Carrier

AquaSnap® 30RC 010-060 Air-Cooled Chillers and 30RC 010-060 Air-Cooled Chillers with Greenspeed® Intelligence and Carrier Controller

Controls, Start-Up, Operation, Service and Troubleshooting

CONTENTS

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing this equipment can be hazardous due to system pressures, electrical components, and equipment location (roof, elevated structures, etc.). Only trained, qualified installers and service technicians should install, start up, and service this equipment. When working on this equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment, as well as any other safety precautions that apply.

Follow all safety codes. Wear safety glasses and work gloves. Use care in handling, rigging, and setting this equipment and in handling all electrical components.

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

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure. This unit uses R32 refrigerant which is classified as semi-flammable, A2L classification. Assure all refrigerant is removed prior to beginning work.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gauge for how much oil to add to the system.
e. Carefully un-sweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ WARNING

This product can expose you to chemicals including lead and lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

Failure to follow this warning could cause personal injury, death and/or equipment damage.

This system uses an A2L refrigerant (R-32), both of which operate at higher pressures than R-22 and other refrigerants. No other refrigerant can be used in this system. Failure to use gauge set, hoses, and recovery systems designed to handle R-32 may result in equipment damage or personal injury. Reference UL 60335-2-40 Annex DD for guidelines on proper A2L refrigerant handling and equipment used for A2L refrigerant. If unsure about equipment, consult the equipment manufacturer.

⚠ WARNING

DO NOT VENT refrigerant relief valves within a building. Outlet from relief valves must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE (American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers) 15 (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can display oxygen which can cause asphyxiation. This unit uses R-32 refrigerant with a A2L flammability classification. Accumulation may cause an explosion if ignited. Provide adequate ventilation in enclosed or low overhead areas. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ CAUTION

To prevent potential damage to heat exchanger, always run fluid through heat exchanger when adding or removing refrigerant charge. Use appropriate brine solutions in cooler fluid loop to prevent the freezing of heat exchanger, optional hydronic section and/or interconnecting piping when the equipment is exposed to temperatures below 32°F (0°C). Proof of flow switch is factory installed on all models. Permanent strainer is factory installed on all BPHE models. Start-up strainer is factory installed on DX models with the optional integrated hydronics package. Do NOT remove power from this chiller during winter shutdown periods without taking precaution to remove all water from heat exchanger and optional hydronic system. Failure to properly protect the system from freezing may constitute abuse and may void warranty.

⚠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.

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.

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. It has 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.

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

⚠CAUTION

Compressors and optional hydronic system pumps require specific rotation. If phase monitor is included, check LED light. If red LED is blinking, the phase sequence is incorrect. Without the phase monitor check the direction of the fan rotation for fixed speed fans, no VFD. If no phase monitor and variable speed fans, VFD, check to ensure the supply power phase rotation is clockwise A-B-C (L1-L2-L3). If any of these show the phase sequence is not correct, swap two of the incoming power leads. Operating the unit without verifying proper phasing could result in equipment damage.

⚠CAUTION

Refrigerant charge must be removed slowly to prevent loss of compressor oil that could result in compressor failure.

⚠CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

A2L Refrigerant Safety Measures

QUALIFICATION OF WORKERS

Qualified installers and service technicians are required to have been trained on the following topics when installing and servicing air-conditioning equipment with A2L refrigerant such as R-32:

1. Explosive potential of A2L refrigerants
2. Potential ignition sources
3. Safety measures for unventilated and ventilated rooms or enclosures
4. Refrigerant detectors
5. Concept of sealed components and sealed enclosures according to IEC 60079-15:2010
6. Correct work procedures for the following:
   a. commissioning
   b. maintenance
   c. repair
   d. decommissioning
   e. disposal

Reference UL 60335-2-40 Annex HH for complete guidelines for qualifications.

SAFETY CHECKS

Prior to beginning work on air-conditioning equipment containing A2L refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the air-conditioning equipment, the following must be completed prior to conducting work on the system:

1. Work shall be undertaken under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.
2. All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
3. The area shall be checked with an appropriate refrigerant detector prior to and during work to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants.
4. If any hot work is to be conducted on the refrigerating equipment or any associated parts, then appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.
5. No person carrying out work in relation to refrigerating equipment that involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removal, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

   Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
6. Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
7. The following checks to the air-conditioning equipment shall also apply when using A2L refrigerants:
   a. The chilled water circuit shall be checked for the presence of A2L refrigerant via the vent, drain, or pipe plug ports at the inlet and outlet water piping connections.
   b. Markings to the equipment shall continue to be visible and legible. Markings and signs that are illegible shall be corrected.
   c. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance that may corrode refrigerant-containing components, unless the components are constructed of

materials that are inherently resistant to being corroded or are suitably protected against being corroded.

d. Upon completing equipment work, check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

COMPONENT REPAIR

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked up prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that, by working on electrical components, the casing is not altered in such a way that the level of protection is affected:

1. Ensure that the apparatus is mounted securely.
2. Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

NOTE: The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

Guidelines for A2L refrigerant detection, evacuation, charging procedures, and proper recovery equipment are presented in the Service section. Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE: Examples of leak detection fluids are

- bubble method,
- fluorescent method agents.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Refrigerant section page 89.

GENERAL

This publication contains Controls, Operation, Start-Up, Service, and Troubleshooting information for the 30RC010-060 and 30RC010-060 air-cooled liquid chillers with Greenspeed® Intelligence and electronic controls. (See Table 1.) 30RC010-060 air-cooled chillers are supplied with R-32 refrigerant. The 30RC chillers are equipped with the Carrier Controller controls, electronic expansion valves, and optional variable speed fans.

Conventions Used in This Manual

This manual uses following conventions for discussing configuration points for the Carrier Controller display. The menu items are shown in this document as they appear on the Carrier Controller display. A path name for each item will show the user how to navigate through the Carrier Controller display to reach the desired configuration. The arrow symbol (→) in the path name represents pressing the menu item on the screen of the Carrier Controller display. The path will be shown in ***bold and italics***. See Appendix A for a complete list of Carrier Controller menu items and descriptions. The Carrier Comfort Network® (CCN) and Building Automation and Controls Network (BACnet™[1]) point names are shown in **bold**. See Appendix B for a list of CCN points and Appendix D for a list of BACnet™ points. See Appendix E for a list of Modbus®[1] points.

Table 1 — Unit Sizes

UNIT	NOMINAL CAPACITY (TONS)
30RC010	10
30RC015	15
30RC020	20
30RC025	25
30RC030	30
30RC035	35
30RC040	40
30RC045	45
30RC050	50
30RC055	55
30RC060	60

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Abbreviations Used in This Manual

The following abbreviations are used in this manual:

LEGEND

AUX — Auxiliary (Board)
AV — Analog Value
AWG — American Wire Gauge
BACnet — Building Automation and Controls Network
BMS — Building Management System
BPHE — Brazed Plate Heat Exchanger
BUS TER — Bus Termination
BV — Binary Value
CB — Circuit Breaker
CCN — Carrier Comfort Network®
CEM — Controls Expansion Module
CIOB — Standard Input/Output Board
CMD — Command
CO — Discrete Output (Coil)
COM — Communications
CSR — Current Sensing Relay
CWFS — Chilled Water Flow Switch
DC — Direct Current
DGT — Discharge Gas Temperature
DI — Digital Input OR Discrete Input
DNS — Domain Name Server
DPT — Discharge Pressure Transducer
ECO — Economizer
ECT — Economizer Temperature
EEPROM — Electronically Erasable Programmable Read-Only Memory
EHS — Electric Heat Stage
EMM — Energy Management Module
EOR — Enable-Off-Remote
EWT — Entering Water Temperature
EWTO — Entering Water Temperature Offset
EXV — Electronic Expansion Valve
FC — Fan Contactor
FM — Fan Motor
HMI — Human Machine Interface
HPS — High Pressure Switch
HR — Heat Reclaim or Holding Register
HSM — Hydronic System Manager
HVAC — Heating, Ventilation, and Air-Conditioning
IGBT — Insulated Gate Bipolar Transistor
IP — Internet Protocol
IR — Input Register or Intrinsic Reporting
LCD — Liquid Crystal Display
LCP — Local Control Panel
LED — Light-Emitting Diode
LEN — Local Equipment Network
LPT — Liquid Pressure Transducer
LWT — Leaving Water Temperature
MCHX — Microchannel Heat Exchanger
MLC — Minimum Load Control
MOP — Maximum Operating Pressure
NA Unit — North America unit
OAT — Outdoor Air Temperature
PCB — Printed Circuit Board
PID — Proportional, Integral, Derivative Control
PTC — Positive Temperature Coefficient
RCD — Replacement Components Division
RFI — Radio Frequency Interference
RNET — Communication Protocol
RO — Read Only
RTN — Return to Normal
RTPF — Round Tube Plate Fin
RTU — Remote Terminal Unit
RW — Read/Write
SCT[a] — Saturated Condensing Temperature
SDT[a] — Saturated Discharge Temperature
SGT — Suction Gas Temperature
SH — Suction Superheat

LEGEND

SHD — Shield Wire on Shielded Cable
SLT — Saturated Liquid Temperature
SM — System Manager
SNVT — Standard Network Variable Test
SP — Suction Pressure
Spt — Setpoint
SPT — Suction Pressure Transducer
SST — Saturated Suction Temperature
ST — Space Temperature
TCP — Transmission Control Protocol
TL — Trend Log
UI — User Interface
USB — Universal Serial Bus
VFD — Variable Frequency Drive
Vlv — Valve
VPN — Virtual Private Network
WAN — Wide Area Network

NOTE(S):
a. SCT and SDT are used interchangeably by software points.

CONTROLS

The 30RC Air-Cooled Liquid Chillers contain the Carrier Controller electronic control system that controls and monitors all operations of the chiller. The control system is composed of several components, as listed in the following sections. All machines have a Carrier Controller module, Standard Input/Output boards, and an Emergency On/Off switch. Table 2 lists power schematics by unit size.

Carrier Controller Display

The Carrier Controller module is the HMI (Human Machine Interface) and core of the control system. It contains the major portion of operating software and controls the operation of the machine. See the Web and Network Interface section on page 14.

The Carrier Controller module continuously monitors input/output channel information received from the CIOB (Carrier Input/Output Board) and AUX (Auxiliary) board. The Carrier Controller module receives inputs from status and feedback switches, pressure transducers, and thermistors. The Carrier Controller module, through the communications bus, also controls outputs on the CIOB and AUX boards. All inputs and outputs that control the chiller are located on other boards. Information is transmitted between modules via a 3-wire communication bus or LEN (Local Equipment Network).

The CCN bus is also supported.

Connections to both LEN and CCN buses are made at terminal board TB3, located within the control box enclosure. See Fig. 1 and 2 for component layout showing the display with field connections.

Carrier Controller Display User Interface

The Carrier Controller display is the standard user interface on all 30RC chillers. The display includes a 4.3 in. LCD (Liquid Crystal Display) touch screen for display and user configuration. A stylus is recommended for use on the touch screen.

HOME SCREEN

The Home screen provides an overview of system controls, allowing the user to monitor the vapor-refrigeration cycle. The screen indicates the current status of the unit, giving information on the unit capacity, the entering and leaving water temperatures, the active setpoint, and the outside air temperature. (See Fig. 3.)

Table 2 — Control and Power Drawings

UNIT	DESCRIPTION	LOCATION
30RC 010-030	Power Wiring Schematic	Fig. 81, page 115
	Control Wiring Schematic	Fig. 83, page 117
	Control Power (24V) Wiring Schematic	Fig. 84, page 118
	Communication Schematic	Fig. 82, page 116
30RC 035-060	Power Wiring Schematic	Fig. 81, page 115
	Control Wiring Schematic	Fig. 83, page 117
	Control Power (24V) Wiring Schematic	Fig. 84, page 118
	Communication Schematic	Fig. 82, page 116

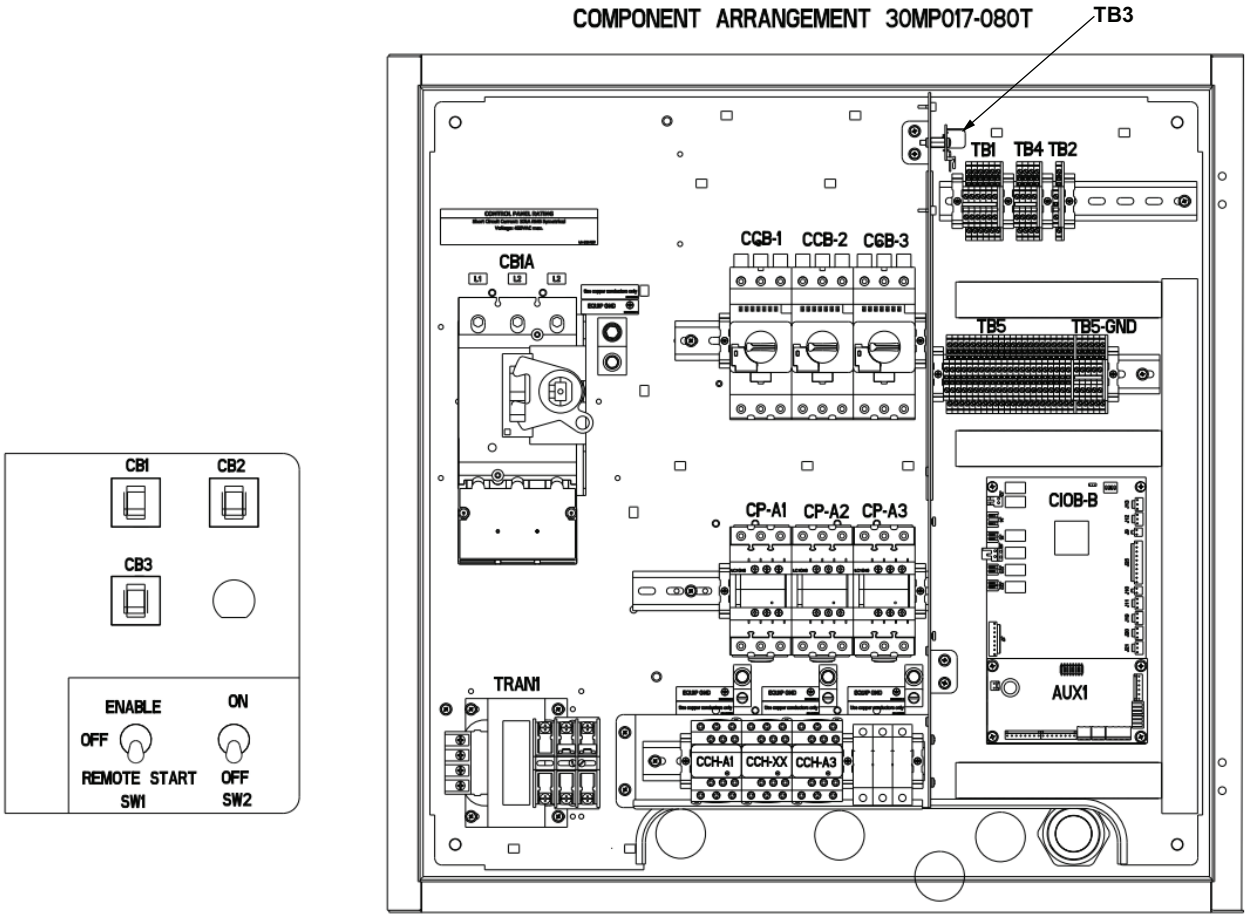


Fig. 1 — Component Layout Drawing (30RC010-030 — Small Main)

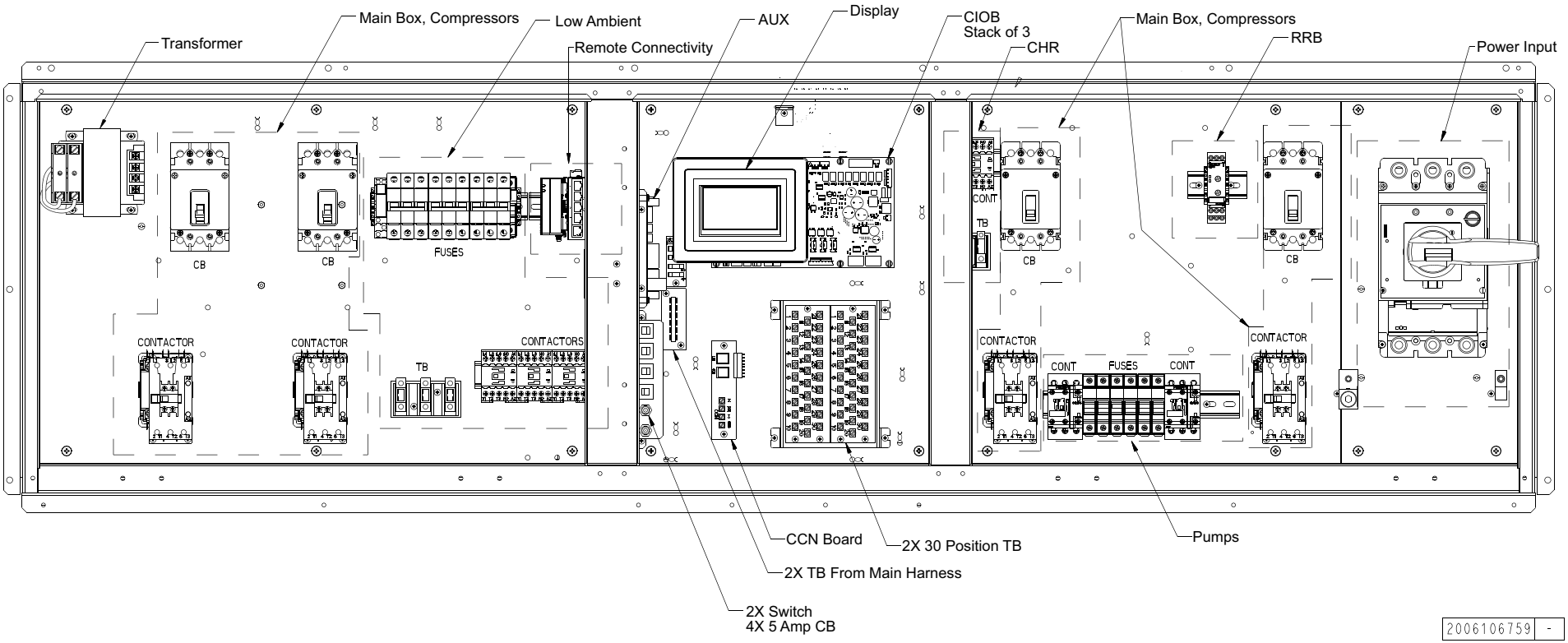
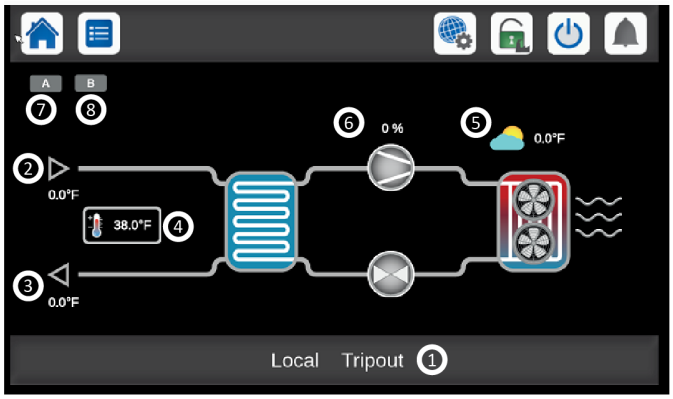


Fig. 2 — Component Layout Drawing (30RC035-060 — Large Main)



LEGEND

1 — Unit Status Message
2 — Entering Evaporator Fluid Temperature
3 — Leaving Evaporator Fluid Temperature
4 — Active Leaving Evaporator Temperature Setpoint
5 — Outside Air Temperature
6 — Current Total Chiller Capacity
7 — Circuit A is Active
8 — Circuit B is Active

Fig. 3 — Home Screen

The following buttons appear on the top panel of the home screen. See Table 3 for more general screen buttons.

Main Menu — Press to access all unit functions. See Main Menu Screen on page 14 for details.

Login — Press to enter passwords. See page 11 for login details. The icon is shown when the user is not logged in; it changes based on access level. Available access levels are Basic, User, Service, and Factory.

System Menu — Press to configure system parameters and provide the end user information on the running system.

Start/Stop — Press to access the unit start/stop screen. See page 29 for details on available operating modes.

Alarm — The alarm icon will display gray when not in alarm, yellow when in alert, and red when in alarm. See page 96 for details on system alarms and alerts.

UNIT STATUS MESSAGE BOX

Messages may be displayed in the status bar at the bottom of the screen relevant to the current user action. See Table 4.

Table 3 — Screen Buttons

BUTTON	FUNCTION
Top Left Panel — General Navigation	
	Home button: Goes back to the home screen (default screen). Button always present.
	Menu button: Goes to the Main Menu screen. Button present on the Home Screen only. See page 8.
	Back button: Goes to the previous screen. Button not present on the Main Menu screen, since it is redundant with the Home button.
Top Right Panel — Special Navigation	
	System Menu button: Goes to the System Menu screen. Button always present except on Login screens.
	Login button: Goes to the Login screen. Button always present and active on Default and Menu screens. Icon shows: - a gray closed lock when the user is not logged in - a green open lock when the user is logged in as User - a green open lock with a tool key when user is logged in as Service - a green open lock with a factory when user is logged in as Factory See the Login section on page 11.
	Start/Stop button: Goes to the chiller start/stop screen. Button always present. When the Start/Stop button is pressed, the current screen is exited immediately, without saving changes. The icon can be blue, green, or blinking between blue and green. See the Machine Control Methods section on page 29.
	Alarm button: Goes to the Alarm Menu screen.Button always present. The icon can be gray (no alarm), yellow (alert), or red (alarm). See the Alarms and Alerts section on page 96.
Bottom Left Panel — Actions Specific to Current Screen Operation	
	Login screen: Login/Logout. Login button validates the currently-entered user level (basic, user, service, or factory) and jumps back to the Home screen. Logout button resets the user level and jumps to the Home screen.
	Save/Cancel buttons: Save button saves the values currently displayed. Cancel discards changes.
Bottom Right Panel — Up/Down Scrolling Inside Screen	
	Up/Down arrows: Scroll within screen content (i.e., next or previous page). Buttons present when there are more items to be displayed than the screen can show. A page indicator shows what page is being viewed and the total number of pages.

Table 4 — Unit Status Messages

SCREEN	MESSAGE
Email Configuration	This is a test!
	New Alarm(s):
	No alarm is currently active on the unit.
Date/Time	Invalid time zone settings
	Platform error in setting time zone
	Time set error
	Date set error
Network	Error, IP address is blank
	IP address is invalid
	Error, IP address is zero
	Error in setting IP address
	Error, subnet mask is blank
	Subnet mask is invalid
	Error, subnet mask is zero
	Error in setting subnet mask
	Failed to execute gateway_wrapper script
	Incorrect arguments to gateway_wrapper
	Invalid gateway ip
	Invalid gateway mask
	Invalid option passed to gateway_wrapper
	Invalid argument to route command
	Network is unreachable
	Gateway exists
	Bogus netmask
	Netmask and route address conflict
	No such gateway ip present
	Gateway deleted
	Gateway_wrapper.sh not found
	Cannot execute gateway_wrapper.sh
	System call failed
	DNS IP invalid
CCN Messages	SUCCESS
	COMMUNICATION FAILURE!
	LOW LIMIT EXCEEDED !
	HIGH LIMIT EXCEEDED !
	HIGH FORCE IN EFFECT!
	ACCESS DENIED !
	TABLE NOT FOUND !
	Your recent changes haven't been saved. Click Okay to continue. Click Cancel to stay in current screen.
	Warning
	Set
	Relinquish
Trending	Unable to fetch Trend Configuration Parameters
	Please Select a Maximum of Ten Trends for Display
	Please select at least 1 point
	Information
	Max Zoom-In Reached
	Please Click on Update Data
	Maximum Zoom Out Reached
	End Date should be greater than Start Date
	Maximum Limit is Set for seven days
	Alarms not found
	Alarm
	Alert
	RTN
	Start time is greater than system time
	End time is greater than system time
	Out of range
	Max Range must be greater than Min Range
	Trend point range is out of bounds
	Please select not more than 4 points

Table 4 — Unit Status Messages (cont)

SCREEN	MESSAGE
Login	The User, Admin, or Factory permission level is required to access the requested screen. Please log in.
	The Admin or Factory permission level is required to access the requested screen. Please log in.
	The Admin permission level is required to access the requested screen. Please log in.
	The User or Admin permission level is required to access the requested screen. Please log in.
	Password Required
	Login Failed
	The password entered does not match any stored passwords.
	LOSS OF COMMUNICATION
	The Factory permission level is required to access the requested screen. Please log in.
	Please select not more than 10 points
	Change password failed
	The new password and confirmation password do not match
	The user password changed successfully
	The user password change failed
	The new user password is invalid
	The user is not authorized
	Please enter new user password
	Please enter confirm password
	Please enter your login password
	Change password
USB Logs	Log collection in progress
	DB points access issue
	Invalid option for device data collection
	Invalid option for technical data collection
	USB not connected
	Could not start log collect. Try again
	Invalid chiller name
	Folder already exists for this Chiller name
	Unable to copy files to USB
	Cannot mount USB. Please check USB format
	Resource busy. Try again later
	Technical data copy in progress
	Developer data copy in progress
	Space not available on USB
	Logs saved successfully with UTC time
	Logs copied Successfully
Cloud Diagnostics	Fail
	Success
	In progress
	Certificate not found
	Unavailable
	Available
Network Diagnostics	Fail
	Success
	Error
	In progress
	Invalid inputs
	Invalid server
	Invalid interface

LEGEND

DNS — Domain Name Server
IP — Internet Protocol
RTN — Return to Normal

CARRIER CONTROLLER LOGIN AND DISPLAY SETUP

Certain control functions and navigation menus are password protected. There are multiple levels of user access on the Carrier Controller display, each with independent password protection:

- Basic — At initial start-up and after a timeout period, the access type defaults to All. In this mode, the user can view system operating conditions.
- User — The User access level authorizes access to modify the Setpoint Configuration and some Configuration Menu parameters, as well as access to all menus accessible with the Basic mode. See menu structure on page 14. The default password for User level access is 11. To change the User access password, the user must first be logged in to User or higher level and go to ***Login Menu → User Login → Change User Password***, then enter the old password and the new password. Confirm the new password, then press the Save button. After pressing the Save button, a pop-up window will indicate that the user password was changed successfully. Press OK to continue. (See Fig. 4.)
- Service — The Service access level authorizes access to all menus and parameters needed for operation and service of the machine, including Quick Test and Maintenance Menus, as well as additional Configuration Menus. See menu structure on page 14. When logged in under Service access, the service icon will appear on the Home Screen in the upper right corner. To acquire Service access, a rolling password is required. See next section.
- Factory — The Factory access level authorizes access to all menus and parameters for the unit, including factory settings. See menu structure on page 14. When logged in under Factory access, the Factory icon will appear on the Home Screen in the upper right corner. To acquire Factory access, a rolling password is required. See next section.

