	HR		0	1	0
0x0BD0	3024	2	PROTOCOL_CHIL_OCC	Chiller occupied?	32bits UINT	HR		0	1	0
0x0BD2	3026	2	GENUNIT_REM_RST	Remote Reset Alarm	32bits UINT	HR		0	1	0
0x0BD4	3028	2	PROTOCOL_FC_START	Start Free Cooling	32bits UINT	HR		0	1	0
0x0807	2055	1	OUTPUTS_RUN_STAT	Chiller Status(Discrete)	1bit BOOL	DI		0	1	0
0x10A4	4260	2	INPUTS_COND_LS	Liquid Level Cond	32bits FLOAT	IR				0
0x10A6	4262	2	OUTPUTS_LQBPtgtV	EXCSV Target Pos volt	32bits FLOAT	IR	V			0
0x10A8	4264	2	EXVCTRL_MEXV_CMD	Main EXV Position Cmd	32bits FLOAT	IR	%			0
0x10AA	4266	2	EXVCTRL_EEXV_CMD	ECO EXV Position Cmd	32bits FLOAT	IR	%			0
0x10AC	4268	2	MBC_flags0	MBC Levitate Status	32bits UINT	IR				0
0x10AE	4270	2	MBC_RPM	Rotational Shaft Speed	32bits FLOAT	IR	rpm			0
0x10B0	4272	2	MBC_SpeedHZ0	Sync Speen (Hz)	32bits FLOAT	IR	Hz			0
0x10B2	4274	2	MBC_jAvGpChg	J Average Gap Change	32bits FLOAT	IR		0	15	0
0x10B4	4276	2	MBC_hAvGpChg	H Average Gap Change	32bits FLOAT	IR		0	15	0
0x10B6	4278	2	MBC_kAvGpChg	K Average Gap Change	32bits FLOAT	IR		0	15	0
0x10B8	4280	2	MBC_jxAvg	J Average Position X	32bits FLOAT	IR		0	15	0
0x10BA	4282	2	MBC_jyAvg	J Average Position Y	32bits FLOAT	IR		0	15	0
0x10BC	4284	2	MBC_hzAvg	H Average Position	32bits FLOAT	IR		0	15	0
0x10BE	4286	2	MBC_kxAvg	K Average Position X	32bits FLOAT	IR		0	15	0
0x10C0	4288	2	MBC_kyAvg	K Average Position Y	32bits FLOAT	IR		0	15	0
0x10C2	4290	2	MBC_tempC01	J Bearing Coil Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x10C4	4292	2	MBC_tempC02	H Outboard Coil Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x10C6	4294	2	MBC_tempC03	H Inboard Coil Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x10C8	4296	2	MBC_tempC04	K Bearing Coil Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x10CA	4298	2	MBC_tempC05	Coldplate Temp	32bits FLOAT	IR	°F			0
							°C			-17.777778
0x10CC	4300	2	MBC_j1Imeas	J1 Coil Current	32bits FLOAT	IR		0	30	0
0x10CE	4302	2	MBC_j2Imeas	J2 Coil Current	32bits FLOAT	IR		0	30	0
0x10D0	4304	2	MBC_j3Imeas	J3 Coil Current	32bits FLOAT	IR		0	30	0
0x10D2	4306	2	MBC_j4Imeas	J4 Coil Current	32bits FLOAT	IR		0	30	0
0x10D4	4308	2	MBC_k1Imeas	K1 Coil Current	32bits FLOAT	IR		0	30	0
0x10D6	4310	2	MBC_k2Imeas	K2 Coil Current	32bits FLOAT	IR		0	30	0
0x10D8	4312	2	MBC_k3Imeas	K3 Coil Current	32bits FLOAT	IR		0	30	0
0x10DA	4314	2	MBC_k4Imeas	K4 Coil Current	32bits FLOAT	IR		0	30	0
0x10DC	4316	2	MBC_h1meas	H1 Coil Current	32bits FLOAT	IR		0	30	0
0x10DE	4318	2	MBC_h2meas	H2 Coil Current	32bits FLOAT	IR		0	30	0
0x10E0	4320	2	MBC5_j1R0	J Coil 1 R0	32bits FLOAT	IR				0
0x10E2	4322	2	MBC5_j2R0	J Coil 2 R0	32bits FLOAT	IR				0
0x10E4	4324	2	MBC5_j3R0	J Coil 3 R0	32bits FLOAT	IR				0