To log in to the Carrier Controller display, press the Login button on the Home screen and select the desired access level. If User access is denied, input the required password on the User Login screen and then press the Unlock button on the bottom left of the User Login screen. To acquire service or factory access, a rolling password is required. See next section. Upon successful login, the Login icon will change to one of 3 icons denoting the access level: User, Service, or Factory. Once logged in to the controller, after 15 minutes of inactivity, the controller will revert back to Basic Access Level. To log out of the controller, press the Login icon and select any of the 3 access levels. From any of the 3 access level login screens, press the Lock button at the bottom left of the screen to log out.

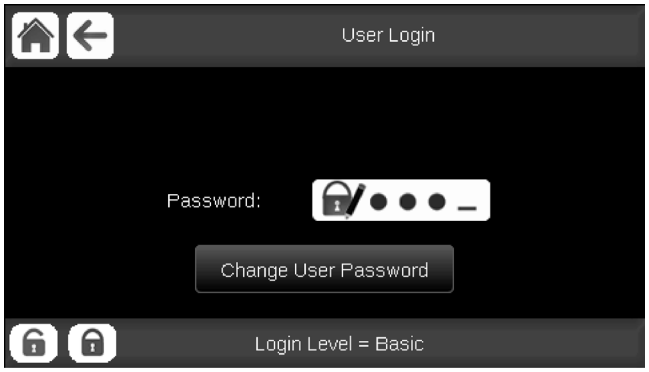


Fig. 4 — User Login Screen

Rolling Password

To access the Rolling Password Login Screen, press the Login button on the Home screen. Rolling password authentication is applicable only for Service and Factory level logins. See Fig. 5-7 for rolling password screen examples.

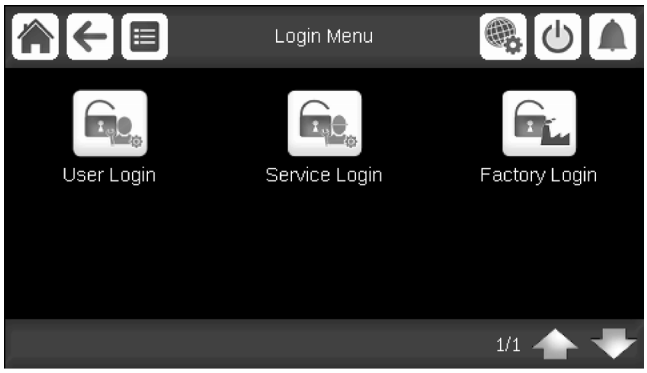


Fig. 5 — Rolling Password Login Screen

Fig. 6 — Factory Login Level Screen

Fig. 7 — Service Login Level Screen

Service and factory access require QR code verification. The QR code image and QR code string QR Code: e2uz i5hb l2c7 5d2c for Service and Factory login are available on the Service login and Factory login screens.

QR code (rolling password) functionality is enabled only if the following conditions are met:

1. The unit must be electrically supplied for at least 48 hours (continuously/without interruption).
2. Power-on reset must be performed on the controller (after being powered for 48 hours — see step 1 above).

NOTE: It is NOT possible to use QR codes (rolling password functionality) before the conditions given above are met. Prior to the 48 hour period and power-on reset, the service-level and factory-level authorization can be accessed via passwords 88 and 113, respectively.

Once the unit has been powered for at least 48 hours and power-on reset is done, service and factory password will change automatically, and users trying to log in to the controller will have to use QR codes and the SmartService application to have their new passwords generated. Scanning the QR code will generate the password via the SMARTService mobile application. The SMARTService mobile application can be downloaded from the Google Play app store or the Apple App store. A new QR code can be generated by pressing the button. Alternatively, the password can be generated by entering the QR code string into the SMARTService web application at the following web address: https://smartservice.carrier.com. Once the password is generated, this password is valid until the expiration period is over (default 7 days).

Verify login level Login Level = Basic at the Factory or Service level login screen.

Changing the Carrier Controller Display Language

To change the Carrier Controller Display language, go to ***System Menu → Language & Unit***. The Language & Unit screen offers 9 language selections for the Carrier Controller Display: English, Spanish, French, German, Dutch, Mandarin, Italian, Portuguese, or a custom language. The factory default language is English. The current language is shown between the arrows ▶◀. To make a change, simply press the desired language icon and then press the Home button on the Language & Unit screen. The language can be changed without being logged in to the controller. (See Fig. 8.)

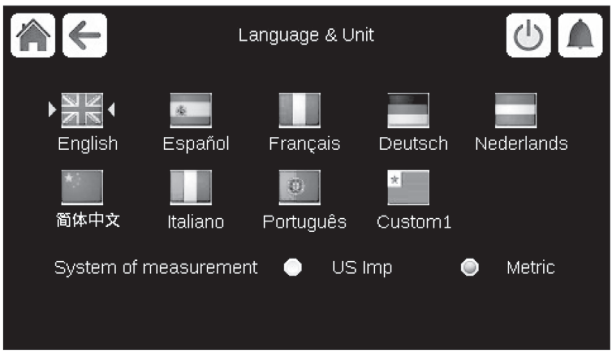


Fig. 8 — Language & Unit Screen

Changing the Units of Measurement

The Language & Unit Screen offers 2 choices for units of measurement: US Imperial or Metric. The factory default is US Imperial. The current selection is denoted by a blue button. To change the measurement system, press the appropriate system on the Language & Unit screen, then press any other button or icon on the Language & Unit screen. The units can be changed without being logged in to the controller. (See Fig. 8.)

MAIN MENU SCREEN

The Main Menu provides access to the main control parameters, including general parameters, temperatures and pressures, input and output status, and others. Press the Main Menu button on the Home screen to access the Main Menu. The Main Menu displayed will depend upon what access level the user is logged in as.

Figure 9 shows the Main Menu. To navigate through the pages, press the arrows at the lower right corner of the screen.

To view or modify system parameters, press the appropriate icon on the Main Menu. For example, to access the General Parameters table, press the General Parameters button .

Figure 10 shows the first page of the General Parameters table if logged in with Service access. Use the arrows at the bottom right corner to navigate the General Parameters table.

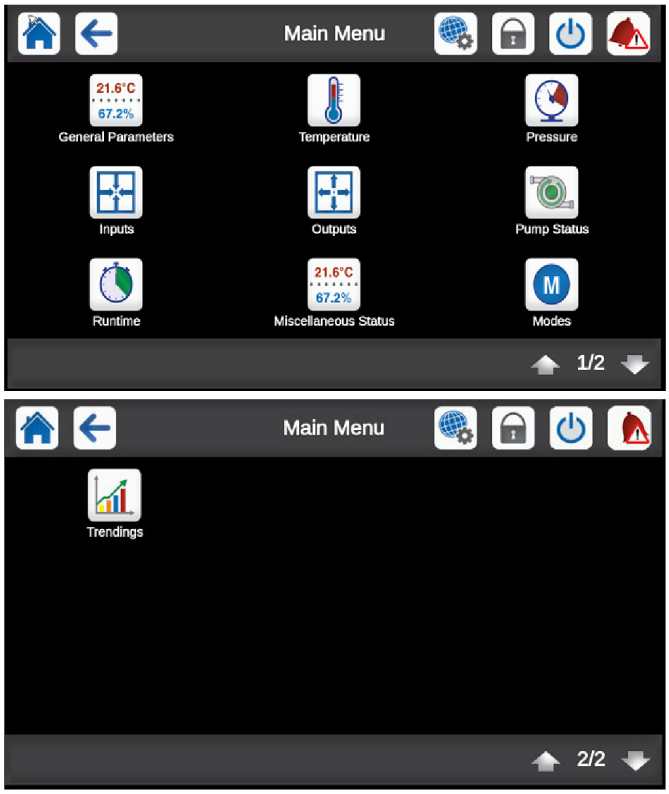


Fig. 9 — Main Menu, Page 1 and Page 2

Points that can be changed with the current level of user access are outlined with a box. For example, to modify the setpoint select parameter, select the current setpoint select value as shown on page 2 of the General Parameters table and enter the desired parameter.

A data entry screen will be displayed. For alphanumeric responses, such as the password screen, a QWERTY keyboard is displayed. (See Fig. 11.) Enter the data required and press the Check Mark button to accept the change. If required, Save and Cancel icons will appear in the Unit Status Line to confirm the changes.

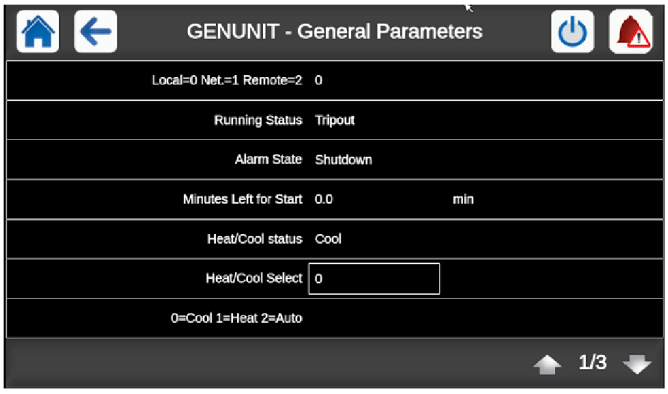


Fig. 10 — General Parameters, Page 1

Fig. 11 — Data Entry Keyboard

If a numeric response is required, either a numeric keypad (see Fig. 12) or a force/relinquish keypad (see Fig. 13) will be displayed. Use the numeric keypad to enter the value and press the Check Mark button . Once complete, Cancel and Save buttons will appear in the lower left section of the Unit Status Line. To accept the change, press the Save button . To cancel, press the Cancel button . The force/relinquish keypad allows a technician to force (or override) a status parameter by pressing the Flash button or to automate (or release) a status parameter by pressing the crossed-out Flash button .

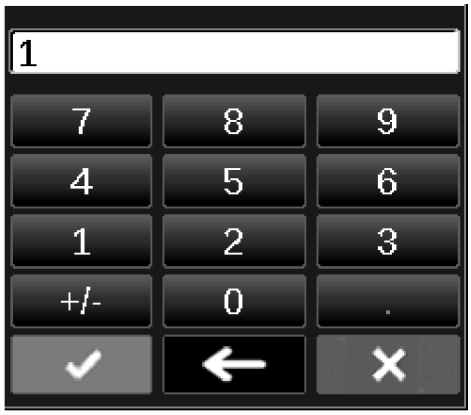


Fig. 12 — Numeric Keypad

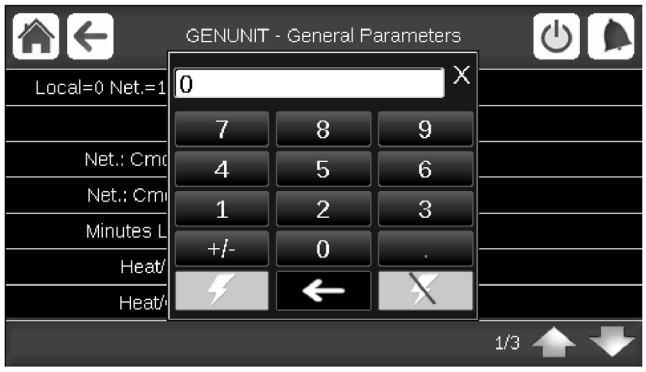


Fig. 13 — Force/Relinquish Keypad

GENERAL CONFIGURATION TABLE

This table contains configuration settings for the unit. Select ***Main Menu → Configuration Menu → General Configuration*** to access the table (Fig. 14).

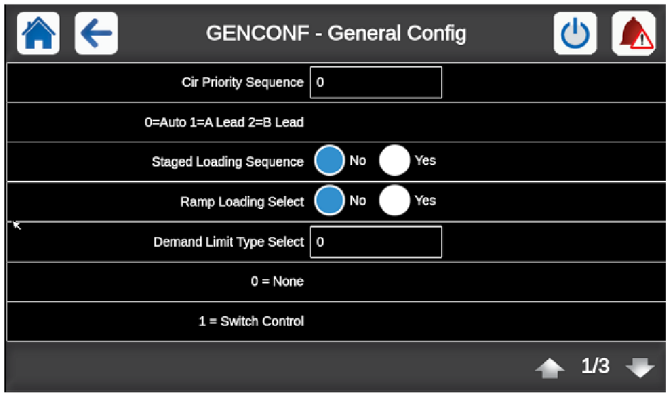


Fig. 14 — General Configuration

Press the field corresponding to the parameter to be modified and make the necessary changes. When all necessary changes have been made, press the Save button to confirm or the Cancel button to cancel changes. For a complete list of general parameters, see page 121 in Appendix A.

TRENDINGS SCREEN

The Trendings Display screen allows for easy monitoring of parameters selected by the user. To access the Trendings Display screen, select Trendings on the Main Menu. See Fig. 15.

Select the parameters to be displayed by pressing the box to the left of the parameter name. The scroll bar on the right of the screen can be used to see all possible selections; to save a selection, press the Save Trend Display Options button. Once the parameters to be trended are selected and saved, press the Display Trend Log button, and the trend graph will be displayed. (See Fig. 16.)

Use the following buttons to adjust the Trendings display:

Navigate across the time line.

Go to beginning or end of selected period.

Zoom in to magnify the view.

Zoom out to expand the viewed area.

Refresh (reload) data.

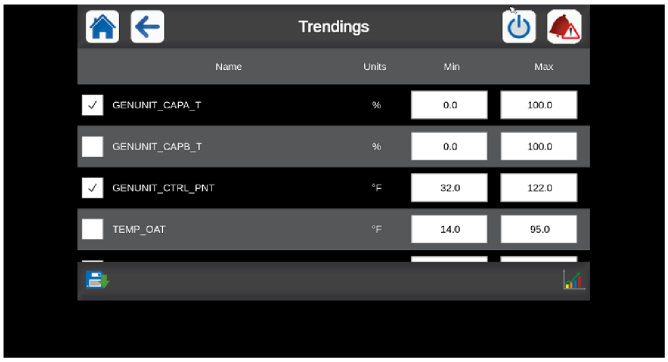


Fig. 15 — Trendings Display Screen

Fig. 16 — Trendings Configuration Screen

MENU ARCHITECTURE

See Fig. 17-20 for Carrier Controller menu structure. The options displayed depend on the user's access level, as shown in the figures. The user can navigate through the Carrier Controller display screens by pressing the buttons that appear on the screen. When a button is pressed, either a submenu or a list of parameters and values will be shown. If the list of parameters and values is shown, the top line of the display will show either the menu item name (if sub-menu items appear) or the table name (if points and values are displayed). Pressing an item will cause a Point Data dialog box to appear. For a complete list of tables and points with display names and CCN point names, see Appendixes A and B, starting on pages 121 and 143, respectively.

SETTING TIME AND DATE

The date and time for the controls can be set by opening the ***System Menu → Date & Time***. The Date & Time screen allows the user to configure the Time Zone and set the date, time, daylight saving time, and whether today or tomorrow is a holiday. See Fig. 19 for details.

WEB AND NETWORK INTERFACE

The Carrier Controller control can be configured to allow access via a standard, java-enabled web browser or over a network. See Appendix H for the "Carrier Controller Web and Network Interface Parameters" on page 160 for detailed information on setting up and accessing the Carrier Controller via the web or network interface. See Table 5 for 4.3 in. screen port connections and Fig. 21 for interface and connectors.

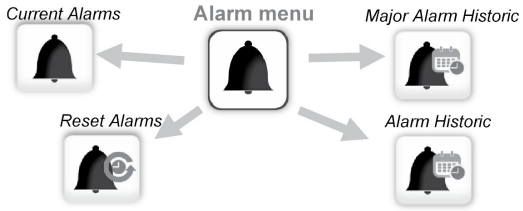


Fig. 17 — Alarm Menu

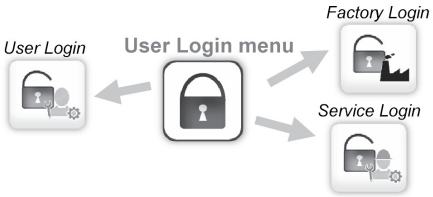


Fig. 18 — Login Menu

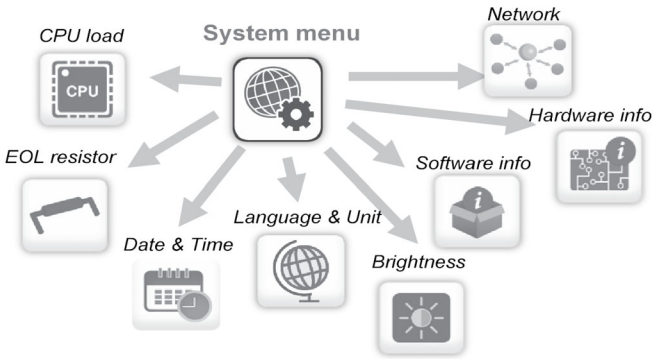


Fig. 19 — System Menu

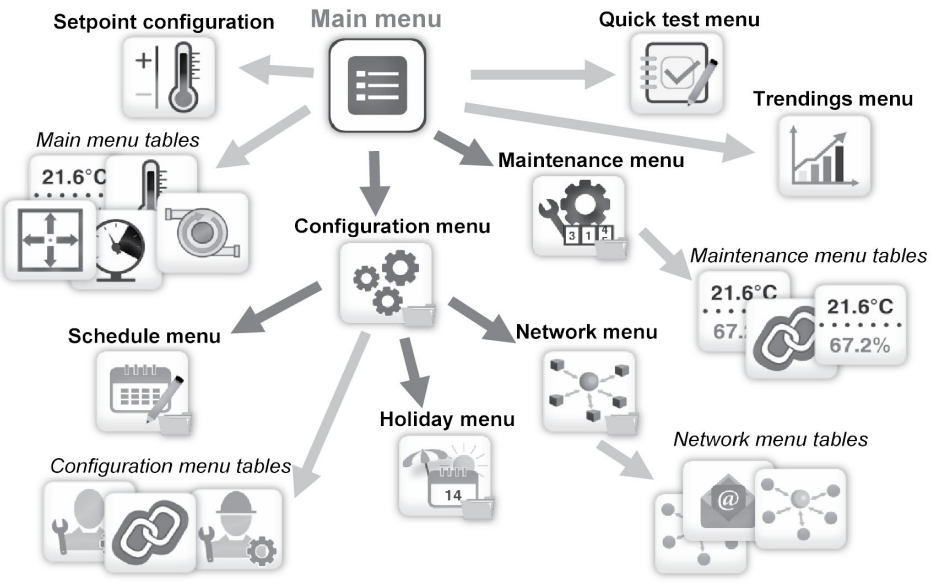


Fig. 20 — Main Menu

Table 5 — Carrier Controller Display Port Connections

CONNECTOR	TYPE / PINOUT[a]	FUNCTION
J5	RJ45	ETH0: BMS Interface, BACnet IP/TCP, Modbus TCP, WAN (connectivity)
J3	TYPE-A	USB-1: Firmware Upgrade
J9	TYPE-A	USB-1: Firmware Upgrade
J8	–	RS485: Unused
	C	
	+	
J10	–	RS485: ModBus® RTU (Secondary), BACnet MS/TP
	C	
	+	
J7	–	RS485: CCN
	C	
	+	
J6	–	RS485: LEN System Internal I/O Boards
	C	
	+	
J4	+	24 vac Power
	G	

NOTE(S):
a. PINOUT is listed as viewed from back of PIC6 (Product Integrated Control) from left to right on connector.

LEGEND
BMS — Building Management System
CCN — Carrier Comfort Network®
LEN — Local Equipment Network
RTU — Remote Terminal Unit
USB — Universal Serial Bus
WAN — Wide Area Network

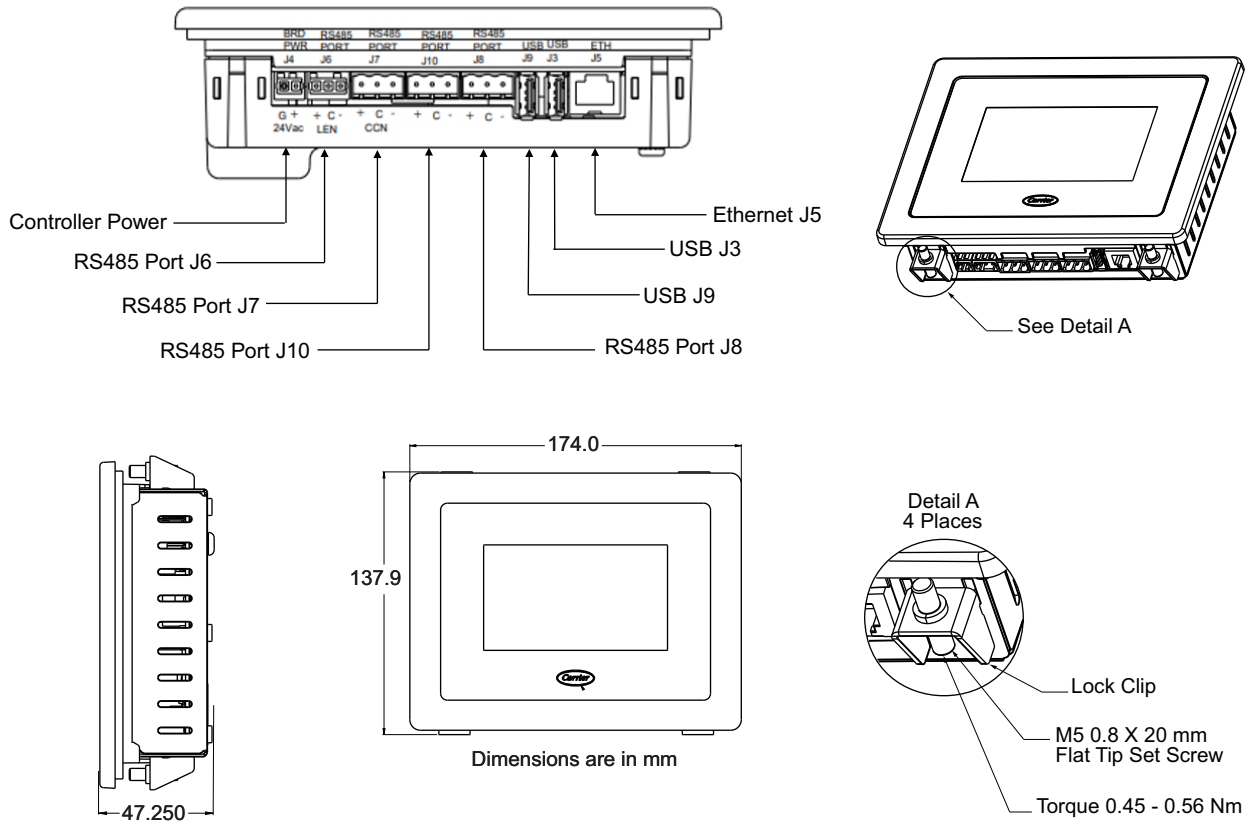


Fig. 21 — Carrier Controller Display Interface and Connectors

Input/Output (CIOB) Boards

There are 2 Standard Input/Output Boards (CIOBs) for each unit, CIOB-A (address 49) for Circuit A and CIOB-B (address 50) for Circuit B and EMM function. (See Fig. 22.) These boards receive inputs from the thermistors, transducers, demand limit switch, dual setpoint switch, remote on/off switch, chilled water flow switch, pump interlock contact, and high pressure switch. They provide output control to the expansion valves, evaporator heater contactor, isolation valves, compressor crankcase heater, customer-supplied pump relays, compressor contactor relays, and customer-supplied alarm and running relays. Information is transmitted between the CIOBs and the Carrier Controller module via a 3-wire communication bus or LEN (Local Equipment Network) bus. Connections for the LEN bus are J12 and J13. Each CIOB has a 4-position DIP (dual in-line package) switch bank used for addressing of the board. CIOB-A is at address 49 and CIOB-B is at address 50. See Table 6 for CIOB DIP switch settings. See Tables 7 and 8 for a list of inputs and outputs for the 2 CIOBs.

Table 6 — CIOB A and B DIP Switch Settings

CIOB-A DIP Switch	1	2	3	4
Position	OFF	OFF	OFF	OFF
CIOB-B DIP Switch	**1**	**2**	**3**	**4**
Position	ON	OFF	OFF	OFF

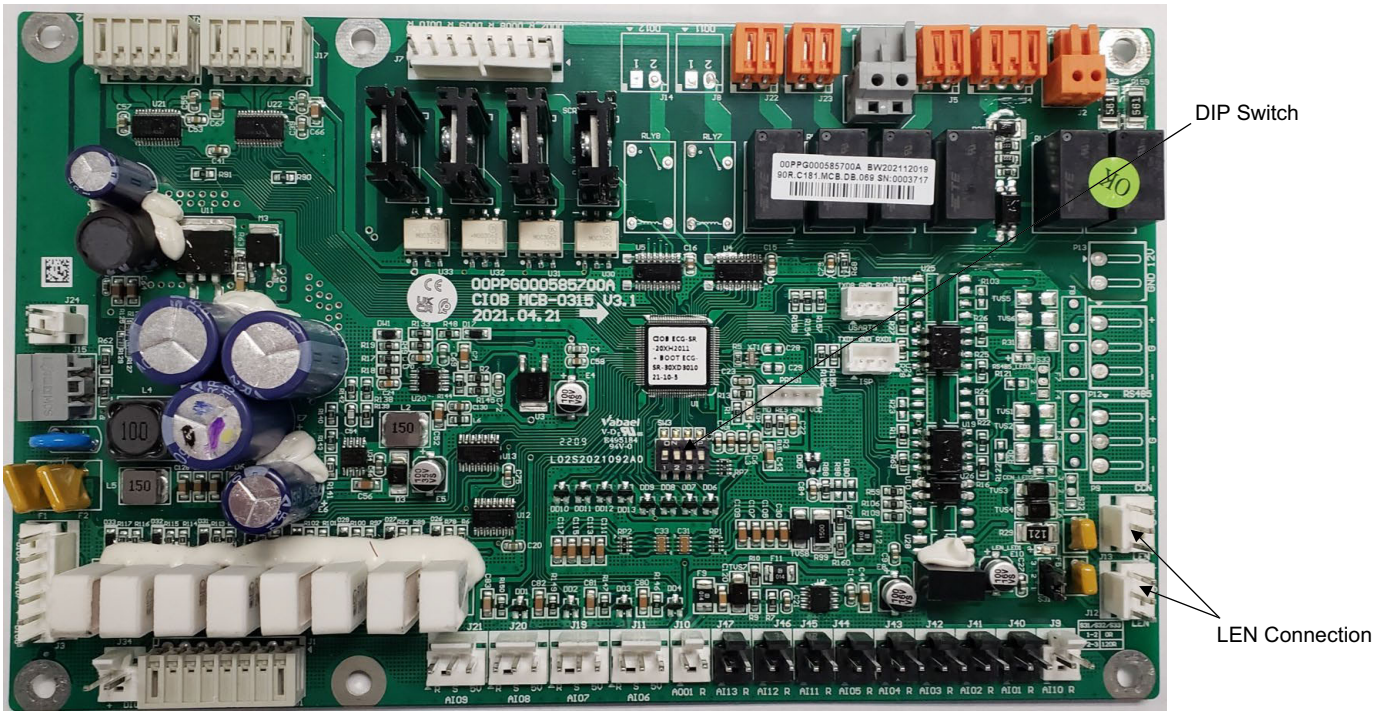


Fig. 22 — CIOB / Energy Management Module

Table 7 — CIOB-A Inputs and Outputs

Point Description	I/O Point Name	Board Connector	In/Out Type	CCN Point Name
Inputs				
On/Off Switch	DI-01	J1	Dry contact 5V	ONOFF_SW
Second Setpoint Switch	DI-02	J1	Dry contact 5V	SETP_SW
Boiler	DI-03	J1	Dry contact 5V	BOILER
Heat/Cool Switch	DI-04	J1	Dry contact 5V	HC_SW
Chilled Water Flow Switch	DI-05	J34	Dry contact 5V	FLOW_SW
Water Pump Interlock #1	DI-06	J3	Dry contact 5V	CWP1
Water Pump Interlock #2	DI-07	J3	Dry contact 5V	CWP2
Reverse Rotation Relay Contact	DI-08	J3	Dry contact 5V	REV_ROT
High Pressure Switch Circuit A	DI-09 J4 IN01-02	J4	Safety contact	HP_SW_A
Entering Water Temperature	AI-01	J40	Thermistor	EWT
Leaving Water Temperature	AI-02	J41	Thermistor	LWT
Outdoor Air Temperature	AI-03	J42	Thermistor	OAT
Suction Temperature Circuit A	AI-04	J43	Thermistor	SUCT_A
Discharge Gas Temperature A	AI-05	J44	Thermistor	DGT-A
Discharge Pressure Circuit A	AI-06	J11	Pressure	DP_A
Suction Pressure Circuit A	AI-07	J19	Pressure	SP_A
Set Point Reset	AI-10	J9	4-20 mA	SP_RESET
Outputs				
Compressor A1	DO-01	J2	Relay	CP_A1
Compressor A2	DO-02	J2	Relay	CP_A2
Water Pump #1	DO-03	J6	Relay	PUMP_1
Water Pump #2	DO-04	J6	Relay	PUMP_2
Alarm Relay	DO-05	J23	Relay	ALARM
Running Relay	DO-06	J22	Relay	RUN
Fan Contactor 1	DO-07	J7	Triac	FANC_1
Fan Contactor 2	DO-08	J7	Triac	FANC_2
Boiler Output	DO-09	J7	Triac	BOILER
Cooler Heater Contactor	DO-10	J7	Triac	EXCH_HTR
EXV Position Circuit A	STPR1	J17	Stepper motor	EXV_A

LEGEND

CCN — Carrier Comfort Network®

EMM — Energy Management Module

PCB — Printed Circuit Board

Table 8 — CIOB-B Inputs and Outputs

Point Description	I/O Point Name	Board Connector	In/Out Type	CCN Point Name
Inputs				
Limit Switch #1	DI-03	J1	Dry contact 5V	LIM_SW1
Limit Switch #2	DI-04	J1	Dry contact 5V	LIM_SW2
ICE Done Swtich	DI-05	J34	Dry contact 5V	ICE_SW
High Pressure Switch B	DI-09 J4 IN01-02	J4	Safety contact	HP_SW_B
Space Temperature T55 (10K)	AI-01	J40	Thermistor	SPACETMP
Dual Leaving Water Temperature	AI-02	J41	Thermistor	DLWT
Suction Temperature Circuit B	AI-04	J43	Thermistor	SUCT_B
Discharge Gas Temperature B	AI-05	J44	Thermistor	DGT_B
Discharge Pressure Circuit B	AI-06	J11	Pressure	DP_B
Suction Pressure Circuit B	AI-07	J19	Pressure	SP_B
Cooling Set Point (4-20mA) 0-5V with 250Ω resistor	AI-09	J21	0..5V	CSP_IN
Demand Limit (4-20mA)	AI-10	J9	4-20 mA	LIM_4_20
Outputs				
Compressor B1	DO-01	J2	Relay	CP_B1
Compressor B2	DO-02	J2	Relay	CP_B2
Fan Contactor 3	DO-08	J7	Triac	FANC_3
EXV Position Circuit B	STPR1	J17	Stepper motor	EXV_B

LEGEND

CCN — Carrier Comfort Network®

PCB — Printed Circuit Board

Reverse Rotation Board

Reverse rotation boards are an option for all units. The reverse rotation board monitors the 3-phase electrical system to provide phase reversal, phase loss, and under-voltage protection. (See Fig. 23.) The reverse rotation board has 2 LEDs (light-emitting diodes) and 2 adjustable dial settings. Under normal conditions, the upper LED will light up green. The lower LED is red and will flash (phase reversal) or turn on solid (phase loss and under-voltage) according to the conditions sensed.

DIAL SETTINGS

The reverse rotation board has 2 dials. (See Fig. 23.) The upper dial should be set to match the incoming 3-phase voltage to the chiller with no compressors running. This dial must be adjusted for 208/230-v chillers operating on 208-v power supply. The dial should be adjusted to a 200-v minimum setting for this case. The lower dial is used for trip delay and should be set fully counterclockwise to the minimum 0.1 second setting.

PHASE REVERSAL PROTECTION

The control monitors the 3-phase power sequence supplied at terminals L1, L2, and L3. If the control senses an incorrect phase relationship, the relay contacts (11/14) on the board will open. The relay contacts will automatically reset when the correct phase sequence is applied.

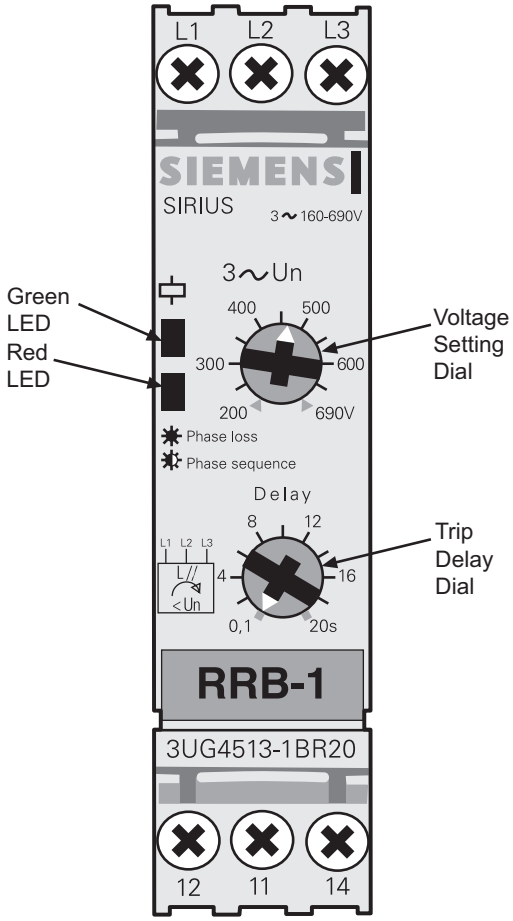


Fig. 23 — Reverse Rotation Board (RRB)

PHASE LOSS AND UNDER-VOLTAGE PROTECTION

If the reverse rotation board senses that any one of the 3 phase inputs has no AC voltage or that any one phase has dropped more than 20% below the voltage dial setting, the relay contacts (11/14) on the board will open. Contacts will reset automatically when all 3 phases are present, in the correct sequence, and within the limits of the voltage dial setting.

LED STATUS	FUNCTION
Upper (green) LED on continuously	Relay contacts closed (normal operation)
Lower (red) LED flashing	Relay contacts open (phase reversal has occurred)
Lower (red) LED on continuously	Relay contacts open (phase loss or under-voltage has occurred)
Upper (green) LED off	Power not present at L1, L2, L3 (off)

NOTE: Normal operation of the reverse rotation board (for example, no faults are detected) results in a closed contact being applied to CIOB-B (DI-01) input through the closed 11/14 relay contact.

Compressor Protection Module

When the digital option is ordered, the A1, digital, compressor on unit sizes 025, 030, 050, 055, and 060, are delivered with a preinstalled motor protection module inside the terminal box. (See Fig. 24.) This device provides for efficient and reliable protection against overheating and overloading, as well as protection against phase loss/reversal. A red and green LED light will show the status of any alerts and the cause. See diagram for LED sequence for all faults. All other compressors are protected by an internal overload inside the compressor shell.

OVERHEATING AND OVERLOADING

The motor protector comprises a control module and PTC (positive temperature coefficient) sensors embedded in the motor winding. The close contact between the thermistors and windings ensures a very low level of thermal inertia.

The motor temperature is constantly measured by a PTC thermistor loop. If any thermistor exceeds its response temperature, its resistance increases above the trip level (4500Ω) and the output relay then trips (i.e., contacts M1-M2 are open). The alert will reset in 30 min if the resistance of the motor circuit is less than 2750 ohms. Five consecutive lockouts will require a power cycle to reset. The red LED will flash one during this alert.

PHASE REVERSAL/LOSS

The module will flash the red Alert LED six times indicating a missing phase in one of the three leads to the compressor. A Code 6 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the missing phase condition is not present. The module will lockout the compressor after 10 consecutive Code 6 Alerts. Once the module has locked out the compressor, a power cycle or Modbus reset command will be required to clear the lockout.

Motor Overload Protection

COPELAND COMPRESSORS MODELS WITH ELECTRICAL CODE TF

Models with a "TF" in the electrical code (i.e., YP123K1T-**TF**D) have an internal line break motor overload located in the center of the Y of the motor windings. This overload disconnects all three legs of the motor from power in case of an over-current or over-temperature condition. The overload reacts to a combination of motor current and motor winding temperature. The internal overload protects against single phasing. Time must be allowed for the motor to cool down before the overload will reset. If current monitoring to the compressor is available, the system controller can take advantage of the compressor internal overload operation. The controller can lock out the compressor if current draw is not coincident with contactor energizing, implying that the compressor has shut off on its internal overload. This will prevent unnecessary compressor cycling on a fault condition until corrective action can be taken.

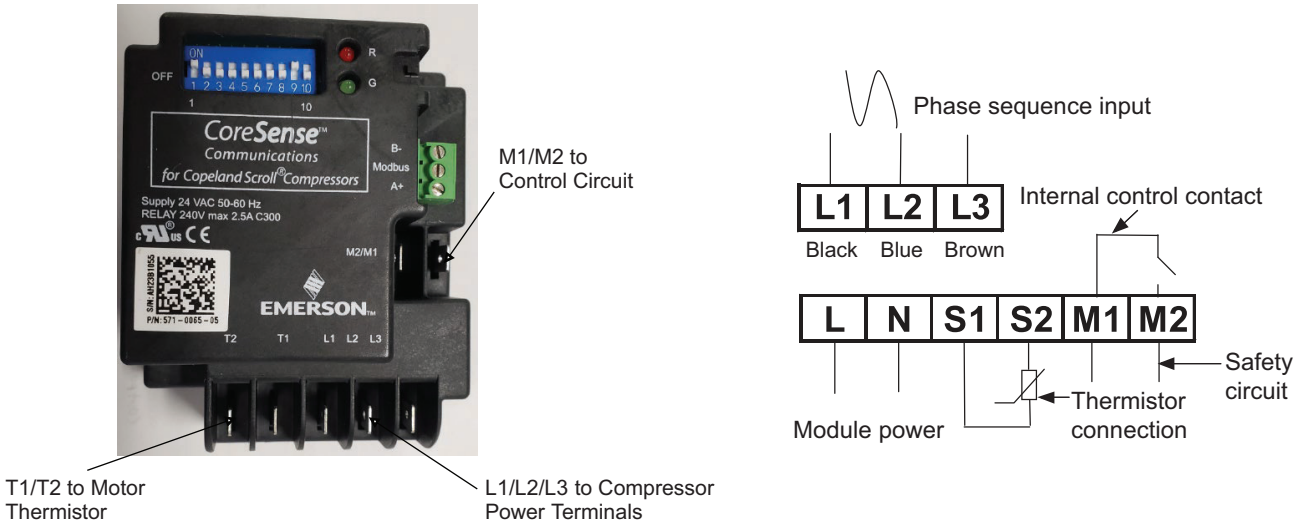


Fig. 24 — Compressor Protection Module

COPELAND COMPRESSORS MODELS WITH ELECTRICAL CODE "TE"

⚠CAUTION

The electronic motor protection module is a safety device that must not be bypassed or compressor damage may result.

Copeland models with "**TE**" in the electrical code (i.e., YPD163K1T-**TE**D) have a motor overload system that consists of an external electronic control module connected to a chain of four thermistors embedded in the motor windings. The module will trip and remain off for a minimum of 30 minutes if the motor temperature exceeds a preset point to allow the scrolls to cool down after the motor temperature limit has been reached. It may take as long as two hours for the motor to cool down before the overload will reset.

NOTE: Turning off power to the module resets it immediately.

⚠CAUTION

Restarting the compressor sooner may cause a destructive temperature buildup in the scrolls.

For this reason, module power must never be switched with the control circuit voltage.

CoreSense Communications Module Troubleshooting

Copeland models with a "**TE**" in the electrical code (i.e., YPD192K1T-**TE**D) have a motor overload system that consists of an external CoreSense communication electronic control module.

Motor thermistors are connected to the CoreSense communication module via a 2x2 plug (Fig. 25).

The CoreSense communications module has field configurable DIP switches for addressing and configuring the module. The DIP switches should be addressed as shown in Table 9.

The CoreSense communication module has a green and a red light-emitting diode (LED). A solid green LED indicates the module is powered and operation is normal. A solid red LED indicates an internal problem with the module. If a solid red LED is encountered, power down the module (interrupt the T1-T2 power) for 30 seconds to reboot the module. If a solid red LED is persistent, change the CoreSense module.

The CoreSense module communicates warning codes via a green flashing LED. Warning codes do not result in a trip or lockout condition. Alert codes are communicated via a red flashing LED. Alert codes will result in a trip condition and possibly a lockout condition. See wiring diagram on terminal box cover, or Fig. 26. The flash code corresponds to the number of LED flashes, followed by a pause; then the flash code is repeated. A lockout condition produces a red flash, followed by a pause, a solid red, a second pause, and then repeated. Table 10 lists the flash code information for Warning and Alert codes along with code reset and troubleshooting information.

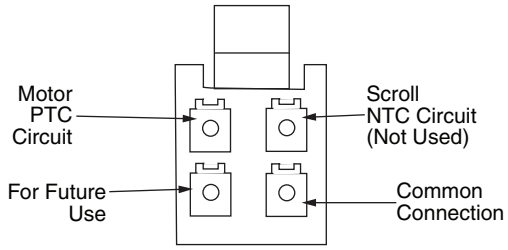


Fig. 25 — CoreSense Communication Motor Thermistor Plug

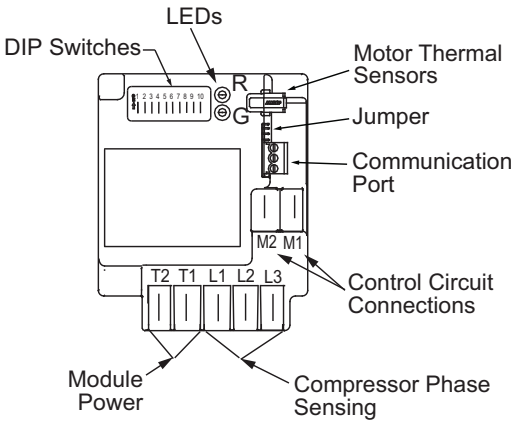


Fig. 26 — CoreSense Communication Motor Protection Wiring

Table 9 — CoreSense Communication Module DIP Switch Settings

COPELAND ELECTRICAL CODE	DIP SWITCH									
	1	2	3	4	5	6	7	8	9	10
"TE"	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
"TW"	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Table 10 — CoreSense Communication Module LED Flash Codes

LED STATUS	FAULT CONDITION	FAULT CODE DESCRIPTION	FAULT CODE RESET	TROUBLESHOOTING INFORMATION
SOLID GREEN	None, normal operation	Module is powered and under normal operation	Not applicable	None
SOLID RED	Module malfunction	Module has an internal fault	Not applicable	1. Reset module by removing power from T1-T2. 2. Replace module.
		WARNING LED FLASH		
GREEN FLASH CODE 1	Loss of communication	Module and Master Controller have lost communications with each other for more than 5 minutes	Automatic when communications are re-established	Not Supported. Check DIP Switch settings.
GREEN FLASH CODE 2	Not used	Not applicable	Not applicable	Not applicable
GREEN FLASH CODE 3	Short cycling	Run time of less than 1 minute. Number of short cycles exceeds 48 in a 24-hour period.	Fewer than 48 short cycles in 24 hours	30RC controls do not allow this operation normally. Confirm proper wiring and DIP switch settings.
GREEN FLASH CODE 4	Open/Shorted Scroll Thermistor	Not applicable	Not applicable	Not applicable
GREEN FLASH CODE 5	Not used	Not applicable	Not applicable	Not applicable
		ALERT/LOCKOUT LED FLASH		
RED FLASH CODE 1	High motor temperature	Thermistor resistance greater than 4500 Ω. Lockout occurs after 5 alerts.	Thermistor resistance less than 2750 Ω and 30 minutes have elapsed	1. Check power supply. 2. Check system charge and superheat. 3. Check compressor contactor.
RED FLASH CODE 2	Open/shorted motor thermistor	Thermistor resistance greater than 4500 Ω, or less than 100 Ω. Lockout occurs after 6 hours.	Thermistor resistance is between 100 and 2750 Ω and 30 minutes have elapsed	1. Check for poor connections at module and thermistor fusite. 2. Check continuity of thermistor wiring harness. 3. Check for an open thermistor circuit.
RED FLASH CODE 3	Short cycling	Run time of less than 1 minute. Lockout if the number of alerts exceeds the number configured by the user in 24 hours.	Interrupt power to T2-T1	30RC controls do not allow this operation normally. Confirm proper wiring.
RED FLASH CODE 4	Scroll high temperature	Not applicable	Not applicable	Not applicable
RED FLASH CODE 5	Not used	Not applicable	Not applicable	Not applicable
RED FLASH CODE 6	Missing phase	Missing phase detected. Lockout after 10 consecutive alerts.	After 5 minutes and missing phase condition is not present	1. Check incoming power. 2. Check fuses or circuit breakers. 3. Check compressor contactor.
RED FLASH CODE 7	Reverse phase	Reverse phase detected. Lockout after 1 alert.	Interrupt power to T2-T1	1. Check incoming power phase sequence 2. Check compressor contactor 3. Check module phase wiring A-B-C.
RED FLASH CODE 8	Not used	Not applicable	Not applicable	Not applicable
RED FLASH CODE 9	Module low voltage	Less than 18 vac supplied to module	After 5 minutes and voltage is between 18 and 30 vac	This alert does not result in a lockout fault. 1. Verify correct 24 vac module is installed. 2. Check for a wiring error.

Warning Codes (Green LED Flash Code):

- Code 1 – Loss of Communication: The module will flash the green Warning LED one time indicating the module has not communicated with the master controller for longer than 5 minutes. Once communication is reinitiated, the Warning will be cleared. The 30RC units do not support the communication capability of this module.
- Code 2 – Reserved For Future Use
- Code 3 – Short Cycling: The module will flash the green Warning LED three times indicating the compressor has short cycled more than 48 times in 24 hours. A short cycle is defined as compressor runtime of less than 1 minute. The Warning will be activated when the "Short Cycling" DIP Switch (no. 10) is OFF (in the down position). When fewer than 48 short cycles are accumulated in 24 hours the Warning code will be cleared.
- Code 4 – Open/Shorted Scroll Thermistor: The module will flash the green Warning LED four times, indicating that the scroll NTC thermistor has a resistance value that indicates an open/shorted thermistor. The Warning will be cleared when the resistance value is in the normal range. The 30RC units do not utilize a scroll thermistor.
- Code 5 – Not used.

Alert/Lockout Codes (Red LED Flash Code):

- Code 1 – Motor High Temperature: The module will flash the red Alert LED one time indicating the motor PTC circuit has exceeded 4500 Ω. A Code 1 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is below 2750 Ω. Five consecutive Code 1 Alerts will lock out the compressor. Once the module has locked out the compressor, a power cycle will be required for the lockout to be cleared.
- Code 2 – Open/Shorted Motor Thermistor: The module will flash the red Alert LED 2 times indicating the motor PTC thermistor circuit has a resistance value greater than 2200 Ω or less than 100 Ω. that indicates an open/shorted thermistor chain. A Code 2 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is back in the normal range. The module will lock out the compressor if the trip condition exists for longer than 6 hours. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 3 – Short Cycling: The module will flash the red Alert LED 3 times indicating the compressor is locked out due to short cycling. A Code 3 Alert will open the M2-M1 contacts. Code 3 will be enabled when the Short Cycling DIP switch (no. 10) is ON (in the up position) and the compressor has exceeded the number of short cycles configured by the user in a 24-hour period. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 4 – Scroll High Temperature: The module will flash the red Alert LED 4 times indicating the scroll NTC circuit is less than 2400 Ω. A Code 4 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the scroll NTC circuit is higher than 5100 Ω. The module will lock out the compressor if the number of Code 4 Alerts exceeds the user configurable number of Code 4 events within a 24-hour period. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 5 – Not used.
- Code 6 – Missing Phase: The module will flash the red Alert LED 6 times indicating a missing phase in one of the three leads to the compressor. A Code 6 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the missing phase condition is not present. The module will lock out the compressor after 10 consecutive Code 6 Alerts. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 7 – Reverse Phase: The module will flash the red Alert LED 7 times indicating a reverse phase in two of the three leads to the compressor. A Code 7 Alert will open the M2-M1 contacts. The module will lock out the compressor after one Code 7 Alert. A power cycle will be required to clear the lockout.
- Code 8 – Not used.
- Code 9 – Module Low Voltage: The module will flash the red Alert LED 9 times indicating low module voltage, less than 18 vac on the T2-T1 terminals for more than 5 seconds. A Code 9 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the T2-T1 voltage is above the reset value in 18 to 30 vac.

Resetting Alert codes can be accomplished manually by cycling power to the module (disconnect T2 or T1 for 5 seconds). If the fault that initiated the Alert code is absent after the reset is performed, the Alert code will be cleared and CoreSense module will allow normal operation. If the fault is still present after the reset is performed, the fault code will continue to be displayed via the green or red flashing LED.

Copeland replacement compressors are shipped with two solid-stage motor protection modules. A 120/240-volt module is installed and a 24-volt module is shipped with the compressor. The 30RC units require the 24-volt module be field installed. Failure to install the 24-volt module will result in a compressor failure alarm. See Fig. 27.

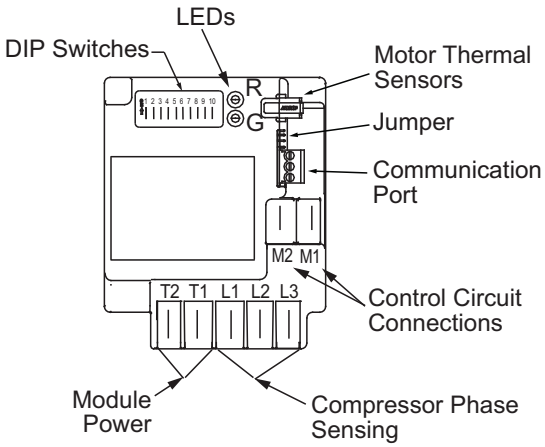


Fig. 27 — Solid-State Motor Protection Module

Auxiliary Boards

For units with the digital compressor or hot gas bypass option, the AUX board (address 86) will be installed. The AUX board responds to commands from the Carrier Controller module and sends the Carrier Controller module the results of the channels they monitor via the LEN. See Fig. 28 for an example of the AUX Board. See Table 11 for AUX Board DIP switch settings. See Table 12 for a list of outputs for the AUX 2 board.

Table 11 — AUX Board DIP Switch Settings

AUX BOARD DIP SWITCHES	1	2	3	4	5	6	7	8
Address	ON	OFF	ON	OFF	ON	OFF	ON	OFF

Emergency On/Off Switch (SW2)

This switch is installed in all units. The Emergency On/Off switch should only be used when it is required to shut the chiller off immediately. Power to all modules is interrupted when this switch is off, and all outputs from these modules will be turned off.

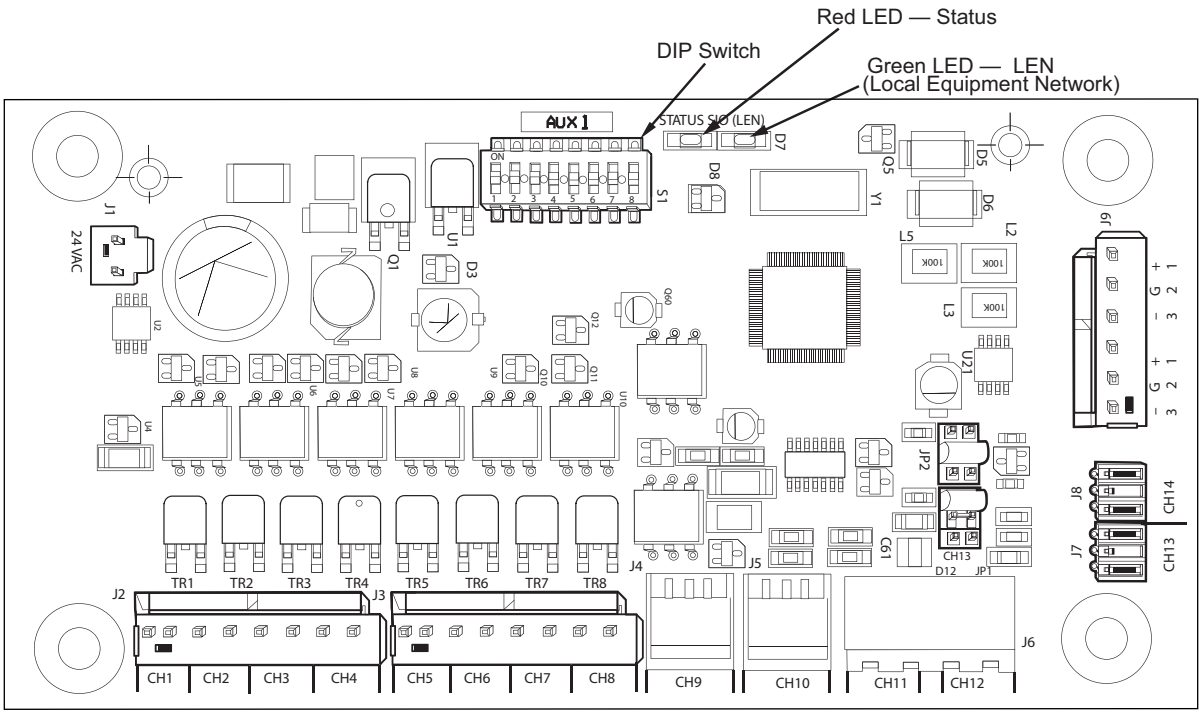


Fig. 28 — AUX Board

Table 12 — AUX 2 Board Configuration

POINT DESCRIPTION	I/O POINT NAME	BOARD CONNECTOR	IN/OUT TYPE	CCN POINT NAME
AUX 2 Board Outputs				
Digital Unloader Solenoid (DUS)	DO 1	J2	Triac	DUS
Minimum Load Valve (MLV)	DO 2		Triac	HGBP_V

LEGEND

CCN — Carrier Comfort Network®

Energy Management Module (EMM)

The EMM (address 50) is available as a factory-installed option or as a field-installed accessory. (Refer to Fig. 22 on page 16.) When the EMM module is field-installed, the Carrier Controller must be set up to communicate with the EMM module (***Main Menu → Configuration Menu → Factory Parameters → Energy Management Module*** = **Yes**). The Energy Management Module allows the following functions:

- Chilled Water Temperature Reset — Resets the chilled water setpoint by the following method:
  a. Space Temperature: A field-supplied space temperature sensor is required.
- Demand Limit — Limits the capacity of the machine from unit capacity by the following methods:
  a. 4 to 20 mA Input: A field-supplied signal generator and 1/2-watt, 250-ohm resistor are required.
  b. 2-Step Switch Control: A field-supplied dry contact switch is required.
- Ice Done Control Switch — Signals the machine to exit the Ice Build mode and enter an unoccupied time period. A field-supplied dry contact switch is required.
- Dual LWT — Input for temperature thermistor to measure mixed water temperature down stream of two chillers in parallel. Used with the Primary/Secondary function of the chiller.
- Cooling Setpoint — Allows 4-20 mA signal to communicate LWT setpoint to the chiller.