APPENDIX C — PROTOCOL CONFIGURATION (cont)

Table D — Modbus Object Table (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX	DEC							MIN.	MAX.	DEFAULT
0x10E6	4326	2	MBC5_j4R0	J Coil 4 R0	32bits FLOAT	IR				0
0x10E8	4328	2	MBC5_jSCal1	J Sensor Gap S1	32bits FLOAT	IR				0
0x10EA	4330	2	MBC5_jTCal1	J Sensor Gap T1	32bits FLOAT	IR				0
0x10EC	4332	2	MBC5_jSCal2	J Sensor Gap S2	32bits FLOAT	IR				0
0x10EE	4334	2	MBC5_jTCal2	J Sensor Gap T2	32bits FLOAT	IR				0
0x10F0	4336	2	MBC5_k1R0	K Coil 1 R0	32bits FLOAT	IR				0
0x10F2	4338	2	MBC5_k2R0	K Coil 2 R0	32bits FLOAT	IR				0
0x10F4	4340	2	MBC5_k3R0	K Coil 3 R0	32bits FLOAT	IR				0
0x10F6	4342	2	MBC5_k4R0	K Coil 4 R0	32bits FLOAT	IR				0
0x10F8	4344	2	MBC5_kSCal1	K Sensor Gap S1	32bits FLOAT	IR				0
0x10FA	4346	2	MBC5_kTCal1	K Sensor Gap T1	32bits FLOAT	IR				0
0x10FC	4348	2	MBC5_kSCal2	K Sensor Gap S2	32bits FLOAT	IR				0
0x10FE	4350	2	MBC5_kTCal2	K Sensor Gap T2	32bits FLOAT	IR				0
0x1100	4352	2	MBC5_h1R0	H Coil 1 R0	32bits FLOAT	IR				0
0x1102	4354	2	MBC5_h2R0	H Coil 2 R0	32bits FLOAT	IR				0
0x1104	4356	2	MBC5_hSCal1	H Sensor Gap S1	32bits FLOAT	IR				0
0x1106	4358	2	MBC5_hSCal2	H Sensor Gap S2	32bits FLOAT	IR				0
0x1108	4360	2	MBC3_jFDC_cur	J Fast Drop Count Now	32bits FLOAT	IR				0
0x110A	4362	2	MBC3_hFDC_cur	H Fast Drop Count Now	32bits FLOAT	IR				0
0x110C	4364	2	MBC3_kFDC_cur	K Fast Drop Count Now	32bits FLOAT	IR				0
0x110E	4366	2	MBC3_jFDC_lim	J Fast Drop Count Limit	32bits FLOAT	IR				0
0x1110	4368	2	MBC3_hFDC_lim	H Fast Drop Count Limit	32bits FLOAT	IR				0
0x1112	4370	2	MBC3_kFDC_lim	K Fast Drop Count Limit	32bits FLOAT	IR				0
0x080C	2060	1	MBC_Alert	General Alert for MBC	1bit BOOL	DI		0	1	0
0x080D	2061	1	MBC_Alarm	General Alarm for MBC	1bit BOOL	DI		0	1	0
0x1114	4372	2	QCK_EOL_cfgidst	MBC ID Status Value	32bits UINT	IR				0
0x080E	2062	1	MAIN_UPS_charging	Battery Charging	1bit BOOL	DI		0	1	0
0x080F	2063	1	MAIN_UPS_bat_full	Battery Fully Charged	1bit BOOL	DI		0	1	0
0x1116	4374	2	MAIN_UPS_chg_lvl	Battery Charge Level	32bits FLOAT	IR	%	0	100	0
0x1118	4376	2	MAIMETER_CMECONDL	Calc Cond Level SP	32bits FLOAT	IR				0
0x111A	4378	2	MAIMETER_MEXV_TGT	Main EXV Tgt Position	32bits FLOAT	IR	%			0
0x111C	4380	2	MAIMETER_EEXV_TGT	Eco EXV Tgt Position	32bits FLOAT	IR	%			0
0x111E	4382	2	OUTPUTS_LQBP_TGT	EXCSV Target Pos Per	32bits FLOAT	IR	%			0

LEGEND

CO — COILS_MEDIA
DEC — Decimal
DI — DISCR_INPUT_MEDIA
HEX — Hexadecimal
HR — HOLDING_REG_MEDIA
IR — INPUT_REG_MEDIA

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