The EMM communicates the status of all inputs with the Carrier Controller module, and the controls adjust the outputs and control point, capacity limit, and other functions according to the information received. See Table 12 for EMM dip switch settings and EMM board inputs and outputs.

⚠ CAUTION

Care should be taken when interfacing with other manufacturer's control systems due to possible power supply differences, full wave bridge versus half wave rectification, which could lead to equipment damage. The 2 different power supplies cannot be mixed. Carrier Controller controls use half wave rectification. A signal isolation device should be utilized if a full wave bridge rectifier signal generating device is used.

Local Equipment Network

Information is transmitted between modules via a 3-wire communication bus or LEN.

Board Addresses

All boards (except the Carrier Controller display) have DIP switches to set the address.

Control Module Communication

RED LED

Proper operation of the control boards can be visually checked by looking at the red status LEDs. When operating correctly, the red status LEDs will blink in unison at a rate of once every 2 seconds. If the red LEDs are not blinking in unison, verify that correct power is being supplied to all modules and that all communication wiring is connected securely. Confirm current version of software installed on Carrier Controller display by navigating to the Software Info screen (***System Menu → Software Info***). If a newer version of the software exists, contact your Carrier service representative to reload current software. If the problem still persists, replace the Carrier Controller module. A red LED that is lit continuously or blinking at a rate of once per second or faster indicates that the board should be replaced.

GREEN LED

All boards have a green LEN LED that should be blinking whenever power is on. If the LEDs are not blinking as described, check LEN connections for potential communication errors at the board connectors. A 3-wire bus accomplishes communication between modules. These 3 wires run in parallel from module to module. They connect to J9 on AUX boards and to J12 or J13 on CIOBs and EMM. A valid unit configuration must be in the Carrier Controller module for proper LEN communication.

Carrier Comfort Network® Interface

All 30RC units can be connected to the Carrier Comfort Network (CCN), if desired. The communication bus wiring is RS-485 Communication Wiring, CM or CMP rated, consisting of a shielded, 3-conductor cable with drain wire, and is field supplied and installed. The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system elements on either side of it. The negative and signal ground pins of each system element must also be wired in the same manner. Wiring connections for CCN should be made at TB3. (See Fig. 29.) For noise consideration, communication wiring must be separate and not run in parallel with other wiring.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gauge) minimum stranded, tinned copper. Individual conductors must be insulated with PVC (Polyvinyl Chloride), PVC/nylon, vinyl, Teflon®[1], or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –4 to 140°F (–20 to 60°C) is required. High temperature applications may require a higher temperature range. Plenum applications will require plenum-rated cable. Cable voltage requirements must match the application.

When connecting to a CCN communication bus, it is important that a color-coding scheme be used for the entire network to simplify the installation. It is recommended that red be used for the signal positive, black for the signal negative, and white for the signal ground. Use a similar scheme for cables containing different colored wires.

At each system element, the shields of its communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to a ground at one point only. If the communication bus cable exits from one building and enters another, the shields must be connected to grounds at the lightning suppressor in each building where the cable enters or exits the building (one point per building only). To connect the unit to the network:

1. Turn off power to the control box.
2. Cut the CCN wire and strip the ends of the red (+), white (ground), and black (–) conductors. (Substitute appropriate colors for different colored cables.)
3. Connect the red wire to (+) terminal on TB3 of the plug, the white wire to COM terminal, and the black wire to the (–) terminal.
4. The RJ14 CCN connector on TB3 can also be used but is only intended for temporary connection (for example, a laptop computer running Network Service Tool).

IMPORTANT: A shorted CCN bus cable will prevent some routines from running and may prevent the unit from starting. If abnormal conditions occur, disconnect the CCN bus. If conditions return to normal, check the CCN connector and cable. Run new cable if necessary. A short in one section of the bus can cause problems with all system elements on the bus.

1. Third-party trademarks and logos are the property of their respective owners.

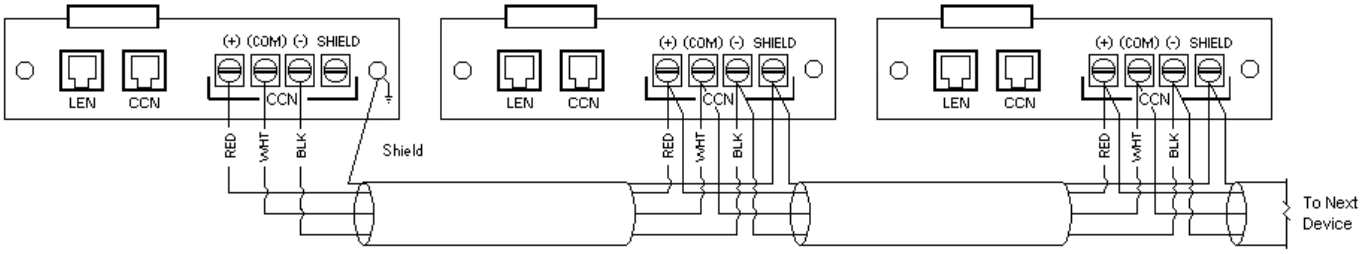


Fig. 29 — Carrier Controller CCN Communication Wiring

External Sensor Wiring

External sensors, such as a Space Temperature Sensor, must be wired to the unit if values are not communicated. The wiring should be CM or CMP rated depending on the application. Wiring is field supplied and installed. For wiring runs of less than 100 ft (30.5 m), 2-conductor, twisted pair, unshielded wire is acceptable. For wiring runs of 100 ft (30.5 m) or more, 2-conductor, twisted pair, shielded wire is recommended. For noise consideration, sensor wiring must be separate and not run in parallel with other wiring.

NOTE: Conductors and drain wire must be 20 AWG stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon®, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon® with a minimum operating temperature range of –4 to 140°F (–20 to 60°C) is required. High temperature applications may require a higher temperature range. Plenum applications will require plenum-rated cable. Cable voltage requirements must match the application.

Remote Alarm Relays

The 30RC chiller can be equipped with remote alarm annunciator contacts. Relay connected to these contacts must be rated for a maximum power draw of 10 va sealed, 25 va inrush at 24 volts.

The remote alarm annunciator relay, indicating that one circuit or the complete unit has been shut down, can be connected to TB5-14 and TB1. Refer to unit wiring diagrams.

CONFIGURATION (SOFTWARE)

Carrier Controller Operation Configuration Table

The Carrier Controller control system can be configured for a range of operating conditions and equipment arrangements. The following parameters should be configured based on unique system layout and operating requirements.

The system parameters may be configured through the Carrier Controller interface or remotely through the CCN. Table 13 shows the Carrier Controller configuration required to access the unit on the CCN. Figure 30 shows the CCN configuration screen.

Table 13 — Carrier Controller Identification Configuration Table

PATH	DISPLAY NAME	VALUE
Main Menu → ***Configuration Menu →*** ***Control Identification***	CCN Element Number	Default = 1
	CCN Bus Number	Default = 0
	CCN Baud Rate	Default = 9600

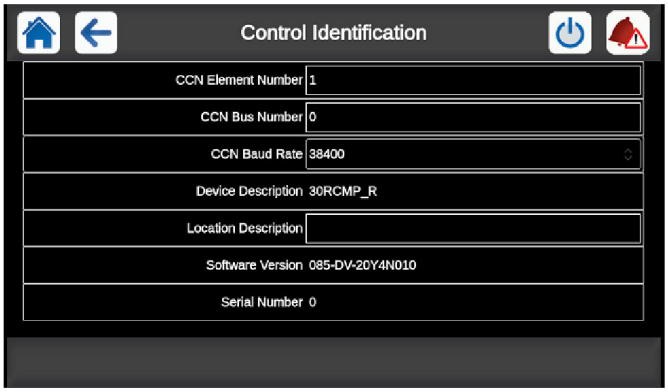


Fig. 30 — CCN Control Identification Screen

Carrier Controller Menu Tables

Carrier Controller operation is controlled by configuration information entered in the configuration tables listed in Tables 14-21. Access to different parameters may be available to all users (BASIC) or password-protected (USER, SERVICE, FACTORY). See Appendix A on page 121 for detailed descriptions of all control tables and parameters.

Table 14 — Main Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	GENUNIT	BASIC, USER, SERVICE, FACTORY[a]	General Parameters	
2	TEMP	BASIC, USER, SERVICE, FACTORY[a]	Temperatures	
3	PRESSURE	BASIC, USER, SERVICE, FACTORY[a]	Pressures	
4	INPUTS	BASIC, USER, SERVICE, FACTORY[a]	Inputs Status	
5	OUTPUTS	BASIC, USER, SERVICE, FACTORY[a]	Outputs Status	
6	PUMPSTAT	BASIC, USER, SERVICE, FACTORY[a]	Pump Status	
7	RUNTIME	BASIC, USER, SERVICE, FACTORY[a]	Run Times	
8	MODES	BASIC, USER, SERVICE, FACTORY[a]	Modes	
10	MSC_STAT	BASIC, USER, SERVICE, FACTORY[a]	Msc Status	
13	TRENDING	BASIC, USER, SERVICE, FACTORY[a]	Trendings	
14	SETPOINT	USER, SERVICE, FACTORY[b]	Setpoint Configuration	
15	CONFIG	USER, SERVICE, FACTORY[b]	Configuration Menu	
18	QCK_TST1	USER, SERVICE, FACTORY[b]	Quick Test #1	
19	QCK_TST2	SERVICE, FACTORY[c]	Quick Test #2	
20	MAINTAIN	SERVICE, FACTORY[c]	Maintenance Menu	

NOTE(S):

a. Minimum access level: Basic (no password required).
b. Minimum access level: User.
c. Minimum access level: Service.

Table 15 — Configuration Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	GENCONF	USER, SERVICE, FACTORY[a]	General Configuration	
2	PUMPCONF	USER, SERVICE, FACTORY[a]	Pump Configuration	
3	RESETCFG	USER, SERVICE, FACTORY[a]	Reset Configuration	
5	USERCONF	USER, SERVICE, FACTORY[a]	User Configuration	
6	HCCONFIG	USER, SERVICE, FACTORY[a]	Heat/Cool Config	
7	SCHEDULE	USER, SERVICE, FACTORY[a]	Schedule	
8	HOLIDAY	USER, SERVICE, FACTORY[a]	Holiday Menu	
9	DATETIME	USER, SERVICE, FACTORY[a]	Date/Time	
10	NETWORK	USER, SERVICE, FACTORY[a]	Network Menu	
11	CTRL_ID	USER, SERVICE, FACTORY[a]	Control Identification	
12	FACTORY	FACTORY[b]	Factory Parameters	
16	OPT_SEL	SERVICE, FACTORY[c]	Option Selection	
17	SERVICE1	SERVICE, FACTORY[c]	Service Parameters	
19	UPDTHOUR	SERVICE, FACTORY[c]	Running Hour Configuration	
20	MST_SLV	SERVICE, FACTORY[c]	Primary/Secondary	
21	CP_UNABL	SERVICE, FACTORY[c]	Compressors Unable	
22	MSC_SERV	SERVICE, FACTORY[c]	Msc Configuration	
23	ADD_OPT	USER, SERVICE, FACTORY[a]	Option Selection	

NOTE(S):
a. Minimum access level: Basic (no password required).
b. Minimum access level: Use.
c. Minimum access level: Factory.

Table 16 — Holiday Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	HOLDY_01	USER, SERVICE, FACTORY[a]	Holiday — HOLDY_01	
2	HOLDY_02	USER, SERVICE, FACTORY[a]	Holiday — HOLDY_02	
...	...	...	...	...
16	HOLDY_16	USER, SERVICE, FACTORY[a]	Holiday — HOLDY_16	

NOTE(S):
a. Minimum access level: User.

Table 17 — Schedule Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	OCCPC01S	USER, SERVICE, FACTORY[a]	OCCPC01S — Schedule Menu	
2	OCCPC02S	USER, SERVICE, FACTORY[a]	OCCPC02S — Schedule Menu	

NOTE(S):
a. Minimum access level: User.

Table 18 — Network Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	EMAILCFG	USER, SERVICE, FACTORY[a]	Email Configuration	
2	MODBUSRS	USER, SERVICE, FACTORY[a]	Modbus RTU Config.	
3	MODBUSIP	USER, SERVICE, FACTORY[a]	Modbus TCP/IP Config.	
4	BACNET	USER, SERVICE, FACTORY[a]	BACNet Standard Conf.	

NOTE(S):
a. Minimum access level: User.

Table 19 — Maintenance Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	LOADFACT	SERVICE	Capacity EXV Ctrl	
2	DRV_CTRL	SERVICE	Drive Maintenance	
3	M_MSTSLV	SERVICE	Primary/Secondary Main	
4	LAST_POR	SERVICE	Last PowerOn Reset	
5	PR_LIMIT	SERVICE	Protection Limit	
6	SERMAINT	SERVICE	Service Maintenance	
7	HEADCTRL	SERVICE	Head Control	

Table 20 — System Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	CPULOAD	USER, SERVICE, FACTORY[a]	CPU Load	
2	NETWORK	USER, SERVICE,FACTORY[a]	Network	
3	DATETIME	USER, SERVICE, FACTORY[a]	Date/Time	
4	LANGUNIT	USER, SERVICE,FACTORY[a]	Language & Unit	
5	BRIGHTNS	USER, SERVICE,FACTORY[a]	Brightness	
6	SWINFO	USER, SERVICE, FACTORY[a]	Software Info	
7	HWINFO	USER, SERVICE, FACTORY[a]	Hardware Info	
8	USB_LOG	SERVICE	USB Log	
9	NETDIAG	SERVICE	Network Diagnostic	
10	CLOUDIAG	SERVICE	Cloud Diagnostics	

NOTE(S):
a. Minimum access level: User.

Table 21 — Alarm Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	ALARMRST	USER, SERVICE, FACTORY[a]	Reset Alarms	
2	CUR_ALM	BASIC, USER, SERVICE, FACTORY[b]	Current Alarms	
3	ALMHIST1	BASIC, USER, SERVICE, FACTORY[b]	Alarm Historic	
4	ALMHIST2	BASIC, USER, SERVICE, FACTORY[b]	Major Alarm Historic	

NOTE(S):
a. Minimum access level: User.
b. Minimum access level: Basic (no password required).

Machine Control Methods

This term refers to how the machine is started and stopped. Several Machine Control Methods are available.

- Local On
- Local Schedule
- Network
- Remote
- Master (only visible when primary/secondary control is enabled)

The Carrier Controller Start/Stop button is used to select one of the above control types; see Fig. 31. Once the Start/Stop button is pressed, and assuming the unit is not running, the current start method will be indicated with a cursor. If the unit is running, then the only option available will be to switch to "Local Off." See Fig. 31 for details. In addition, when the unit is Off, the Local control type can be turned to "Local On" or "Local Schedule." If the Start/Stop button is green, then the unit is running. If the Start/Stop button is blue, then the unit is not running. If the button is flashing between green and blue, then the unit is preparing to start.

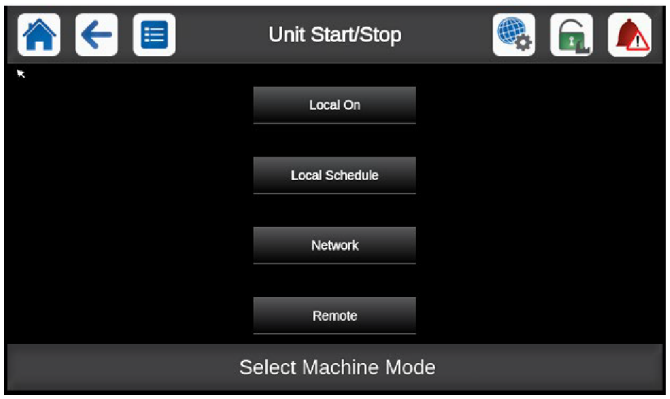


Fig. 31 — Machine Control Methods

LOCAL ON

With this mode selected, the unit is under local control and will be allowed to start. The unit will ignore the Remote Control Contacts and any network commands except Emergency Stop. Use this method if the unit is to run all the time without direction from a Building Management System or network.

LOCAL SCHEDULE

With this mode selected, the unit is under local control and will be allowed to start if Occupancy Schedule 1 (***Configuration Menu → Schedule Menu → OCCPC01S***) indicates the current time is within an occupied period. Otherwise, the unit will remain off. See Defining Occupancy Schedule on page 33 for details on configuring a local schedule. The unit will ignore the Remote Control Contacts and any network commands except Emergency Stop. Use this method if the unit is to run based on an occupancy schedule without direction from a Building Management System or network.

NETWORK

With this mode selected, the unit is under CCN, BACnet™ (if enabled), or ModBus® (if enabled) control and will be controlled by CCN, BACnet™ (if enabled), or ModBus® (if enabled) commands. The unit will ignore the Remote Control Contacts. Use this method if the unit is to run based on a Building Management System or network.

REMOTE

With this mode selected, the unit is under remote control and will be allowed to start if the Remote Contacts (TB5-9 and 10) are closed. The unit will ignore any network commands except Emergency Stop. Use this method if the unit is to operate the chiller via a contact closure from a Building Management System. The remote contacts are field-installed dry contacts that can be used to start and stop the chiller. The contacts must be capable of handling a 24 vac, 50 mA load. In Remote Unit Control Type and with the Remote Contact closed, the chiller is allowed to operate and respond to the scheduling configuration and setpoint data.

PRIMARY

With this mode selected, the unit is operating as the Primary unit of a 2-unit Primary Secondary Chiller Plant. The Primary unit can be started under Local On, Local Schedule, Network, or Remote. The exceptions noted for each of the control methods will still apply. Use this method if the unit is to run as the Primary unit.

Table 22 summarizes the available operating types.

Table 22 — Operating Types

MACHINE CONTROL TYPE	OPERATING TYPE	DESCRIPTION
Local Off	Local	The unit is under Local control method. It will remain halted and will ignore all CCN network commands and remote switch contacts.
Local On	Local	The unit is under Local control method and will be allowed to start. The control will ignore all remote control contacts and all CCN network force commands (except the Emergency Stop Command).
Local Schedule	Local	The unit is under Local control method and will be allowed to start if the schedule no. 1 is occupied (**CHIL_OCC**). Otherwise, the unit will remain off. The control will ignore all remote control contacts and all CCN network force commands (except the Emergency Stop Command).
Network	CCN	The unit is under CCN, BACnet™, or ModBus® control method and will be controlled by CCN, BACnet™, or ModBus® force commands. The control will ignore all remote control contacts.
Remote	Remote	The unit is under Remote control method and will be controlled by the start/stop. In this mode, no CCN force command can affect the unit control except the Emergency Stop Command.
Master	Master	The unit is configured as the master unit in a 2-unit master/secondary plant. The master unit control method can be done locally, remotely, or through CCN commands upon the primary/secondary configuration.

MACHINE CONTROL METHOD SELECTION

The Machine Control Method is selected through the Carrier Controller by pressing the Start/Stop button .

Start/Stop Selection Screen

The Carrier Controller Start/Stop button is a hotkey, and when pressed, opens the Start/Stop selection screen. and displays the list of Machine Control Methods if the unit is off (see Fig. 31), or Confirm Stop if the unit is on (see Fig. 32).

Start a Stopped Machine

If the unit is off, the Start/Stop button will be blue. Press the icon to display the list of operating modes and select the required mode. Once the unit has been started, the display will return to the home screen.

Stop a Running Machine

To stop a running unit, press the green Start/Stop button . For Machine Control Methods Local On or Master, confirm the unit shutdown by pressing Confirm Stop or cancel by pressing the Back button (see Fig. 32).

Fig. 32 — Confirm Stop

For Machine Control Method Local Schedule, press the Confirm Stop button to stop the machine or Back button to cancel (see Fig. 32).

For Machine Control Method Network, press the Confirm Stop button to stop the machine or Back button to cancel (see Fig. 32).

Once the unit has been stopped, the Home screen is displayed.

If the unit is running, then pressing the Start/Stop button displays a screen with a Confirm Stop button (see Fig. 32), which when pressed changes the chiller to Local Off mode. If the unit is Off, pressing the Start/Stop button shows a list of operating types with the currently selected type corresponding to the last running operating type (refer to Fig. 31).

MACHINE ON/OFF FUNCTION

The machine operating state can be viewed by going to ***Main Menu → General Parameters → Run Status***. Table 23 summarizes possible unit states.

Table 23 — Unit States

STATE	DESCRIPTION
Off	Unit is commanded to be off (stopped manually).
Stopping	Unit is currently stopping (after a manual, emergency, or shutdown request). Next state will be Off.
Delay	Unit is in delay at start-up (waiting for the end of the On/Off delay to be reached). Next state will be Running.
Running	Unit compressor capacity is more than 0% (unit has started running).
Ready	Unit compressor capacity is 0%. Unit is ready to start.
Override	The compressor cannot start because of an override (SST, SCT, etc.).
Tripout	Unit is Off (down) due to an alarm.
Test	Unit is in Quick Test mode.

NOTE(S):
a. The control type and the unit state determine the actual running state of the unit.

Table 24 summarizes the unit control method and stop or go status with regard to the following parameters set in the Carrier Controller module:

- Machine Control Method: Machine Control Method as selected on the unit Start/Stop screen.
- **CHIL_S_S**: Current CCN chiller start/stop force command (enable/disable) (***Main Menu → General Parameters → Net:Cmd Start/Stop***)
- **ONOFF_SW**: Start-stop contact status when unit is under remote operating type (***Main Menu → Inputs → Remote On/Off Switch***).
- **CHIL_OCC**: Chiller occupied state. If the occupancy override input switch is closed, then the chiller remains occupied regardless of the setpoint scheduled selection (***Main Menu → General Parameters → Net:Cmd Occupied***).
- **MS_CTRL**: Primary/Secondary control type. This parameter status will determine if the primary unit is going to be controlled locally, remotely, or through Network (***Main Menu → Maintenance Menu → Primary/Secondary Main,* 0 = Disabled, 1 = Primary, 2 = Secondary**).
- **EMSTOP**: CCN emergency stop command (enable/disable) (***Main Menu → General Parameters → Emergency Stop***).
- Alarm shutdown: Unit is totally stopped due to alarm.

The Machine Control Method and Parameter Status combinations listed in Table 24 will determine the actual unit running state.

NOTE: When changing from one Machine Control Method (Local On, Local Schedule, Network, Remote, or Master) to another, the unit will observe a transition through the Off state before being allowed to start again. At this time the on-to-off delay is always applied.

Table 24 — Start/Stop Control

ACTIVE OPERATING TYPE						PARAMETERS STATUS						CONTROL TYPE	UNIT STATE
Local Off	Local On	Local Schedule	Remote	Network	Master Unit	Start/Stop Force Command	Remote Start/Stop Contact	Master Control Type	Start/Stop Time Schedule	Network Emergency Shutdown	General Alarm		
—	—	—	—	—	—	—	—	—	—	Enabled	—	—	Off
—	—	—	—	—	—	—	—	—	—	—	Yes	—	Off
Active	—	—	—	—	—	—	—	—	—	—	—	Local	Off
—	—	Active	—	—	—	—	—	—	Unoccupied	—	—	Local	Off
—	—	—	Active	—	—	—	Open	—	—	—	—	Remote	Off
—	—	—	Active	—	—	—	—	—	Unoccupied	—	—	Remote	Off
—	—	—	—	Active	—	Disabled	—	—	—	—	—	Network	Off
—	—	—	—	Active	—	—	—	—	Unoccupied	—	—	Network	Off
—	—	—	—	—	Active	—	—	Local	Unoccupied	—	—	Local	Off
—	—	—	—	—	Active	—	Open	Remote	—	—	—	Remote	Off
—	—	—	—	—	Active	—	—	Remote	Unoccupied	—	—	Remote	Off
—	—	—	—	—	Active	Disabled	—	Network	—	—	—	Network	Off
—	—	—	—	—	Active	—	—	Network	Unoccupied	—	—	Network	Off
—	Active	—	—	—	—	—	—	—	—	Disabled	No	Local	On
—	—	Active	—	—	—	—	—	—	Occupied	Disabled	No	Local	On
—	—	—	Active	—	—	—	Closed	—	Occupied	Disabled	No	Remote	On
—	—	—	—	Active	—	Enabled	—	—	Occupied	Disabled	No	Network	On
—	—	—	—	—	Active	—	—	Local	Occupied	Disabled	No	Local	On
—	—	—	—	—	Active	—	Closed	Remote	Occupied	Disabled	No	Remote	On
—	—	—	—	—	Active	Enabled	—	Network	Occupied	Disabled	No	Network	On

Chilled Water Setpoint Configuration

The chilled water setpoint and fluid type configuration will determine the chiller operating conditions.

FLUID SETPOINT CONTROL LOCATION

The factory default for the chilled water fluid setpoint is to control to the leaving water temperature. An option to configure the machine for entering water control is available. To configure this option go to ***Main Menu → Configuration Menu → General Configuration***. The default for Entering Fluid Control is No (leaving fluid control is the default condition). To enable Entering Water Control, change Entering Fluid Control to Yes. Entering Water Control is recommended for constant flow applications only.

COOLING SETPOINT SELECTION

The Control Point (shown in the upper right corner of the Home Screen, or ***Main Menu → General Parameters → Control Point***) represents the water temperature that the unit must produce. The unit will vary the capacity depending on the load conditions in order to satisfy the setpoint. The Control Point (**CTRL_PNT**) is calculated based on the Active Setpoint (***Main Menu→ General Parameters***) and the reset calculation, where Control Point = Current Setpoint + Temperature Reset. (See "Temperature Reset" on page 46.) Control Point can be written to by the Building Management System, instead of the setpoint calculation, only if Network is selected as the Machine Control Method for the unit. See ***Main Menu → General Parameters,*** **Local = 0, Net. = 1, Remote = 2** to verify operating type.

DEFINING SETPOINTS

The cooling setpoints are set via the Setpoint Table (***Main Menu → Setpoint Configuration***). Cooling Setpoint 1, Cooling Setpoint 2, and Cooling Ice Setpoint are temperature setpoints that are available as the Current Setpoint for unit operation. These setpoints are limited by the type of fluid in the system (see Table 25).

See the Ice Storage Operation section on page 54 for more details about the Cooling Ice Setpoint. To utilize Ice Storage Operation, the chiller must operate in low LWT conditions and must be factory-installed with the brine application option (H in position 11 of the unit model number). Chillers with brine application option are factory charged with lower refrigerant, as well as increased oil for R-32 chillers.

All default setpoints are based on Leaving Water Control (Entering Fluid Control, EWTO [Entering Water Temperature Offset] set to No). Values must be confirmed for the individual setpoints. Limits for the setpoints are listed in Table 25. These values depend on the Evaporator Fluid Type and the Brine Freeze Setpoint (see Chilled Water Fluid Type Selection on page 34).

Table 25 — Evaporator Fluid Setpoint Limits

SETPOINT LIMITS	EVAPORATOR FLUID TYPE (flui_typ)	
	1 = Water[a]	3 = Low Brine
Minimum[b]	40°F (4.4°C)	15°F (–9.4°C)
Maximum	70°F (21.1°C)	70°F (21.1°C)

NOTE(S):
a. The minimum cooling setpoint may be lowered to 38°F (3.3°C) for Fluid Type 1 if the chiller is used in comfort cooling applications and there is a suitable inhibited antifreeze solution present in the chilled water loop.
b. The minimum setpoint for brine applications is related to the brine freeze setpoint. The setpoint is limited to be no less than the brine freeze setpoint + 4°F (2.2°C).

CURRENT OPERATING SETPOINT

Depending on the current operation type, the active setpoint can be selected manually in the Main Menu, with the dry user contacts or with network commands (CCN, BACnet™, or ModBus®) or automatically with the setpoint time schedule (Occupancy Schedule 2).

Setpoints can be selected manually through the main interface when the unit is in Local operating type, through contacts when the unit is in Remote operating type, or through the RS485 bus when unit is in CCN mode.

Setpoints can also be selected automatically through a setpoint time schedule: when the period is occupied, Cooling Setpoint 1 will be activated, and when the period is Unoccupied, Cooling Setpoint 2 will be active. When in local operating type, time schedule is available if the Setpoint Select Variable is set to AUTO (see below). In remote operating type, the AUTO mode will be available unless the dual setpoint control through contacts has already been selected. In Network mode, the setpoint can be forced through the **SP_OCC** CCN point (0 = Occupied = Cooling Setpoint 1, 1 = Unoccupied = Cooling Setpoint 2).

Setpoint selection offers 3 different control options (***Main Menu → General Parameters → Setpoint Select***): Auto, Setpoint 1, and Setpoint 2.

- 0 = Auto: The active cooling setpoint will be determined by the configured Occupancy Schedules. See the Defining Occupancy Schedule section for details on setting the schedules. Depending on the Ice Storage configuration and ice contact state, the active setpoint may alternately be set to the Cooling Ice Setpoint.
- 1 = Setpoint 1: The active cooling setpoint will be Cooling Setpoint 1 defined in the setpoint table.
- 2 = Setpoint 2: The active cooling setpoint will be Cooling Setpoint 2 defined in the setpoint table. Depending on the Ice Storage configuration and ice contact state, the active setpoint may alternately be set to the Cooling Ice Setpoint.

SETPOINT OCCUPANCY

Setpoint Occupancy is the default configuration for the Setpoint Select variable. When Setpoint Select (***Main Menu → General Parameters → Setpoint Select***) is configured to 0 (Auto), the unit's active setpoint is based on the programmed occupancy schedules. Under Time Schedule 1 (**OCCPC01S**), the unit controls to Cooling Setpoint 1 (**CSP1**) during the occupied periods. If the Time Schedule 2 (**OCCPC02S**) is in use, the unit's active setpoint is based on Cooling Setpoint 1 (**CSP1**) (***Main Menu → Setpoint Configuration → Cooling Setpoint 1***) during the occupied period and Cooling Setpoint 2 (**CSP2**) (***Main Menu → Setpoint Configuration → Cooling Setpoint 2***) during the unoccupied period. The 2 schedules are used together to determine periods when the chiller will be controlling to Setpoint 1, Setpoint 2, or Off. See Table 26 for details on how the active cooling setpoint is determined based on unit operating type and parameter settings.

Table 26 — Active Cooling Setpoint Parameters

Operating Type	Setpoint Selection	Ice Storage Configuration	Ice Done Contact	Setpoint Switch	Schedule 2 Status	Active Setpoint
Local/ Local Schedule	sp-1	Default	Any configuration	Any configuration	Default	csp1
	sp-2	No	Any configuration	Any configuration	Default	csp2
	sp-2	Yes	Close	Any configuration	—	csp2
	sp-2	Yes	Open	Any configuration	—	Ice_sp
	Auto	Default	Any configuration	Any configuration	Occupied	csp1
	Auto	No	Any configuration	Any configuration	Unoccupied	csp2
	Auto	Yes	Close	Any configuration	Unoccupied	csp2
	Auto	Yes	Open	Any configuration	Unoccupied	Ice_sp
Remote	Default	Default	Any configuration	Open	Default	csp1
	Default	No	Any configuration	Close	Default	csp2
	—	Yes	Close	Close	—	csp2
	Default	Yes	Open	Close	Default	Ice_sp
Network	Default	Default	Any configuration	Any configuration	Occupied	csp1
	Default	No	Any configuration	Any configuration	Unoccupied	csp2
	Default	Yes	Close	Any configuration	Unoccupied	csp2
	Default	Yes	Open	Any configuration	Unoccupied	Ice_sp

LEGEND

csp1 — Cooling Setpoint 1
csp2 — Cooling Setpoint 2
Ice_sp — Cooling Ice Setpoint

DEFINING OCCUPANCY SCHEDULE

Two internal Time Schedules are available and must be field programmed. Occupancy Schedule 1 (**OCCPC01S**) is used for single setpoint On/Off control. Occupancy Schedule 2 (**OCCPC02S**) is used in combination with **OCCPC01S** for dual setpoint On/Off and Occupied/Unoccupied setpoint control. To access the Schedule screens, go to ***Main Menu → Configuration Menu → Schedule Menu***.

If the chiller is to be controlled to a single setpoint, use Schedule 1 (**OCCPC01S**). This type of schedule will start and stop the machine only. During the unoccupied times, the chiller will be off. The unit start/stop schedule **OCCPC01S** has a default setting of always occupied. If the chiller is to be controlled to 2 setpoints, occupied and unoccupied, also use Schedule 2 (**OCCPC02S**). Cooling Setpoint 1 will be active during occupied periods, and Cooling Setpoint 2 will be active during unoccupied periods.

To set the occupancy schedules, select **OCCPC01S** or **OCCPC02S** and select the applicable days for the displayed time schedule period. The selected period will be displayed as a green band on the timeline. Press the Save button to confirm or the Cancel button to cancel changes. See Fig. 33.

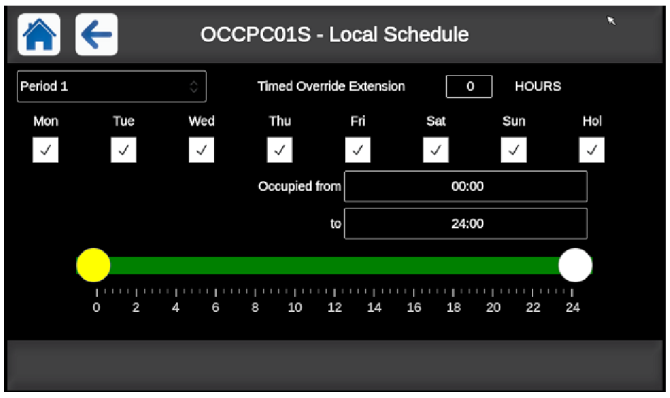


Fig. 33 — Schedule Menu

The schedules consist of 8 user-configurable occupied time periods. The control supports time schedules for local control, remote control, and ice building. These time periods can be flagged to be in effect or not in effect on each day of the week. The day begins at 00:00 and ends at 24:00. The machine is in unoccupied mode unless a scheduled time period is in effect. If an occupied period is to extend past midnight, the occupied period must end at 24:00 hours (midnight) and a new occupied period must be programmed to begin at 00:00 hours.

In the example in Table 27, an early morning pulldown time period is scheduled for Monday morning from 12:00 AM to 3:00 AM. The occupied period starts at 7:00 AM, Monday through Saturday. The occupied time ends at 6:00 PM on Monday and Tuesday, 9:30 PM on Wednesday, 5:00 PM on Thursday and Friday, and 12:00 PM on Saturday.

NOTE: This example schedule was designed to illustrate the programming of the schedule function and is not intended as a recommended schedule for chiller operation.

Holiday Schedule

The unit control allows up to 16 holiday periods. Each holiday period is defined by 3 parameters: the month, the start day, and the duration of the holiday period. During the holiday periods, the controller will be in occupied or unoccupied mode, depending on the periods validated as holidays. The Holiday Configuration Table is accessed by ***Main Menu → Configuration Menu → Holiday Menu***. Select one of the 16 available Holiday periods (**HOLDY_01** through **HOLDY_16**) to define the holiday.

Table 27 — Example Configuring Schedules

ITEM	VALUE	PATH
Period 1		
Occupied from	00:00	***Main Menu → Configuration Menu → Schedule Menu → OCCPC01S or OCCPC02S → Page 1***
Occupied to	03:00	
Monday Select	Yes	
Tuesday Select	No	
Wednesday Select	No	
Thursday Select	No	
Friday Select	No	
Saturday Select	No	
Sunday Select	No	
Holiday Select	No	
Period 2		
Occupied from	07:00	***Main Menu → Configuration Menu → Schedule Menu → OCCPC01S or OCCPC02S → Page 2***
Occupied to	18:00	
Monday Select	Yes	
Tuesday Select	Yes	
Wednesday Select	No	
Thursday Select	No	
Friday Select	No	
Saturday Select	No	
Sunday Select	No	
Holiday Select	No	
Period 3		
Occupied from	07:00	***Main Menu → Configuration Menu → Schedule Menu → OCCPC01S or OCCPC02S → Page 3***
Occupied to	21:30	
Monday Select	No	
Tuesday Select	No	
Wednesday Select	Yes	
Thursday Select	No	
Friday Select	No	
Saturday Select	No	
Sunday Select	No	
Holiday Select	No	
Period 4		
Occupied from	07:00	***Main Menu → Configuration Menu → Schedule Menu → OCCPC01S or OCCPC02S → Page 4***
Occupied to	17:00	
Monday Select	No	
Tuesday Select	No	
Wednesday Select	No	
Thursday Select	Yes	
Friday Select	Yes	
Saturday Select	No	
Sunday Select	No	
Holiday Select	No	
Period 5		
Occupied from	07:00	***Main Menu → Configuration Menu → Schedule Menu → OCCPC01S or OCCPC02S → Page 5***
Occupied to	12:00	
Monday Select	No	
Tuesday Select	No	
Wednesday Select	No	
Thursday Select	No	
Friday Select	No	
Saturday Select	Yes	
Sunday Select	No	
Holiday Select	No	

CARRIER COMFORT NETWORK® (CCN) CONTROL

To operate under this control, Network must be selected under the Select Machine Mode accessed by pressing the Start/Stop button (see Machine Control Methods on page 29). An external CCN device, such as ChillerVu™, controls the On/Off state of the machine. Careful evaluation of Chilled Water Plant control is necessary. In the event Local Control is established, be sure that all pumps, valves, and other devices are capable of operating properly. In the event of a loss of communication with the network, the machine will start and be controlled locally. The CCN device forces the variable **CHIL_S_S** to control the chiller. The Unit Run Status (***Main Menu → General Parameters → Run Status***) will indicate the current status of the machine (OFF, RUNNING, STOPPING, or DELAY), depending on the CCN command. The unit Occupied status (***Main Menu → General Parameters***) will indicate the current occupied state according to the CCN command and will be displayed as either NO or YES. The Unit Control Type (**CTRL_TYP**) will be LOCAL OFF when the Start/Stop button is Off. If the unit is in Network mode, the Unit Control Type will be Network when the **CHIL_S_S** variable is Stop or Start. For dual chiller control applications, the secondary chiller must be enabled using the Network control option.

CHILLED WATER FLUID TYPE SELECTION

The chilled water fluid type must be configured to obtain the proper leaving water setpoint control range and freeze protection. The Evaporator Fluid Type (**FLUI_TYP**) (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) can be set to Water or Low Brine.

To configure this option:

DISPLAY NAME	VALUE	SETPOINT RANGE	PATH
Evaporator Fluid Type	1 = Water	40 to 70°F (4.4 to 21.1°C)	***Main Menu → Configuration Menu → Factory Parameters***
	3 = Low Brine	15 to 70°F (–9.4 to 21.1°C)	

Comfort Cooling Application

Configure the unit Evaporator Fluid Type to Water for units without brine or glycol installed in the chilled water loop. The factory default fluid type is Water. This option will allow for a water temperature setpoint range of 40 to 70°F (4.4 to 21.1°C). With Water as the selection, the freeze point is fixed at 34°F (1.1°C).

The cooling setpoint and freeze point may be lowered to 38°F (3.3°C) and 32°F (0°C), respectively, for Fluid Type 1 if there is a suitable inhibited antifreeze solution present in the chilled water loop.

Process Cooling Application

For units intended for process cooling and low leaving water temperatures, configure the unit Evaporator Fluid Type to Low Brine, "3". These units must have brine or glycol added to the chilled water loop. The Low Brine option will allow for a setpoint temperature down to 15°F (–9.4°C).

See prior chart for temperature limits for brine options.

Before making this selection, confirm suitable antifreeze has been added and is of sufficient concentration to protect the loop. In addition, the Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Parameters → Brine Freeze Setpoint***) must be set for proper freeze protection operation. Set the Brine Freeze Setpoint to the freeze protection provided by the antifreeze concentration. This value will be the freeze point of the fluid.

Evaporator Pump Control

Evaporator pump control is required on all units unless the chilled water pump runs continuously or the chilled water system contains a suitable antifreeze solution. For units supplied with the pump option, this is set up from the factory. Internal pumps can be configured using ***Main Menu → Configuration Menu → Factory Parameters → Factory Water Pump*** or ***Factory Dual Water Pump***. The 30RC units can be configured for single or dual external evaporator pump control with the standard controls. In addition to the pumps, all wiring, including connections to the pump contactor and a feedback circuit from the contactor, must be field supplied. Table 28 summarizes evaporator pump configuration parameters. Figure 34 shows the wiring.

Table 28 — Evaporator Pump Configuration Parameters

DISPLAY NAME	VALUE	PATH
Evaporator Pumps Sequence	0 = No Pump (Default) 1 = One Pump Only 2 = Two Pumps Auto 3 = Pump no. 1 Manual 4 = Pump no. 2 Manual	***Main Menu→ Configuration Menu→ Pump Parameters***
Pump Auto Rotation Delay	Default: 48 hrs. (Range 24 to 3000 hrs.)	
Pump Sticking Protection	Default: No	
Stop Pump During Standby	Default: No	
Flow Checked If Pump Off	Default: Yes	

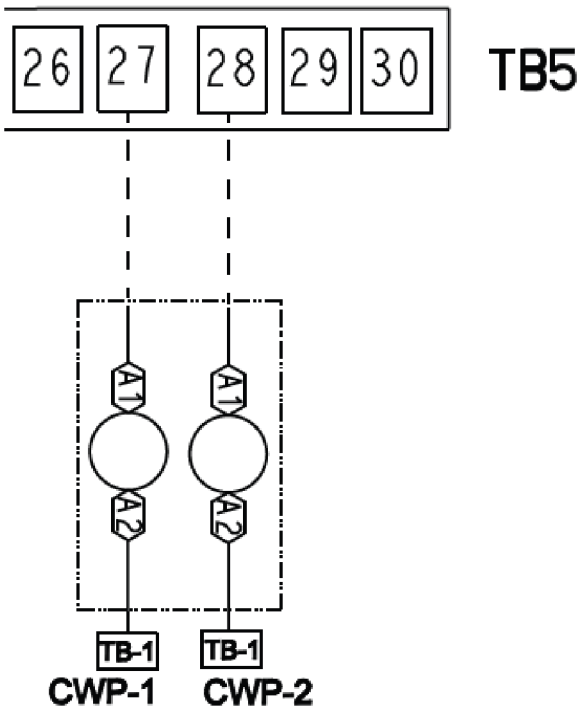


Fig. 34 — Wiring for Evaporator Pump Control

PUMP SELECTION

The Evaporator Pump Sequence mode can be reached by following ***Main Menu → Configuration Menu → Pump Configuration***. The available settings are:

- 0 = No Pump: The evaporator pump will not be controlled by the chiller. Default setting for units without factory-installed hydronic package.
- 1 = One Pump Only: Single factory-supplied pump or single remote pump. Default setting for units with single factory-installed pump.
- 2 = Two Pump Auto: When 2 pumps are selected in auto mode, only one pump will be allowed to run at a time and the control will determine the On/Off state of each pump. Default setting for units with dual factory-installed pumps. The control will start the pumps and automatically alternate their operation to even the wear on them, based on the hours configured under Pump Auto Rotation Delay (***Main Menu → Configuration Menu → Pump Configuration → Pump Auto Rotation Delay***). If the difference between the operating hours of the 2 pumps exceeds the Pump Auto Rotation Delay, then the lead pump will change. If a flow failure is detected, the other pump will attempt to start. If the unit is in the Network control type and pump rotation (***Main Menu → Pump Status → Rotate Water Pumps Now?***) is set to "yes" in the Pump Status menu, then the pump changeover will take place when no compressor is running, including secondary units. Please remember that 2 pumps cannot be forced at the same time.
- 3 = Pump No. 1 Manual: Pump No. 1 will be the active pump.
- 4 = Pump No. 2 Manual: Pump No. 2 will be the active pump.

For all Evaporator Pumps Sequence settings (including 0 = No Pump), proof of flow from the chilled water flow switch (CWFS) and closure of the pump interlock contact (connected across TB-5 terminals 1 and 2) are required. When the Evaporator Pumps Sequence is configured, the evaporator pump output will be energized when the chiller enters an ON state. The evaporator pump output is also energized when certain alarms are generated. The evaporator pump output should be used as an override to the external pump control if evaporator pump control is not utilized. The evaporator pump output is energized if a 10001 Water Exchanger Freeze Protection alarm is generated, which provides additional freeze protection if the system is not protected with a suitable antifreeze solution.

If the Primary/Secondary function is not active for the chiller, or if the Primary/Secondary function is active and the unit is the lead, then the pump will be turned on when the unit is in the On, Stopping, or Delay state, as well as in the case of the quick test request. In addition, when the unit is turned off, the pump will continue operating for 1 minute after the last compressor is turned off. The pump will be turned on when requested by the evaporator heater function (see the Freeze Protection section on page 85).

Regardless of the evaporator pump control option selected, if the chilled water flow switch does not close within the MINUTES OFF TIME (***Main Menu → Configuration Menu → General Configuration → Unit Off to On Delay***) period after the unit is enabled and in an ON mode, alarm 10014 will be generated. Other conditions which will trigger this alarm include:

- Chilled water flow switch is open for at least 40 seconds during chiller operation.
- Evaporator pump control is enabled and the chilled water flow switch is closed for more than 1 minute following a command to shut down the pump.

The last alarm criterion can be disabled. If Flow Checked if Pump Off (***Main Menu → Configuration Menu → Pump Configuration → Flow Checked if Pump Off***) is set to NO, then the control will ignore the chilled water flow switch input if the evaporator pump output is OFF.

FACTORY-SUPPLIED PUMPS

Pumps supplied by the factory are piped in a parallel arrangement. Dual pump hydronic packages have the option to be driven by variable speed drives, one VFD per pump. Otherwise, factory supplied pumps will be fixed speed. For the hydronic package with VFD, the sensorless control based in the VFD is used to determine the speed of the active pump. The chiller control is only used for starting and stopping the pump system.

PERIODIC PUMP QUICK START

The control system has the ability to start the pumps periodically to maintain bearing lubrication and seal integrity. This function will be used when the unit is stopped for a long time period (e.g., during the winter season). If Pump Sticking Protection (***Main Menu → Configuration Menu → Pump Configuration → Pump Sticking Protection***) is set to YES, and if the unit is off at 2:00 PM, then a pump will be started once each day for 2 seconds. If the unit has 2 pumps, then Pump 1 will be started on even days (such as day 2, 4, or 6 of the month); Pump 2 will be started on odd days (such as day 1, 3 or 5 of the month). The default for this option is NO.

PUMP ECO MODE

This feature allows the pump to stop when cooling is not required. The pump will start for a brief time to circulate water through the loop for a reliable water temperature reading. This reading is used to determine if additional cooling is required. The on/off times are configurable per the menu in Appendix A on page 139. This feature can be enabled/disabled on the same menu.

PRIMARY/SECONDARY CHILLER PUMP OPERATION

If the Primary/Secondary function is active, and if the chiller is the lag unit, then the pump will be turned on when the unit is in On mode and if the unit active lag demand limit is greater than 1%. Otherwise, the pump will be stopped 30 seconds after the last compressor is turned off. However, if the lag unit pump has been configured to run even if the unit is commanded to stop (***Main Menu → Configuration Menu → Primary/Secondary → Lag Unit Pump Control*** **= 1, Run if Unit Stops**) then the above condition will be ignored and the lag pump will run all the time.

CHILLED WATER FLOW SWITCH STATUS

If Flow Checked if Pump Off (***Main Menu → Configuration Menu → Pump Configuration → Flow Checked if Pump Off***) is set to YES, then the control will monitor chilled water flow switch status and will send an alarm if pump is commanded off and chilled water flow switch is closed. This can provide the user with information about a faulty evaporator pump contactor or a failed chilled water flow switch. This parameter should be set to NO for series flow machines. The factory default for this item is YES.

MANUAL OPERATION

The evaporator pumps can be forced ON through the CCN when the chiller is off. This allows the unit to run with no delay and for an unlimited length of time for flow rate calculations when the unit is installed on site. Manual operation of the pumps is controlled through CCN points PUMPSTAT_PUMP_1 (***Main Menu → Pump Status → Water Pump #1 Command***) and PUMPSTAT_PUMP_2 (***Main Menu → Pump Status → Water Pump #2 Command)***. If equipped with dual pumps, it is not possible to force both pumps ON at the same time.

Capacity Control

The control system cycles compressors and minimum load valve solenoid or digital compressor (if equipped) to maintain the user-configured leaving chilled fluid temperature setpoint. The optional hot gas bypass or digital compressor is only available on Circuit A. Entering fluid temperature is used by the CIOB-A board to determine the temperature drop across the evaporator and is used in determining the optimum time to add or subtract capacity stages. Entering fluid temperature, space temperature (requires additional sensor), or outdoor-air temperature reset features can automatically reset the leaving chilled fluid temperature setpoint. It can also be reset from an external 4 to 20-mA signal.

The control has an automatic lead-lag feature built in for circuit and compressor starts. If enabled, the control will determine which circuit (***Main Menu → Configuration Menu → General Configuration→ Cir Priority Sequence***) and compressor to start to even the wear. The compressor wear factor (combination of starts and run hours) is used to determine which compressor starts.

$$\text{Compressor Wear Factor} = \left(\text{Compressor Starts}\right) + 0.1\left(\text{Compressor Run Hours}\right)$$

In this case, the circuit with the lowest average compressor wear factor (the average of the wear factors of all available compressors in the circuit) is the circuit that starts first. The compressor within the circuit with the lowest wear factor is the first to start. If the automatic lead-lag function for the circuit is not enabled (***Main Menu→ Configuration Menu→ General Configuration→ Cir Priority Sequence*** **= 1** [Circuit A leads] or **2** [Circuit B leads]), then the selected circuit will be the first to start. Again, the compressor with the lowest wear factor within the circuit will be the first to start. If Hot Gas Bypass is enabled (***Main Menu→ Configuration Menu→ Factory Parameters→ Hot Gas Bypass Selection*** = **Yes**), then the valve will be operational only during the last stage of cooling.

Once the lead compressor has been started, the lag compressors will be determined by the wear factor and loading sequence selected. If equal loading is selected, (***Main Menu→ Configuration Menu→ General Configuration→ Staged Loading Sequence*** = **No**), then the remaining circuit will start next, with the compressor with the lowest wear factor starting. The control will attempt to keep both circuits at approximately the same number of compressors ON. For this option to function properly, both circuits must have the same number of compressors available. If a circuit compressor is not available due to an alarm condition or demand limit, then the capacity staging will change to staged. If staged loading is selected, (***Main Menu→ Configuration Menu→ General Configuration→ Stage Loading Sequence*** = **Yes**), the started circuit will continue to turn on compressors according to the lowest wear factor until all are on, then start the remaining circuit(s).

The electronic expansion valves provide a controlled start-up. During start-up, the low pressure logic in the lead circuit will be ignored for 30 seconds to allow for the transient changes during start-up. As additional stages of compression are required, the processor control will add them. The following example is based on a 30RC 150 machine, which has three 25 ton compressors in each circuit. See Table 29.

Table 29 — Compressor Starts and Run Hours

COMPRESSOR	STARTS	RUN HOURS	WEAR FACTOR	CIRCUIT AVERAGE WEAR FACTOR
A1	25	249	49.9	44.8
A2	22	237	45.7	44.8
B1	41	453	86.3	67.6
B2	38	138	51.8	67.6

Each example below has different configurations and is intended to illustrate the loading sequences possible for normal operation.

In Example 1 (Table 30), assume the following configurations are in place:

- ***Main Menu → Configuration Menu → Factory Parameters→ Hot Gas Bypass Selection*** = **Yes**
- Hot Gas Bypass installed and enabled before turning off the last Circuit A compressor only
- ***Main Menu → Configuration Menu → General Configuration → Staged Loading Sequence*** = **No**
- Equal Circuit Loading
- ***Main Menu → Configuration Menu → General Configuration → Cir Priority Sequence*** = **1**
- Circuit A Leads

Since Hot Gas Bypass is enabled and Hot Gas Bypass Selection (HGBP) is only available on Circuit A, it will be the lead circuit. Within the circuit, compressor A2 has the lowest wear factor and will start first with Hot Gas Bypass OFF. Stage 2 will start a compressor in the same circuit because of the Staged Circuit Loading configuration. After that, compressor A1 will be next to start. Since all compressors in Circuit A are ON, the next stage will start Circuit B, and the compressor with the lowest wear factor is B2. All Circuit B compressors will be started in the same manner as Circuit A. The process continues until all compressors are ON. If circuit capacity is to be reduced, the compressor with the highest wear factor in the lag circuit will be shut off first (in most cases). With Staged Circuit Loading, stages will be removed from the same circuit, following the same criteria used in the loading sequence but in the opposite order. With Hot Gas Bypass enabled, the last stage will be only one compressor with HGBP.

In Example 2 (Table 31), assume the compressor starts and run hours are the same as in the previous example and the following configurations are in place:

- ***Main Menu → Configuration Menu → Factory Parameters → Hot Gas Bypass Selection*** = **Yes**
- Hot Gas Bypass installed and enabled before turning off the last Circuit A compressor only
- ***Main Menu → Configuration Menu → General Configuration → Staged Loading Sequence*** = **Yes**
- Staged Circuit Loading
- ***Main Menu → Configuration Menu → General Configuration → Cir Priority Sequence*** = **1**
- Circuit A Leads

Since Hot Gas Bypass is enabled and HGBP is only available on Circuit A, it will be the lead circuit. Within the circuit, compressor A2 has the lowest wear factor and will start first with Hot Gas Bypass OFF. Stage 2 will start a compressor in the same circuit because of the Staged Circuit Loading configuration. After that, compressor A1 will be next to start. Since all compressors in Circuit A are ON, the next stage will start Circuit B, and the compressor with the lowest wear factor is B2. All Circuit B compressors will be started in the same manner as Circuit A. The process continues until all compressors are ON (Table 31). If the circuit capacity is to be reduced, the compressor with the highest wear factor in the lag circuit will be shut off first (in most cases). With Staged Circuit Loading, stages will be removed from the same circuit, following the same criteria used in the loading sequence but in the opposite order. With Hot Gas Bypass enabled, the last stage will be only one compressor with HGBP.

Table 30 — Compressor Stages and Circuit Cycling, Example 1[a,b]

STAGE	TOTAL CAP.	CIRCUIT A				CIRCUIT B		
		Cir. Cap.	HGBP[c]	A1	A2	Cir. Cap.	B1	B2
0	0	0				0		
LAST	12	24	X		X	0		
1	25	50			X	0		
2	50	50			X	50		X
3	75	100		X	X	50		X
4	100	100		X	X	100	X	X

NOTE(S):
a. Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.
b. Example is to determine minimum load control, equal circuit loading, and Circuit A leads select.
c. Hot Gas Bypass is only available as last stage of capacity during de-staging and bypassed during chiller start-up.

LEGEND
HGBP — Hot Gas Bypass

Table 31 — Compressor Stages and Circuit Cycling, Example 2[a,b]

STAGE	TOTAL CAP.	CIRCUIT A				CIRCUIT B		
		Cir. Cap.	HGBP[c]	A1	A2	Cir. Cap.	B1	B2
0	0	0				0		
LAST	12	24	X		X	0		
1	25	50			X	0		
2	50	50		X	X	50		
3	75	100		X	X	50		X
4	100	100		X	X	100	X	X

NOTE(S):
a. Total Cap. (Total Unit Capacity) and Cir. Cap. (Circuit Capacity) are approximate percentage values.
b. Example is to determine minimum load control, equal circuit loading, and Circuit A leads select.
c. Hot Gas Bypass is only available as last stage of capacity during de-staging and bypassed during chiller start-up.

LEGEND
HGBP — Hot Gas Bypass

CAPACITY CONTROL OVERRIDES

The following capacity control overrides (***Main Menu → Maintenance Menu → Capacity Control***) will modify the normal operation routine. If any of the following override conditions listed below is satisfied, it will determine the capacity change instead of the normal control.

Override No. 1: Cooler Freeze Protection

This override attempts to avoid the freeze protection alarm. If the Leaving Water Temperature is less than Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) + 2.0°F (1.1°C), then remove a stage of capacity.

NOTE: The freeze setpoint is 34°F (1.1°C) for comfort cooling units with fresh water. The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) is set to 1. The freeze setpoint is Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Point***) for Low Temperature Brine (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type* = 3**).

Override No. 2: Circuit A Low Saturated Suction Temperature in Cooling

Override No. 3: Circuit B Low Saturated Suction Temperature in Cooling

These overrides attempt to avoid the low suction temperature alarms. This override is active only when more than one compressor in a circuit is ON. If the Saturated Suction Temperature is less than Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) –18.0°F (–10°C) for 90 seconds, or the Saturated Suction Temperature is less than –4°F (–20°C), then a compressor in the affected circuit will be turned off.

Override No. 5: Low Temperature Cooling

This override removes one stage of capacity when the difference between the Control Point (***Main Menu → General Parameters → Control Point***) and the Leaving Water Temperature (***Main Menu → Temperatures → Leaving Fluid Temp***) reaches a predetermined limit and the rate of change of the water is 0 or still decreasing.

Override No. 6: EWT Below Control Point

This override removes 2 stages of capacity when the Entering Water Temperature (***Main Menu → Temperature → Entering Fluid Temp***) is less than the Control Point (***Main Menu → General Parameters → Control Point***.)

Override No. 7: Ramp Loading

If the unit is configured for ramp loading (***Main Menu → Configuration Menu → General Configuration → Ramp Loading Select*** = **Yes**), and if the difference between the Leaving Water Temperature and the Control Point is greater than 4º F (2.2º C) and the rate of change of the leaving water is greater than Cool Ramp Loading Rate (***Main Menu → Setpoints → Setpoint Configuration → Cooling Ramp Loading***), then no capacity stage increase will be made. Operating modes 2 and 3 will be in effect.

Override No. 9: Demand Limit

This override mode is active when a command to limit capacity is received. If the current unit capacity is greater than the active capacity limit value, a stage is removed. If the current capacity is lower than the capacity limit value, the control will not add a stage that will result in the new capacity being greater than the capacity limit value. Operating mode 4 will be in effect.

Override No. 10: Water Loop Override

This override prohibits compressor operation until the chilled water flow switch (CWFS) is closed. This override has been added for Primary/Secondary control and assures that no compressor can be started until the water flow is established, since the lag chiller evaporator pump start/stop is commanded upon lag demand limit value. It shall also prevent evaporator from freezing due to pump failure.

Override No. 13: Minimum On/Off and Off/On Time Delay

Whenever a capacity step change has been made, either with Hot Gas Bypass or a compressor, the control will remain at this capacity stage for the next 90 seconds. During this time, no capacity control algorithm calculations will be made. If the capacity step is a compressor, an additional 2 minute delay is added to the previous hold time (see Override No. 22). This override allows the system to stabilize before another capacity stage is added or removed. If a condition of a higher priority override occurs, the higher priority override will take precedence.

Override No. 14: Slow Change Override

This override prevents compressor stage changes when the leaving temperature is close to the control point and slowly moving towards the control point.

Override No. 15: System Manager Capacity Control

If a ChillerVu™ module is controlling the unit, and the ChillerVu module is controlling multiple chillers, then the unit will add a stage to attempt to load to the demand limited value.

Override No. 16: Circuit A High Pressure Override

Override No. 17: Circuit B High Pressure Override

These overrides attempt to avoid a high pressure failure. The algorithm is run every 1 seconds. At least one compressor must be on in the circuit. If the Discharge Pressure for the circuit is above the High Pressure Threshold (***Main Menu → Configuration Menu → Service Configuration → High Pressure Threshold***), then a compressor for that circuit will be removed.

Override No. 19: Standby Mode

This override algorithm will not allow a compressor to run if the unit is in Standby mode.

Override No. 22: Minimum On Time Delay

In addition to Override No. 13, Minimum On/Off and Off/On Time Delay, for compressor capacity changes, an additional 2 minute delay will be added to Override No. 13 delay. No compressor will be de-energized until 3.5 minutes have elapsed since the last compressor has been turned ON. When this override is active, the capacity control algorithm calculations will be performed, but no capacity reduction will be made until the timer has expired. A control with higher precedence will override the Minimum On Time Delay.

Override No. 23: Circuit A Low Saturated Suction Temperature in Cooling

Override No. 24: Circuit B Low Saturated Suction Temperature in Cooling

If the circuit is operating in an area close to the operational limit of the compressor, then the circuit capacity will remain at the same point or unload to raise the saturated suction temperature. This algorithm will be active if at least one compressor in the circuit is on and one of the following conditions is true:

1. Saturated Suction Temperature is less than Brine Freeze (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) –3.8ºF (–19.9ºC).
2. Saturated Suction Temperature is less than Brine Freeze (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***), and the circuit approach (Leaving Water Temperature – Saturated Suction Temperature) is greater than 15ºF (8.3ºC) and the Circuit Superheat (Return Gas Temperature – Saturated Suction Temperature) is greater than 15ºF (8.3ºC).

   NOTE: The freeze setpoint is 34ºF (1.1ºC) for comfort cooling units with fresh water. The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) is 1. Freeze setpoint is Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***), for Low

Temperature Brine systems (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type* = 3**).

If any of these conditions are met, then the appropriate operating mode, 23 (Circuit A) or 24 (Circuit B), will be in effect.

Override No. 26: Circuit A Operation Outside Compressor Operating Envelope — High SCT

Override No. 27: Circuit B Operation Outside Compressor Operating Envelope — High SCT

This override prevents compressor operation outside of its operating envelope.

1. If the current SCT is more than the SCT instant limit minus 3.6°F (–15.8°C), then the circuit will be unloaded immediately.
2. If the mean SCT over a 2 minute period is more than the SCT permanent limit minus 6.3°F (–14.3°C), then the circuit will be unloaded after a 90 second delay.
3. If the mean DGT over a 30 second period is more than the limit, then the circuit will be unloaded after a 60 second delay.

Override No. 29: Circuit A Low SST for 3 Minutes in Cooling

Override No. 30: Circuit B Low SST for 3 Minutes in Cooling

This capacity override avoids having low SST for too long a period of time. If the SST is lower than Brine Freeze (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) –3.8°F (–19.9°C) for more than 3 minutes, then the capacity shall be decreased.

Override No. 34: Circuit A Low Refrigerant Charge

Override No. 35: Circuit B Low Refrigerant Charge

The capacity override attempts to protect the compressor from starting with no refrigerant in the circuit. This algorithm runs only when the circuit is not operational, (no compressors ON). There are several criteria that will enable this override:

1. The Saturated Suction Temperature is less than –13°F (–25°C).
2. All of these conditions must be true:
   a. The Saturated Suction Temperature is less than Leaving Water Temperature by more than 5.4ºF (3.0ºC).
   b. Saturated Suction Temperature is less than 41°F (5°C).
   c. Outdoor Air Temperature is less than 32°F (0ºC).
   d. Saturated Suction Temperature is less than the Outdoor Air Temperature by more than 5.4º F (3.0ºC).
3. All of these conditions must be true:
   a. The Saturated Suction Temperature is less than Leaving Water Temperature by more than 5.4ºF (3.0ºC).
   b. Saturated Suction Temperature is less than 41ºF (5ºC).
   c. Saturated Suction Temperature is less than the Brine Freeze Point (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) by more than 6ºF (3.3ºC).

   NOTE: The freeze setpoint is 34ºF (1.1ºC) for comfort cooling units with fresh water. The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) is 1. The freeze setpoint is Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) for Low Temperature Brine systems (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type* = 3**).
4. All of these conditions must be true:
   a. The Saturated Suction Temperature is less than Leaving Water Temperature by more than 5.4ºF (3.0ºC).
   b. Saturated Suction Temperature is less than 41ºF (5ºC).
   c. Saturated Suction Temperature is less than the Outdoor Air Temperature by more than 9ºF (5ºC).

If any of these conditions (1, 2, 3 or 4) are met, then the appropriate operating mode, 34 (Circuit A) or 35 (Circuit B), will be in effect.

Override No. 37: Circuit A High Superheat

Override No. 38: Circuit B High Superheat

This override attempts to prevent the high superheat that may introduce compressor failures due to low SST. No capacity steps will be added to the affected circuit while the superheat is greater than 45ºF (25ºC). If the capacity of the machine must be increased, the control will look to another circuit for additional capacity.

Override No. 42: Eco Pump

This override is activated when the capacity is frozen because the pump is in eco mode (stopped).

Override No. 43: Eco Pump Restart

This override is activated when the capacity is frozen because the pump has left the eco mode but its activation time is still below the Unit Off to On Delay (Main Menu - Configuration Menu - General Configuration - Unit Off to On Delay), which is needed to stabilize the water loop.

Override No. 45: Circuit A High SCT Capacity Freeze

Override No. 46: Circuit B High SCT Capacity Freeze

If SCT is out of the compressor map, this mode is activated. If the overrides #26 and #27 can't be applied because compressors have just been unloaded, the capacity loading shall be frozen.

Override No. 52: HGBP Oil Management

If HGBP is active for 40 minutes, the valve will be closed.

Override No. 58: Circuit A Operation Outside Compressor Operating Envelope — Low SCT

Override No. 59: Circuit B Operation Outside Compressor Operating Envelope — Low SCT

This override prevents compressor operation outside of its operating envelope. If the current SCT is lower than one or more SCT limits for a defined period of time, then a compressor will be started.

Dual Chiller Control

The dual chiller function allows for Primary/Secondary control of 2 units installed in parallel or series arrangement supplying chilled fluid on a common loop. The chillers must be linked by the Carrier Comfort Network® network and operate on the same bus.

When the units are installed for parallel operation and chilled water control is done on the outlet side of the units, the dual chiller accessory kit (P/N 00EFN900044000A) is required. The kit includes additional leaving fluid temperature thermistors that must be installed on the common chilled water leaving piping as described in the installation instructions for the kit. The leaving fluid temperature sensors will be connected to each chiller as described in the installation instructions. When the chilled water control is done on the inlet side of the parallel units, no additional temperature sensor is required. See the Field Control Wiring and Dual Chiller Control Option sections in the 30RC Installation Instructions for dual chiller LWT sensor control wiring. When chillers are configured to operate in series mode, no additional chilled water temperature sensor is required.

The Primary chiller will monitor all external commands, such as start/stop, demand limiting, and setpoint select, and needs to be started in Primary operating type. The commands are transmitted automatically to the secondary unit, which must operate in CCN (Network) mode. The secondary chiller has no action in the Primary/Secondary operations; it will only verify that CCN communication with the Primary chiller is correct. If the Primary chiller is turned off while the Primary/Secondary function is active, then the secondary chiller will be stopped. Under certain circumstances, the secondary unit may be started first to balance the run times of the 2 units. In the event of a communication

failure between the 2 units, each unit will return to an autonomous operating mode until the fault is cleared. If the Primary unit is stopped due to an alarm, the secondary unit is authorized to start, and therefore the secondary unit configurations should be verified with desired setpoints.

The CCN communication port for the primary and secondary chillers must be joined using a shielded cable in order to avoid communication issues.

The Primary/Secondary linkage will not be allowed to operate if any one of the secondary chiller **CHIL_S_S**, **HC_SEL**, **CTRL_PNT**, **DEM_LIM**, **LAG_LIM**, or **LCW_STPT** variables has a force priority higher than a control force. In that case, the Primary/Secondary operations will not be allowed or will be disabled.

The control algorithm relies on several parameters that must be field configured for operation. Both chillers must be on the same CCN bus with different addresses. On both chillers, Primary/Secondary Select (***Main Menu → Configuration Menu → Primary/Secondary → Primary/Secondary Select*, 1 = Primary 2 = Secondary**) must be enabled. The water piping arrangement must be specified with the Chiller in Series variable (***Main Menu → Configuration Menu → Primary/Secondary → Chiller in Series***), where **No** equates to parallel arrangement and **Yes** equates to a series arrangement. The Primary chiller must be programmed with the Slave Address (***Main Menu → Configuration Menu → Primary/Secondary → Secondary Address***). Additional optional programming parameters may be configured to meet application requirements.

The Lead Lag Select variable (***Main Menu → Configuration Menu → Primary/Secondary → Lead Lag Select***) determines which chiller is the lead machine. The options are: Always Lead, Lag Once Failed Only, and Lead/Lag Runtime Select. Under Runtime Select control, the lead chiller will change based on the time increment selected in the Lead/Lag Balance Delta configuration (***Main Menu → Configuration Menu → Primary/Secondary → Lead/Lag Balance Delta***). If the run hour difference between the Primary and the secondary remains less than the Lead/ Lag Balance Delta, then the chiller designated as the lead will remain the lead chiller. The Lead/Lag changeover between the Primary and the secondary chiller due to hour balance will occur during chiller operating odd days, such as day 1, 3, and 5 of the month, at 11:00 p.m. If a lead chiller is not designated, the Primary chiller will always be designated the lead chiller.

The dual chiller control algorithm has the ability to delay the start of the lag chiller in 2 ways. The Lead Pulldown Time parameter (***Main Menu → Configuration Menu → Primary/Secondary → Lead Pulldown Time***) is a one-time delay initiated after starting the lead chiller, before checking whether to start an additional chiller. This time delay gives the lead chiller a chance to remove the heat that the chilled water loop picked up while inactive during an unoccupied period. The second time delay, Lead/Lag Start Timer (***Main Menu → Configuration Menu → Primary/Secondary → Lead/Lag Start Timer***) is a time delay imposed between the last stage of the lead chiller and the start of the lag chiller. This prevents enabling the lag chiller until the lead/lag delay timer has expired.

A minimum on time for the lag chiller can be programmed with the Lag Minimum Running Time configuration (***Main Menu → Configuration Menu → Primary/Secondary → Lag Minimum Running Time***). This parameter causes the control to run the lag chiller for the programmed minimum on time.

The Lag Unit Pump Control (***Main Menu → Configuration Menu → Primary/Secondary → Lag Unit Pump Control***) can be configured such that the pump can be on or off while the chiller is off. This parameter is only active in Parallel Chiller Operation.

The lead chiller is started first and the lag chiller will be maintained at 0% capacity through Primary forcing the lag demand limit value (**LAG_LIM**) to 0%. The lag water pump will be maintained off. When the lead chiller cannot be loaded anymore (because it is loaded at its full available capacity or at the Primary demand limit value), then the lag start timer is started. When the lag start time has elapsed, if the error on the Primary controlled setpoint is greater than the dead band (**start_dt**), and if the pulldown time is elapsed, then the lag chiller water pump will be turned on (if required by configuration) and the lag chiller will be allowed to start through the Primary chiller forcing the lag chiller demand limit value (**LAG_LIM**) to its own demand limit value. To ensure that the lag chiller will be unloaded first in case of water load decrease, the lead chiller setpoint error will be reset downwards by 4°F (2.2°C), provided that the lead capacity is not zero. If a Lead/Lag changeover occurs, then the new lead unit's **LAG_LIM** will be set to the Primary unit's demand limit, and the new lag unit will reduce in capacity by 25% every 5 minutes. Once the lead unit's capacity is at maximum available capacity, or the lag unit's capacity is 0%, then the lag start timer will start.

Each dual chiller application, parallel and series, is described separately below.

PRIMARY/SECONDARY ASSEMBLY ERROR

Errors that emerge during the primary/secondary operation may affect the whole system. In the event of a primary/secondary error (**ms_error**), an error code will be displayed in the Primary/Secondary Control menu in the Maintenance menu (***Main Menu → Maintenance Menu → Primary/Secondary Main → Primary/Scd Error***). See Table 32 for descriptions of assembly error codes.

Table 32 — Primary/Secondary Assembly Error Codes

ERROR CODE	DESCRIPTION
9001	The primary or secondary water pump is not configured (**pump_seq = 0**), while the control of the lag unit pump is required (**lag_pump = 0**).
9002	Primary and secondary units have same network address.
9003	There is no secondary configured at the secondary address (**lagstat = 0, M_MSTSLV**).
9004	Secondary pump sequence configuration incorrect.
9005	There is a conflict between the primary and the secondary LWT option: The primary is configured for EWT control, while the secondary is configured for LWT control.
9006	There is a conflict between the primary and the secondary EWT option: The primary is configured for LWT control, while the secondary is configured for EWT control.
9007	There is a conflict between the primary and the secondary pump option: The primary is configured for lag pump control, while the secondary is not configured. (**lag_pump**, Lag Unit Pump Control, **MST_SLV)**
9008	There is a conflict between the primary and the secondary pump option: The primary is not configured for lag pump control, while the secondary is configured for lag pump control.
9009	The secondary chiller is in Local or Remote control (**chilstat = 3**).
9010	The secondary chiller is down due to fault (**chilstat = 5**).
9011	The primary chiller operating type is not Primary.
9012	No communication with the secondary unit.
9013	Heat/Cool status for Primary is different than the Heat/Cool status for Secondary.
9014	Primary and secondary serial/parallel configurations are different.
9015	Primary using entering fluid control while in series mode.
9016	Secondary using entering fluid control while in series mode.

DUAL CHILLER CONTROL FOR PARALLEL APPLICATIONS

To configure the primary chiller for parallel applications, see Table 33. To configure the secondary chiller for parallel applications, see Table 34.

Table 33 — Dual Primary Chiller Control Parameters for Parallel Applications

DISPLAY NAME	VALUE	PATH
Primary/Secondary Select	1 (Primary) Default: 0 (Disable)	***Main Menu→ Configuration Menu → Primary/Secondary***
Primary Control Type	1 = Local Control 2 = Remote Control 3 = Network Control Default: 1(Local) Configure for proper control type.	
Secondary Address	Must be set to the Secondary Chiller's address. The Primary and Secondary chiller must have different addresses and be on the same Bus Number Default: 2	
Lead Lag Select	0 (Primary Always Leads) 1 (Lag Once Failed Only) 2 (Lead/Lag Runtime Select) Default: 0 (Primary Always Leads)	
Lead/Lag Balance Delta	Range: 40 to 400 hours Default: 168 hours	
Lead/Lag Start Timer	Range: 2 to 30 minutes Default: 10 minutes	
Lead Pulldown Time	Range: 0 to 60 minutes Default: 0 minutes	
Start If Error Higher	Range: 3 to 18°F (1.7 to 10.0°C) Default: 4°F (2.2°C)	
Lag Minimum Running Time	Range: 0 to 150 minutes Default: 0 minutes	
Lag Unit Pump Control	0 (Stop If Unit Stops) 1 (Run If Unit Stops) Default: 0 (Stop If Unit Stops)	
Chiller In Series	No (Not in Series) Default: No	
Legacy Compatibility?	No = No message adaptation (the other unit of the primary/secondary assembly has PIC6 hardware) Default: No	

Table 34 — Dual Secondary Chiller Control Parameters for Parallel Applications

DISPLAY NAME	VALUE	PATH
Primary/Secondary Select	2 (Secondary) Default: 0 (Disable)	***Main Menu → Configuration Menu → Primary/Secondary***
Primary Control Type	1 = Local Control 2 = Remote Control 3 = Network Control Default: 1(Local) Configure for proper control type.	
Secondary Address	Must be set to the Secondary Chiller's address. The Primary and Secondary chiller must have different addresses and be on the same Bus Number Default: 2	
Lead Lag Select	0 (Primary Always Leads) 1 (Lag Once Failed Only) 2 (Lead/Lag Runtime Select) Default: 0 (Primary Always Leads)	
Lead/Lag Balance Delta	Range: 40 to 400 hours Default: 168 hours	
Lead/Lag Start Timer	Range: 2 to 30 minutes Default: 10 minutes	
Lead Pulldown Time	Range: 0 to 60 minutes Default: 0 minutes	
Start If Error Higher	Range: 3 to 18°F (1.7 to 10.0°C) Default: 4°F (2.2°C)	
Lag Minimum Running Time	Range: 0 to 150 minutes Default: 0 minutes	
Lag Unit Pump Control	0 (Stop If Unit Stops) 1 (Run If Unit Stops) Default: 0 (Stop If Unit Stops)	
Chiller In Series	No (Not in Series) Default: No	
Legacy Compatibility?	No = No message adaptation (the other unit of the primary/secondary assembly has PIC6 hardware) Default: No	

DUAL CHILLER PUMP CONTROL FOR PARALLEL CHILLER APPLICATIONS

Parallel chiller control with dedicated pumps is recommended. The chiller must start and stop its own water pump located in its own piping. If pumps are not dedicated for each chiller's piping, chiller isolation valves are required; each chiller must open and close its own isolation valve through the control. Figures 35-39 show typical pump arrangements for dual chiller parallel applications.

In constant water flow applications, the primary chiller should be the primary control source for the chilled water pump. The secondary chiller should have override capability. In the event of a communication failure between the primary and secondary chillers, the secondary chiller will operate as a stand-alone machine and therefore must be able to enable the chilled water pump.

DUAL CHILLER CONTROL FOR SERIES CHILLER APPLICATIONS

When chillers are configured to work in series mode, no additional chilled water supply sensor is required. The primary chiller will be installed downstream of the secondary chiller (the secondary chiller outlet fluid is the primary inlet fluid). If pump control is required, it will be controlled by the primary chiller.

To configure the primary chiller for series applications, see Table 35. To configure the secondary chiller for series applications, see Table 36.

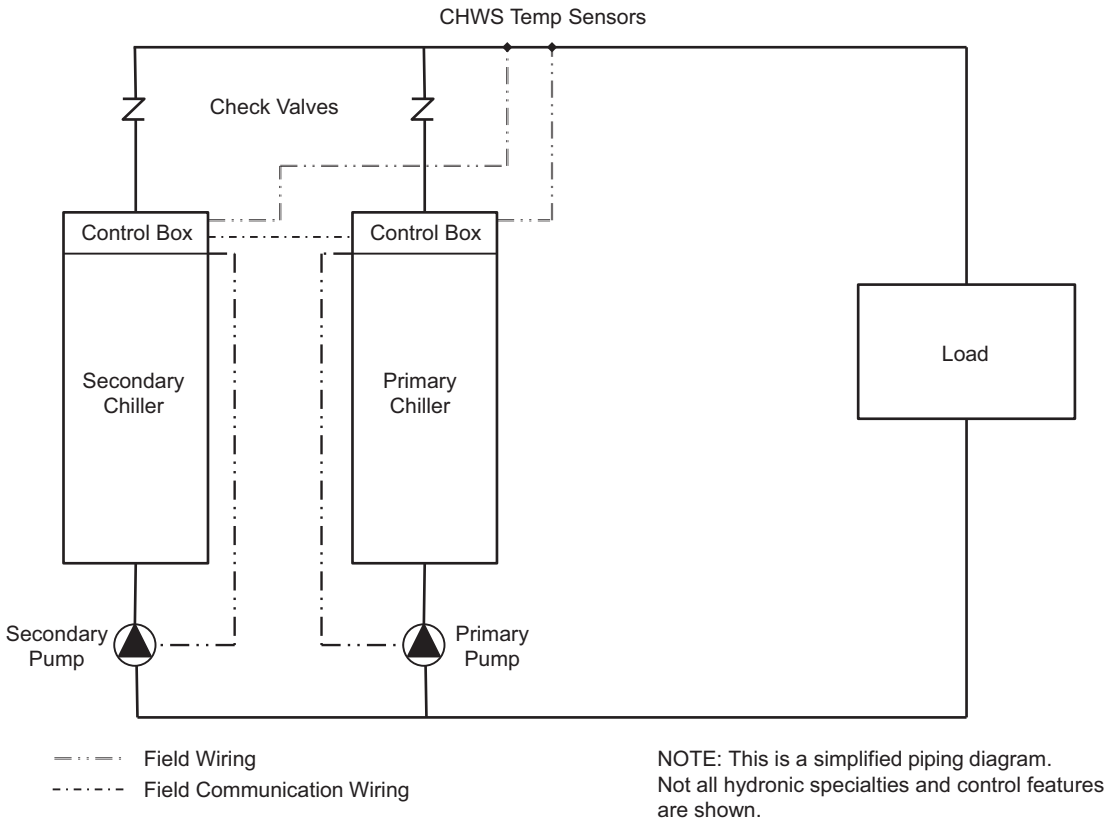


Fig. 35 — Typical Parallel Primary/Secondary Chillers Dedicated Primary Pumping, Variable Flow, Leaving Water Control

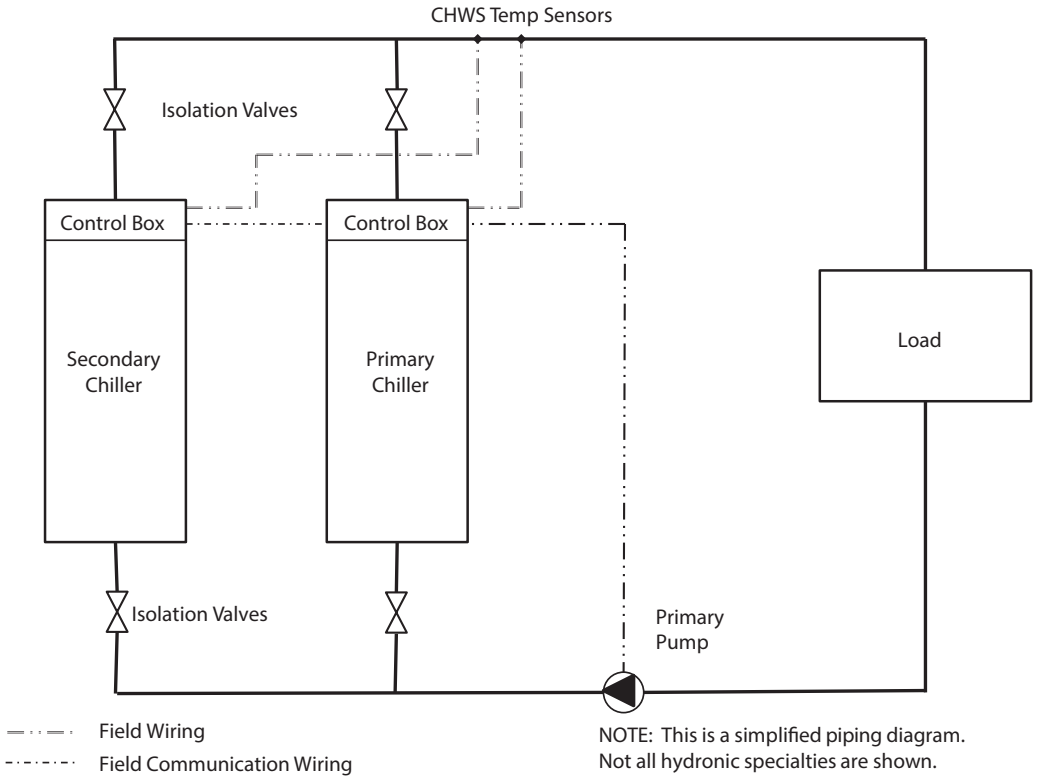


Fig. 36 — Typical Parallel Primary/Secondary Chillers Common Primary Pumping, Constant Flow, Leaving Water Control

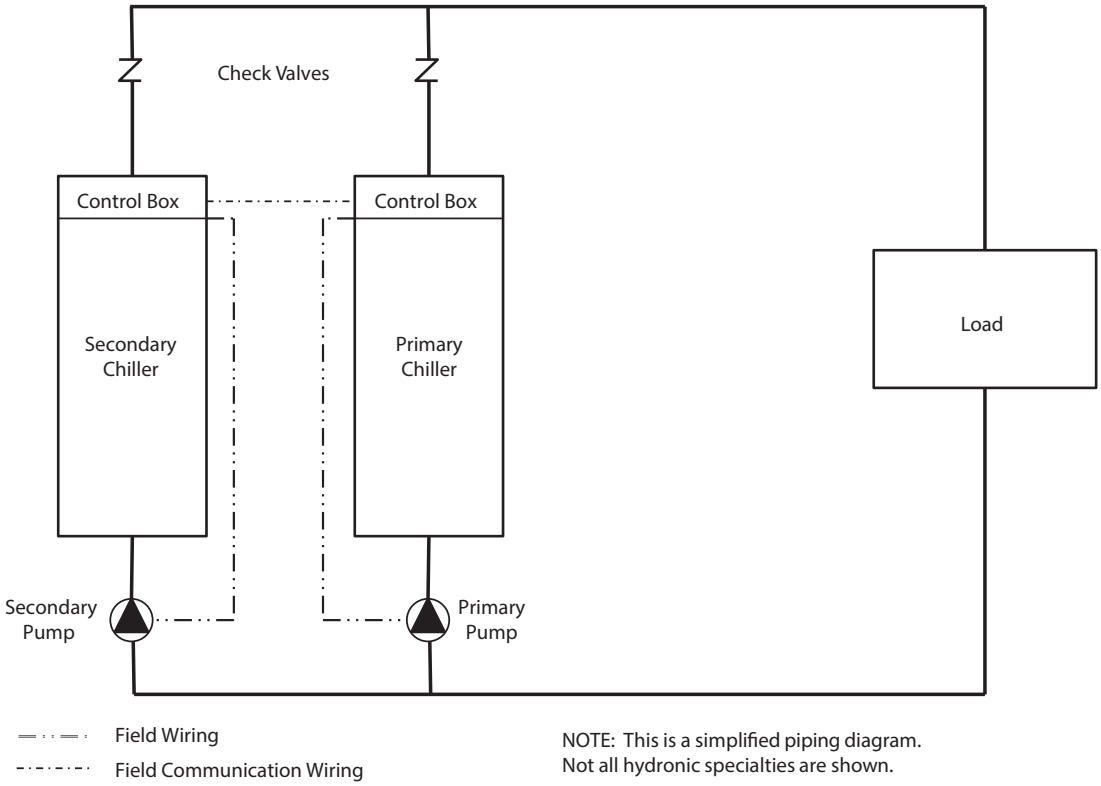


Fig. 37 — Typical Parallel Primary/Secondary Chillers Dedicated Primary Pumping, Variable Flow, Entering Water Control

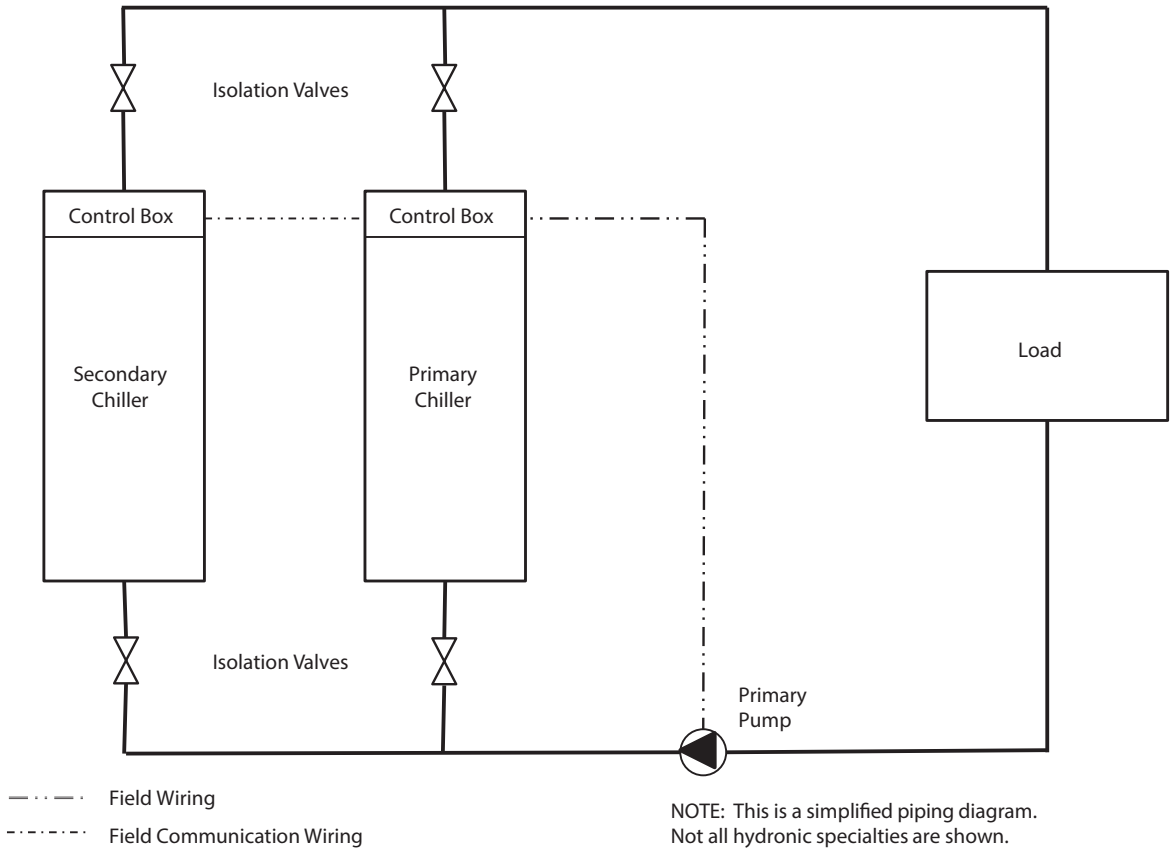


Fig. 38 — Typical Parallel Primary/Secondary Chillers
Common Primary Pumping, Variable Flow, Entering Water Control

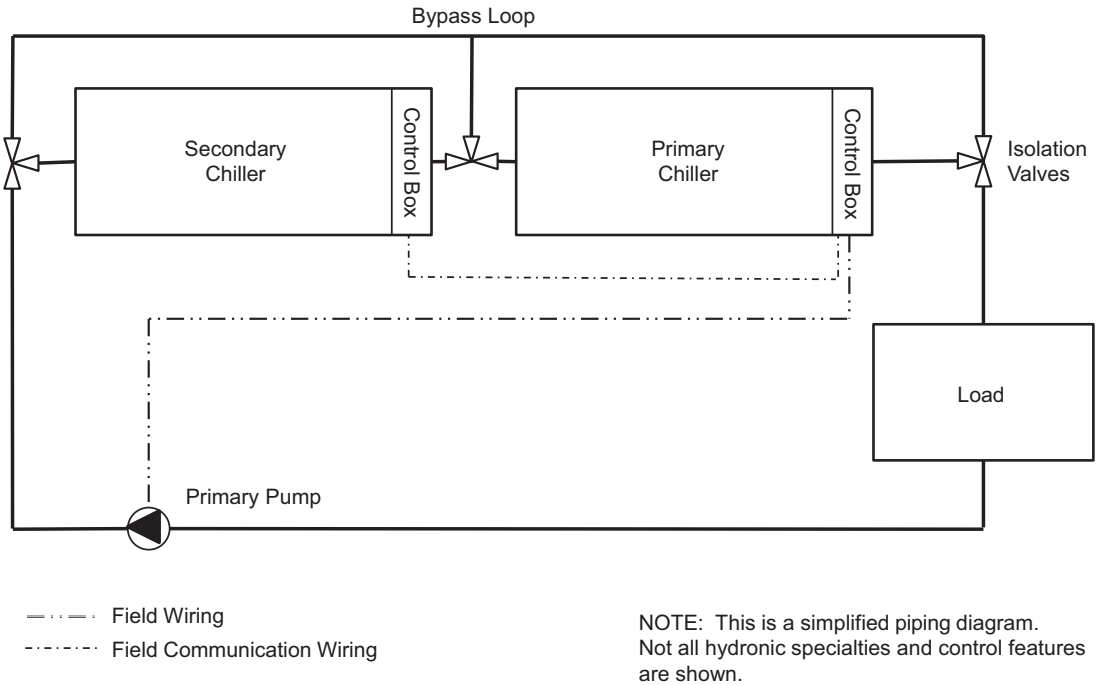


Fig. 39 — Typical Series Primary/Secondary Chillers
Dedicated Primary Pumping, Constant Flow, Leaving Water Control

Table 35 — Primary Chiller Configuration in Series Applications[a]

DISPLAY NAME	VALUE	PATH
Primary/Secondary Select	1 (Primary) Default: 0 (Disable)	***Main Menu → Configuration Menu → Primary/Secondary***
Primary Control Type	1 = Local Control 2 = Remote Control 3 = Network Control Default: 1 (Local) Configure for proper control type.	
Secondary Address	Must be set to the secondary chiller's address. The primary and secondary chiller must have different addresses and be on the same Bus Number Default: 2	
Lead Lag Select	0 (Primary Always Leads) 1 (Lag Once Failed Only) 2 (Lead/Lag Runtime Select) Default: 0 (Primary Always Leads)	
Lead/Lag Balance Delta	Range: 40 to 400 hours Default: 168 hours	
Lead/Lag Start Timer	Range: 2 to 30 minutes Default: 10 minutes	
Lead Pulldown Time	Range: 0 to 60 minutes Default: 0 minutes	
Start If Error Higher	Range: 3 to 18°F (1.7 to 10.0°C) Default: 4°F (2.2°C)	
Lag Minimum Running Time	Range: 0 to 150 minutes Default: 0 minutes	
Lag Unit Pump Control	0 (Stop If Unit Stops) 1 (Run If Unit Stops) Default: 0 (Stop If Unit Stops)	
Chiller In Series	Yes (In Series) Default: No	
Legacy Compatibility?	No = No message adaptation (the other unit of the primary/secondary assembly has PIC6 hardware) Default: No	

Table 36 — Secondary Chiller Configuration in Series Applications[a]

DISPLAY NAME	VALUE	PATH
Primary/Secondary Select	2 (Secondary) Default: 0 (Disable)	***Main Menu → Configuration Menu → Primary/Secondary***
Primary Control Type	1 = Local Control 2 = Remote Control 3 = Network Control Default: 1 (Local) Configure for proper control type.	
Secondary Address	Must be set to the secondary chiller's address. The primary and secondary chiller must have different addresses and be on the same Bus Number Default: 2	
Lead Lag Select	0 (Primary Always Leads) 1 (Lag Once Failed Only) 2 (Lead/Lag Runtime Select) Default: 0 (Primary Always Leads)	
Lead/Lag Balance Delta	Range: 40 to 400 hours Default: 168 hours	
Lead/Lag Start Timer	Range: 2 to 30 minutes Default: 10 minutes	
Lead Pulldown Time	Range: 0 to 60 minutes Default: 0 minutes	
Start If Error Higher	Range: 3 to 18°F (1.7 to 10.0°C) Default: 4°F (2.2°C)	
Lag Minimum Running Time	Range: 0 to 150 minutes Default: 0 minutes	
Lag Unit Pump Control	0 (Stop If Unit Stops) 1 (Run If Unit Stops) Default: 0 (Stop If Unit Stops)	
Chiller In Series	Yes (In Series) Default: No	
Legacy Compatibility?	No = No message adaptation (the other unit of the primary/secondary assembly has PIC6 hardware) Default: No	

NOTE(S):
a. For Primary/Secondary Series Chiller Application, Primary Chiller should always be downstream of Secondary.

DUAL CHILLER PUMP CONTROL FOR SERIES CHILLER APPLICATIONS

Pump control for series chiller applications is controlled by the primary chiller only. The control of the secondary chiller is directed through commands transmitted by the primary chiller. The secondary chiller has no action in primary/secondary operations. The secondary chiller only verifies that CCN communication with the primary chiller is present. See the Dual Chiller Sequence of Operation section on page 68. Figure 39 shows a typical pump arrangement for dual chiller series applications.

Ramp Loading

The Ramp Loading function limits the rate of change of the leaving water temperature. When leaving water temperature reaches the ramp loading setpoint, the control slows down the process at which the compressor loads or unloads. To enable the Ramp Loading sequence:

DISPLAY NAME	VALUE	PATH
Ramp Loading Select	Yes	***Main Menu → Configuration Menu → General Configuration***
Cooling Ramp Loading	Range: 0.2 to 2.0°F/min (0.1 to 1.1°C/min) Default: 1.0°F/min (0.5°C/min)	***Main Menu → Setpoint Configuration***

Temperature Reset

The temperature reset function will determine the cooling control point. This control point is the active setpoint adjusted with the current reset value:

$$\text{Control Point} = \text{Setpoint} + \text{Reset}$$

The purpose of this reset value is to decrease the required capacity if it is allowed by unit load operating conditions. When a non-zero temperature reset is applied, the chiller controls to the new control point instead of the setpoint. The type of temperature reset is configured with the Cooling Reset Select variable.

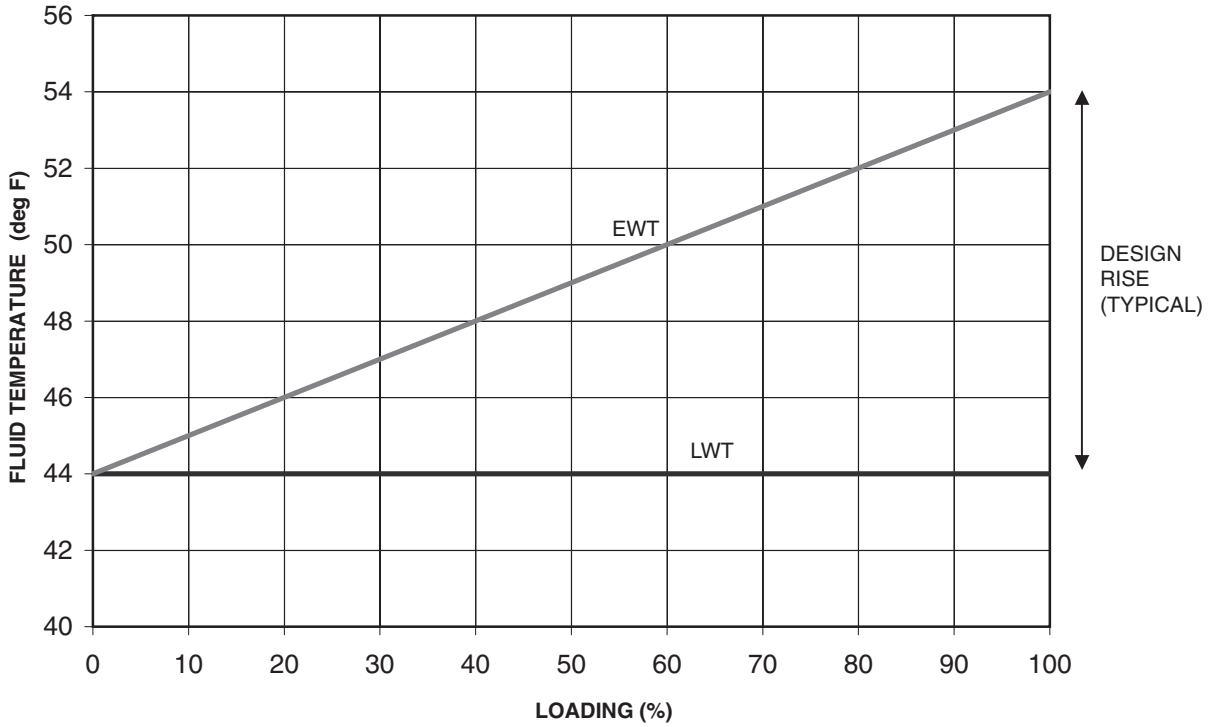
Four types of temperature reset are available: Outdoor Air Temperature, Return Water Reset (Delta T), 4 to 20 mA control, and Space Temperature control. To select a temperature reset configuration:

DISPLAY NAME	VALUE	PATH
Cooling Reset Select	0 = None 1 = OAT 2 = Delta T 3 = 4 to 20 mA Control 4 = Space Temp	***Main Menu → Configuration Menu → Reset Configuration***

Under normal operation, the chiller will maintain a constant entering or leaving fluid temperature, based on the configuration, approximately equal to the chilled fluid setpoint. As the evaporator load varies, the evaporator fluid temperature difference will change in proportion to the load. For example, if the chiller was selected for an entering to leaving water temperature difference of 10°F (5.5°C) at full load, then at 50% load, the temperature difference would be 5°F (2.2°C). See Fig. 40. Because the change in temperature through the evaporator is a measure of the building load, the temperature difference reset is the average building load. Usually the chiller size and fluid temperature setpoint are selected based on a full load condition. At part load, the fluid temperature setpoint may be lower than required. When the fluid temperature is allowed to increase at part load, the efficiency of the machine will increase. The chiller can also be set for return water temperature control. See Fig. 41.

Other indirect means of estimating building load and controlling temperature reset are also available and are discussed below.

To verify that reset is functioning correctly, subtract the Current Setpoint (***Main Menu → General Parameters → Current Setpoint***) from the Control Point (***Main Menu → General Parameters → Control Point***) to determine the degrees reset.

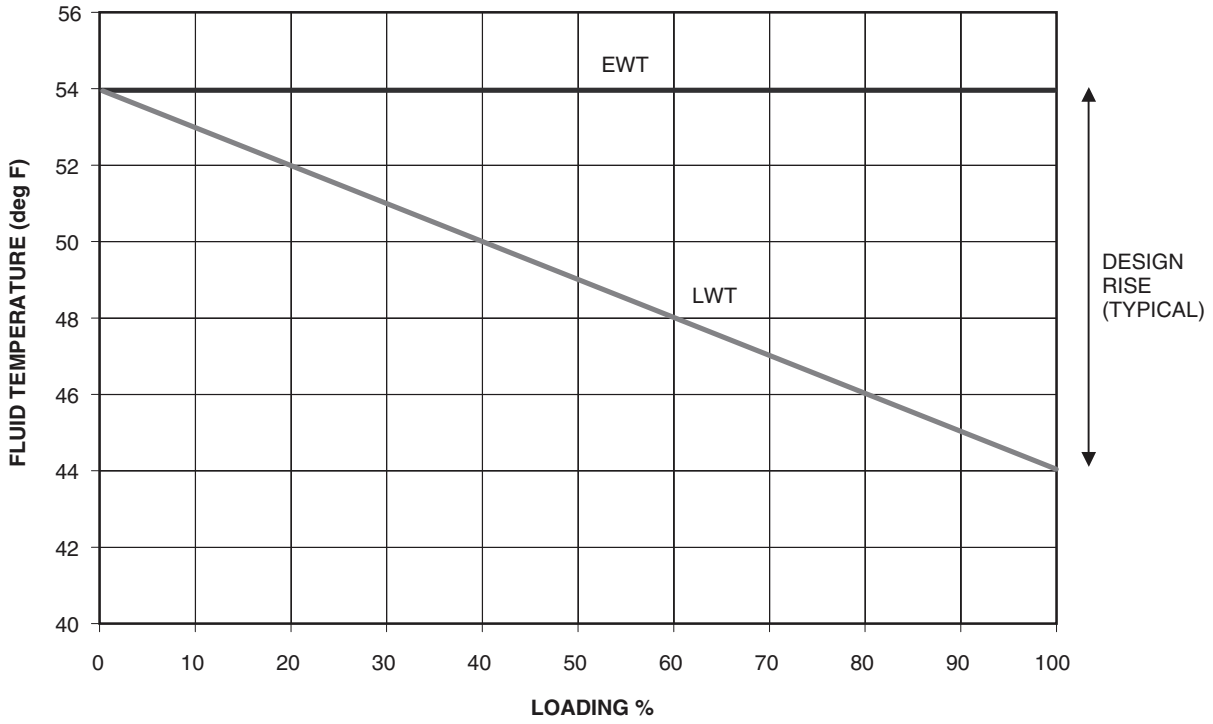


LEGEND

EWT — Entering Water Temperature

LWT — Leaving Water Temperature

Fig. 40 — Leaving Chilled Water Temperature Control



LEGEND
EWT — Entering Water Temperature
LWT — Leaving Water Temperature

Fig. 41 — Return Water Temperature Control Load Profile

OUTSIDE AIR TEMPERATURE RESET

The control system is capable of temperature reset based on OAT. Typically, as the outdoor temperature decreases, so does building cooling load. The chilled water temperature can be increased to lower energy usage while still meeting load demand.

To use OAT Reset, 4 variables must be configured: Cooling Reset Select, OAT No Reset Value (outdoor temperature at which no reset is required), OAT Full Reset Value (outdoor temperature at which full reset is required), and Cooling Reset Deg Value (the amount of temperature reset desired).

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Cooling Reset Select	Default = 1 0 = None, 1 = OAT 2 = Delta T, 3 = 4 to 20 mA control 4 = Space Temp	***Main Menu → Configuration Menu → Reset Configuration***
OAT No Reset Value	Default = 14°F (7.8°C) Range 14 to 125°F (7.8 to 69.4°C)	
OAT Full Reset Value	Default = 14°F (7.8°C) Range 14 to 125°F (7.8 to 69.4°C)	
Cooling Reset Deg. Value	Default = 0°F (0°C) Range –30 to 30°F (–16.7 to 16.6°C)	

In the example shown in Fig. 42, the OAT reset provides 0°F (0°C) chilled water setpoint reset at 85°F (29.4°C) OAT and 15°F (8.3°C) reset at 55°F (12.8°C) OAT.

In the example shown in Fig. 43, using Return Water Temperature Reset, the chilled water temperature will be reset by 5°F (2.8°C) when the Fluid Temperature Difference is 2°F (1.1°C) and 0°F (0°C) reset when the Temperature Difference is 10°F (5.6°C).

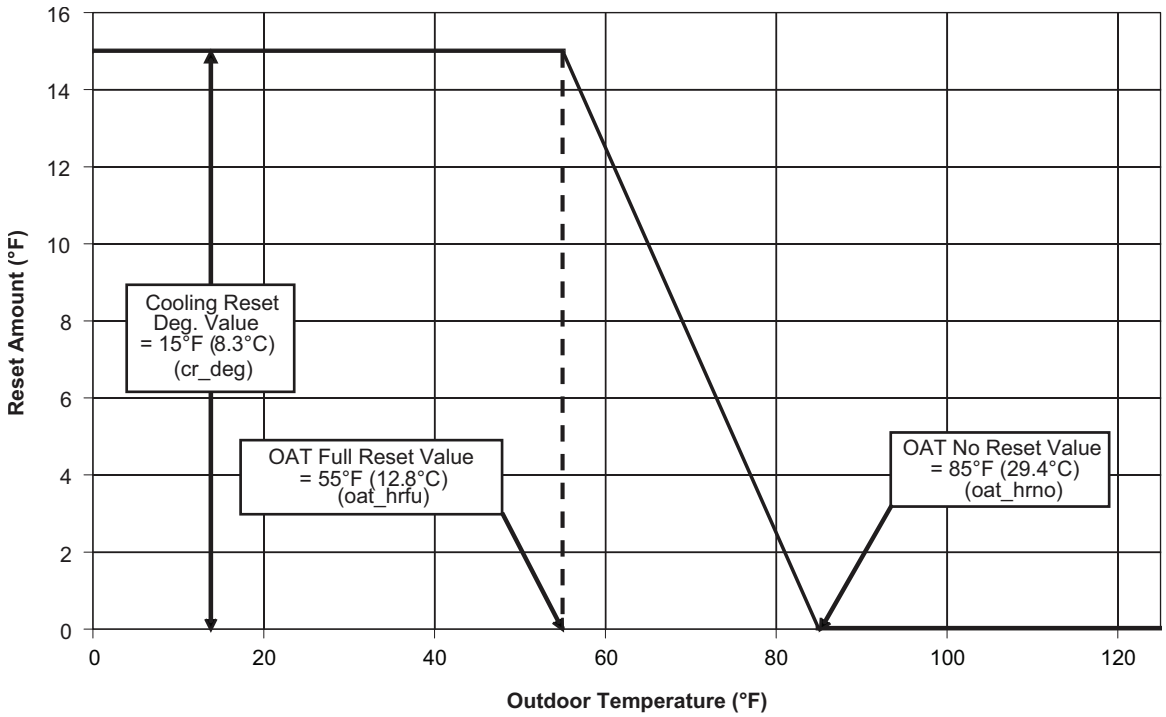


Fig. 42 — Example: OAT Reset

DELTA T RESET (RETURN WATER RESET)

The control system is also capable of performing fluid temperature reset based on evaporator fluid temperature difference (Delta T), sometimes called return water reset. Because the change in temperature through the evaporator is a measure of the building load, the temperature difference reset is, in effect, an average building load reset method.

Delta T Reset allows for the chilled water temperature setpoint to be reset upward as a function of the fluid temperature difference (building load).

NOTE: Delta T (Return Water) Temperature Reset should not be used with variable evaporator flow rate systems.

To use Delta T Reset, 4 variables must be configured: Cooling Reset Select, Delta T No Reset Value (evaporator temperature difference at which no chilled water temperature reset should occur), Delta T Full Reset Value (evaporator temperature difference at which the maximum chilled water temperature reset should occur), and Cooling Reset Deg Value (the maximum amount of temperature reset desired).

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Cooling Reset Select	Default = 2 0 = None, 1 = OAT 2 = Delta T, 3 = 4 to 20 mA control 4 = Space Temp	***Main Menu→ Configuration Menu→ Reset Configuration***
Delta T No Reset Value	Default = 0°F (0°C) Range 0°F to 25°F (0°C to 13.8°C)	
Delta T Full Reset Value	Default = 0°F (0°C) Range 0°F to 25°F (0°C to 13.8°C)	
Cooling Reset Deg Value	Default = 0°F (0°C) Range –30 to 30°F (–16.7 to 16.6°C)	

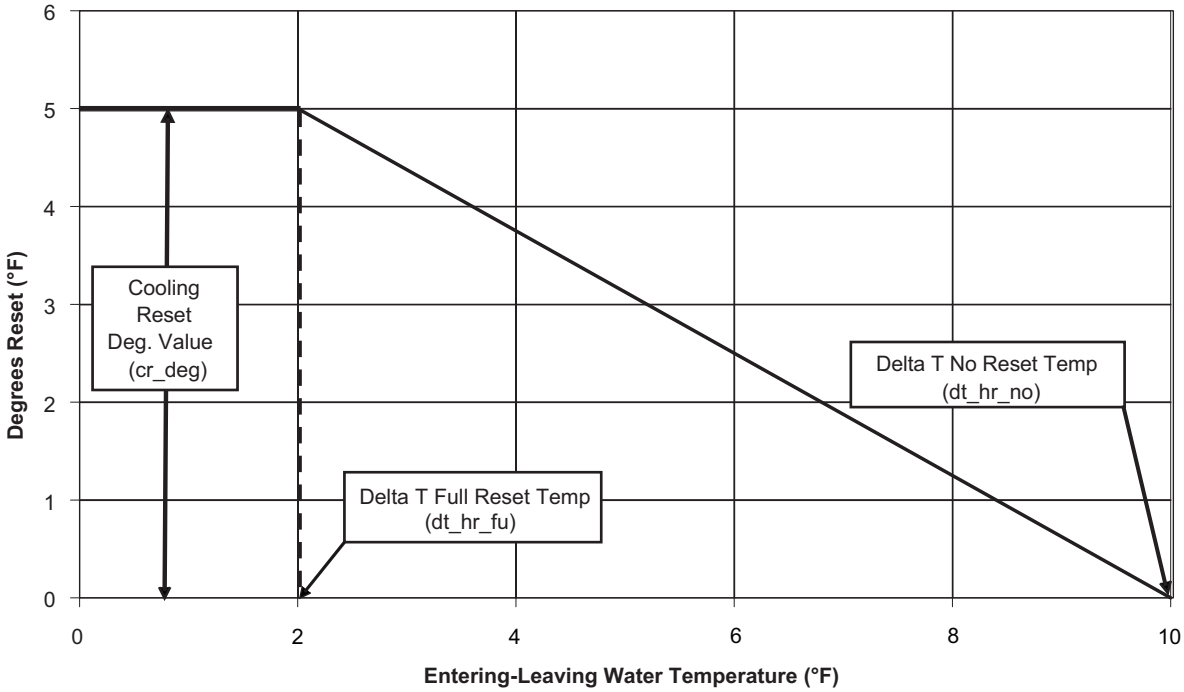


Fig. 43 — Example: Return Water Reset

4 TO 20 MA TEMPERATURE RESET

The control system is also capable of temperature reset based on an externally powered 4 to 20 mA signal.

To use 4 to 20 mA Temperature Reset, 4 variables must be configured: Cooling Reset Select, Current No Reset Value (milliamp signal at which no temperature reset is required), Current Full Reset Value (milliamp signal at which full temperature reset is required), and Cooling Reset Deg Value (the maximum amount of temperature reset desired).

⚠ CAUTION

Care should be taken when interfacing with other control systems due to possible power supply differences, such as a full wave bridge versus a half wave rectification. Connection of control devices with different power supplies may result in permanent damage. Carrier Controller controls incorporate power supplies with half wave rectification. A signal isolation device should be utilized if the signal generator incorporates a full wave bridge rectifier.

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Cooling Reset Select	Default = 3 0 = None, 1 = OAT 2 = Delta T, 3 = 4 to 20 mA control 4 = Space Temp	***Main Menu→ Configuration Menu→ Reset Configuration***
Current No Reset Value	Default = 0 mA Range 0 to 20 mA	
Current Full Reset Value	Default = 0 mA Range 0 to 20 mA	
Cooling Reset Deg Value	Default = 0°F (0°C) Range –30 to 30°F (–16.7 to 16.6°C)	

In the example shown in Fig. 44, at 4 mA, no reset takes place, and at 20 mA, 5°F (2.8°C) chilled water setpoint reset is required.

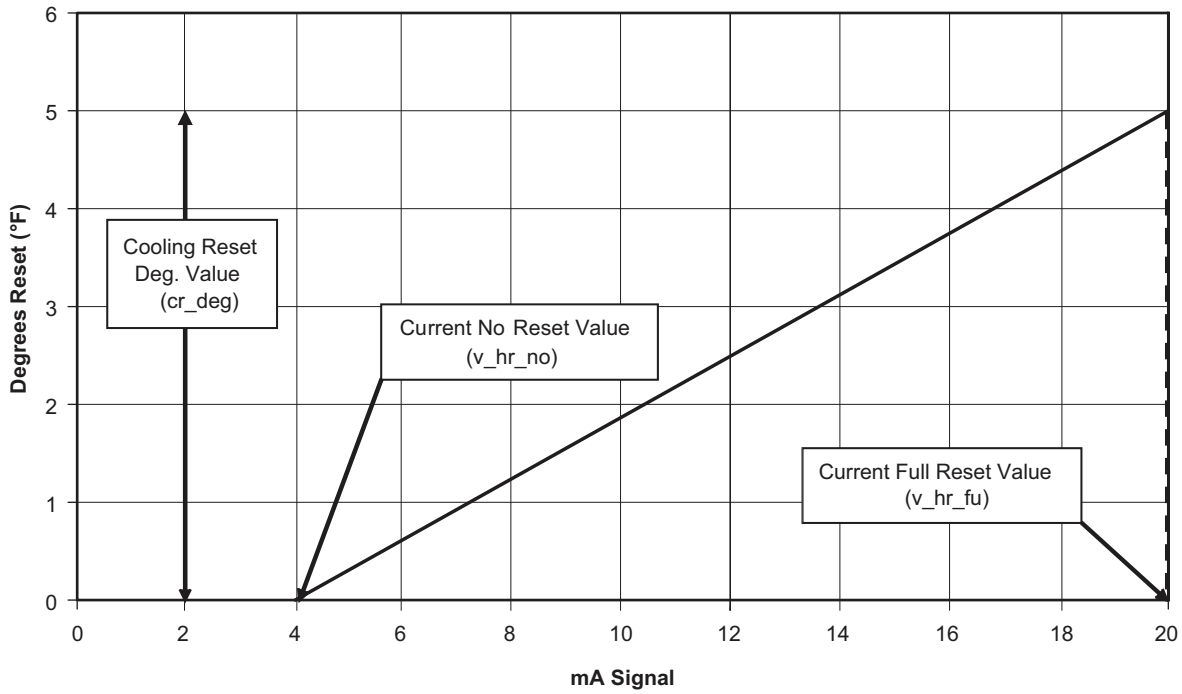


Fig. 44 — Example: 4 to 20 mA Temperature Reset

SPACE TEMPERATURE RESET

The control system is also capable of temperature reset based on space temperature. The EMM and accessory sensor (P/N 33ZCT55SPT) are required for temperature reset using space temperature. This sensor measures the space (room) temperature for the purpose of setpoint reset. Only units with the optional energy management module are fitted with this sensor.

To use Space Temperature Reset, 4 variables must be configured: Cooling Reset Select, Space T No Reset Value (space temperature at which no temperature reset is required), Space T Full Reset Value (space temperature at which full temperature reset is required), and Cooling Reset Deg Value (the maximum amount of temperature reset desired).

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Cooling Reset Select	Default = 4 0 = None, 1 = OAT 2 = Delta T, 3 = 4 to 20 mA control 4 = Space Temp	***Main Menu→ Configuration Menu→ Reset Configuration***
Space T No Reset Value	Default = 14°F (7.8°C) Range 14 to 125°F (7.8 to 69.4°C)	
Space T Full Reset Value	Default = 14°F (7.8°C) Range 14 to 125°F (7.8 to 69.4°C)	
Cooling Reset Deg Value	Default = 0°F (0°C) Range –30 to 30°F (–16.7 to 16.6°C)	

In the space temperature reset example shown in Fig. 45, a reset of 6°F (3.3°C) is applied when the space temperature is 68°F (20.0°C), and no reset takes place when the space temperature is 72°F (22.2°C).

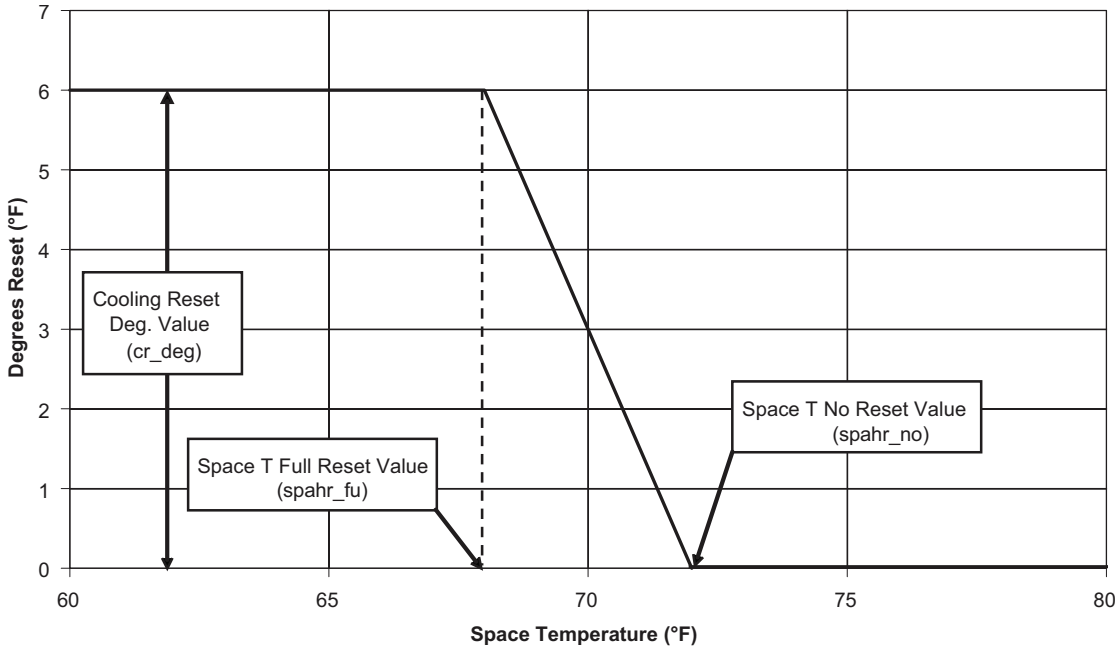


Fig. 45 — Example: Space Temperature Reset

Demand Limit

There are 3 types of demand limiting that can be configured. The first type is through switch control, which will reduce the maximum capacity to up to 3 user-configurable percentages. The second type is by 4 to 20 mA signal input which will reduce the maximum capacity linearly between 100% at a 4 mA input signal (no reduction) down to 0% at a 20 mA input signal. The third type uses CCN, ModBus®, or BACnet™ communication to an external loadshed device and has the ability to limit the current operating capacity to maximum and further reduce the capacity if required. Demand limit control can be based on a calculated capacity level. If the Demand Limit is enabled and the current capacity requirement meets or exceeds the current Demand Limit level, the unit will unload and display Override No. 9: Demand Limit section on page 38.

SWITCH CONTROLLED DEMAND LIMIT

The control system is capable of demand limit based on a field-supplied switch for 1-step demand limit or 2 switches for 3-step demand limit. One-step demand limit is standard. The 2 or 3-step switch control of demand limiting requires the EMM. Demand limit steps are controlled by 2 relay switch inputs field wired to TB5-5 and TB5-14 for Switch 1 (**LIM_SW1**) and TB6-14 and TB6-15 for Switch 2 (**LIM_SW2**).

For demand limit by switch control, closing the first demand limit contact (**LIM_SW1**) will put the unit on the first demand limit (**LIMIT 1**) by capacity. The unit will not exceed the percentage of capacity entered as Demand Limit Switch 1 setpoint. Closing contacts on the second demand limit switch (**LIM_SW2**) and opening the Demand Limit Switch 1 prevents the unit from exceeding the demand limit (**LIMIT 2**) entered as Demand Limit Switch 2 setpoint. If both demand limit switch (**LIM_SW1** and **LIM_SW2**) contacts are closed, then the unit will not exceed the limit (**LIMIT 3**) set by the switch limit setpoint 3. See the table below.

CONTACT	ACTIVE DEMAND LIMIT			
	NONE	LIMIT 1	LIMIT 2	LIMIT 3
LIM_SW1	Open	Close	Open	Close
LIM_SW2	Open	Open	Close	Close

To use demand limit, select the type of demand limiting to use by configuring the Demand Limit Select variable (***Main Menu → Configuration Menu → General Configuration → Demand Limit Type Select***) to Switch. Configure the demand limit setpoints based on the type selected.

If using 2 or 3-step demand limit control, an energy management module must be installed. The energy management module must be enabled in the controls. To enable the EMM, navigate to Factory Parameters menu ***(Main Menu → Configuration Menu → Factory Parameters)*** and set Energy Management Module to YES (1). One-step demand limit control does not require the EMM. To configure demand limit for switch control, 3 parameters for 1-step switch control must be configured. For 2 or 3-step control, additional setpoint parameters must be configured. The parameters are: the type of Demand Limit Selection, the setting for Switch Limit Setpoint 1, the setting for Switch Limit Setpoint 2 (if required), and the setting for Switch Limit Setpoint 3 (if required).

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Demand Limit Type Select	Default = 0 (None) Range None = 0 Switch = 1 4 to 20 mA = 2	***Main Menu → Configuration Menu → General Configuration***
Switch Limit Setpoint 1	Default = 100% Range 0 to 100%	***Main Menu → Setpoint Configuration***
Switch Limit Setpoint 2	Default = 100% Range 0 to 100% (Not required for 1-Step Control)	***Main Menu → Setpoint Configuration***
Switch Limit Setpoint 3	Default = 100% Range 0 to 100% (Not required for 1 or 2-Step Control)	***Main Menu → Setpoint Configuration***

In the following example, 2-step demand limit based on capacity is desired, with the first switch closure limiting the capacity to 60%. The second switch closure is to limit the capacity to 40%. Demand Limit Switch 1 is 60% and Demand Limit Switch 2 is 40%. Since no third-step demand limit is required, Switch Limit Setpoint 3 is set at 0%.

DISPLAY NAME	VALUE
Demand Limit Type Select	1
Switch Limit Setpoint 1	60%
Switch Limit Setpoint 2	40%
Switch Limit Setpoint 3	0%

EXTERNALLY POWERED (4 TO 20 MA) DEMAND LIMIT

The energy management module is required for 4 to 20 mA demand limit control. An externally powered 4 to 20 mA signal must be connected to TB6-1 and TB6-2.

⚠ CAUTION

Care should be taken when interfacing with other control systems due to possible power supply differences, such as a full wave bridge versus a half wave rectification. Connection of control devices with different power supplies may result in permanent damage. Carrier Controller controls incorporate power supplies with half wave rectification. A signal isolation device should be utilized if the signal generator incorporates a full wave bridge rectifier.

To configure demand limit for 4 to 20 mA control based on unit capacity, one parameter must be configured. The parameter is Demand Limit Type Select. The value of the capacity limit will vary linearly for 0% to 100% based on the input signal, where 4 mA is 100% and 20 mA is 0% of total unit capacity.

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Demand Limit Type Select	Default = 0 (None) 4 to 20 mA Control = 2	***Main Menu → Configuration Menu → General Configuration***

In the example shown in Fig. 46, a 4 mA signal is Demand Limit 100%, and a 20 mA Demand Limit signal is 0%. The 4 to 20 mA signal is connected to TB6-1 and TB6-2. The demand limit is a linear interpolation between the 2 values entered. If the machine receives a 12 mA signal, the machine controls will limit the capacity to 50%.

CCN LOADSHED CONTROLLED DEMAND LIMIT

To configure Demand Limit for CCN Loadshed control, the unit Operating Type Control must be in Network control. With the Carrier Controller display, the machine must be started in Network Mode. Network control can be verified from the GENUNIT table. The unit must be controlled by an external loadshed device. The device shall be able to force the demand limit variable and directly control the capacity of the machine. Additionally, the unit's set-point will be artificially lowered to force the chiller to load to the demand limit value.

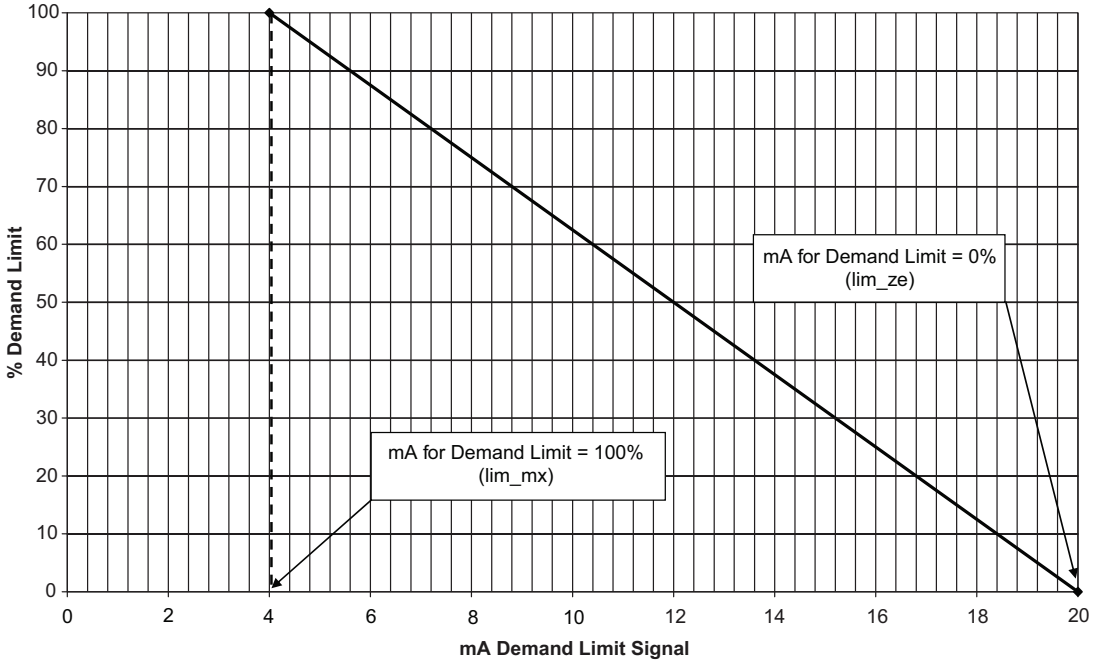


Fig. 46 — Example: 4 to 20 mA Demand Limit

Machine Start Delay

An option to delay the start of the machine is available. This parameter is useful in keeping multiple machines from starting at the same time in case of a power failure. The parameter has a factory default of 1 minute. This parameter also has a role in the timing for a chilled water flow switch alarm. To configure this option with the Carrier Controller display, select ***Main Menu → Configuration Menu → General Configuration*** and select Unit Off to On Delay.

Ice Storage Operation

Chiller operation can be configured to make and store ice. The energy management module (EMM), an Ice Done Switch, microchannel heat exchanger (MCHX) condenser coils, and the brine application option (H in position 11 of the unit model number) are required for operation in Ice Mode. In this configuration, the machine can operate with up to 3 cooling setpoints: Cooling Setpoint 1 is used during the Occupied period, Cooling Setpoint 2 is used during the Unoccupied period when the ice build is complete (Ice Done Switch is closed), and Cooling Ice Setpoint is used during the unoccupied period while ice is building (Ice Done Switch is open). Refer to the 30RC Typical Field Wiring Schematic on page 114 for Ice Done Switch wiring.

To configure this option with the Carrier Controller display:

DISPLAY NAME	VALUE	PATH
Ice Mode Enable	Drop Down Selection (YES/NO) Default = No	***Main Menu → Configuration Menu General Configuration***
Cooling Ice Setpoint	Default = 44°F (6.7°C) Range = –20 to 78.8°F (–29 to 26°C)	***Main Menu → Setpoint Configuration***

Alarm Control

ALARM ROUTING CONTROL

Alarms recorded on the chiller can be routed through the CCN. To configure this option, the Carrier Controller controls must be configured to determine which CCN elements will receive and process alarms. Input for the decision consists of 8 digits, each of which can be set to either 0 or 1. Setting a digit to 1 specifies that alarms will be sent to the system element that corresponds to that digit. Setting all digits to 0 disables alarm processing. The factory default is 00000000. See Fig. 47. The default setting is based on the assumption that the unit will not be connected to a network. If the network does not contain a ComfortVIEW™, ComfortWORKS™, TeLink, DataLINK™, or BACLink module, then enabling this feature will only add unnecessary activity to the CCN communication bus.

Typical configuration of the Alarm Routing variable is 11010000. This Alarm Routing status will transmit alarms to ComfortVIEW™ software, TeLink, BACLink, and DataLINK.

This option cannot be configured with the Carrier Controller display. To change the alarm control routing through the Network Service Tool, navigate to point **ALRM_CNT** in table **ALARMDEF**.

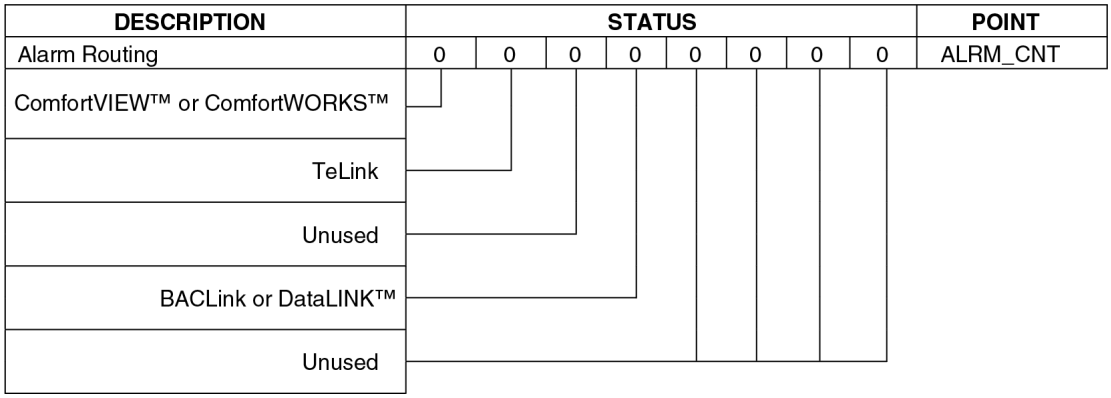


Fig. 47 — Alarm Routing Control

ALARM EQUIPMENT PRIORITY

The Carrier controller software uses the equipment priority value when sorting alarms by level. The purpose of the equipment priority value is to determine the order in which to sort alarms that have the same level. A priority of 0 is the highest and would appear first when sorted. A priority of 7 would appear last when sorted. For example, if 2 chillers send out identical alarms, the chiller with the higher priority would be listed first. The default is 4. This variable can only be changed when using the ComfortVIEW software or Network Service Tool. This variable cannot be changed with the Carrier Controller display. To configure this option with the Network Service Tool, navigate to point **EQP_TYP** in table **ALARMDEF**.

COMMUNICATION FAILURE RETRY TIME

This variable specifies the amount of time that will be allowed to elapse between alarm retries. Retries occur when an alarm is not acknowledged by a network alarm acknowledger, which may use either ComfortVIEW software or TeLink. If acknowledgment is not received, the alarm will be re-transmitted after the number of minutes specified in this decision. This variable can only be changed when using the ComfortVIEW software or Network Service Tool. This variable cannot be changed with the Carrier Controller display. To configure this option with the Network Service Tool, navigate to point **RETRY_TM** in table **ALARMDEF**.

RE-ALARM TIME

This variable specifies the amount of time that will be allowed to elapse between re-alarms. A re-alarm occurs when the conditions that caused the initial alarm continue to persist for the number of minutes specified in this decision. Re-alarming will continue to occur at the specified interval until the condition causing the alarm is corrected. This variable can only be changed when using the ComfortVIEW software or Network Service Tool. This variable cannot be changed with the Carrier Controller display. To configure this option with the Network Service Tool, navigate to point **RE_ALARM** in table **ALARMDEF**.

ALARM SYSTEM NAME

This variable specifies the system element name that will appear in the alarms generated by the unit control. The name can be up to 8 alphanumeric characters in length. This variable can only be changed when using the ComfortVIEW™ software or Network Service Tool. This variable cannot be changed with the Carrier Controller display. To configure this option with the Network Service Tool, navigate to point **ALRM_NAM** in table **ALARMDEF**.

Head Pressure Control

STANDARD UNIT

The Carrier Controller controls the condenser fans to maintain the lowest condensing temperature possible and thus the highest unit efficiency. The Carrier Controller uses the saturated condensing temperature input from the discharge pressure transducer to control the fans. Head pressure control is maintained through a calculated setpoint which is automatically adjusted based on actual saturated condensing and saturated suction temperatures so that the compressor(s) is (are) always operating within the manufacturer's specified envelope (see Fig. 48). The control will automatically reduce the unit capacity as the saturated condensing temperature approaches an upper limit. See capacity overrides 16-17. The control will indicate through an operating mode that high ambient unloading is in effect. If the saturated condensing temperature in a circuit exceeds the calculated maximum, then the circuit will be stopped. For these reasons, there are no head pressure control methods or setpoints to enter. The control will turn off a fan stage when the condensing temperature is below the minimum head pressure requirement for the compressor. Fan sequences are shown in Table 38 and the condenser fan layout with fans operating data is shown in Fig. 49. The fan staging may vary depending on the active override. Fan staging overrides can be verified in the Capacity Control menu (***Main Menu → Maintenance Menu → Capacity Control → Head Control***). Refer to Table 37 for list of fan staging overrides.

Table 37 — Fan Overrides

Override Number	Point Name	Description
0	FAN_NO_OVERRIDE	No Fan override
1	FAN_COOLING_FS__NORMAL_CTRL	Fixed speed fan in cooling - normal control
2	FAN_COOLING_FS__CIR_STOPPING	Fixed speed fan in cooling - Fan Stopping during circuit stopping
3	FAN_COOLING_FS__FAN_START_AT_CP_START	Fixed speed fan in cooling - start one fan at compressor start if capacity is greater than 0%
4	FAN_COOLING_FS__FAN_STOP_SCT_LOW	Fixed speed fan in cooling - fan stop because SCT below the low SCT limit
5	FAN_COOLING_FS__FAN_STOP_FOR_OPTIMIZATION	Fixed speed fan in cooling - fan stop for SEER optimization
6	FAN_COOLING_FS__FAN_ADD_SCT_HIGH	Fixed speed fan in cooling - fan start due to SCT above high SCT limit
7	FAN_COOLING_FS__FAN_ADD_EXTENDED_MAP_EXCEEDED	Fixed speed fan in cooling - fan start due to SCT above extended MAP
10	FAN_COOLING_VS__NORMAL_CTRL	Variable speed fan in cooling - Normal control
11	FAN_COOLING_VS__HIGH_SCT	Variable speed fan in cooling - high SCT: increase maximum speed
12	FAN_COOLING_VS__CIR_STOPPING	Variable speed fan in cooling - Fan stopping during circuit stopping
13	FAN_COOLING_VS__FAN_START	Variable speed fan in cooling - start fan at compressor start if capacity is greater than 0%

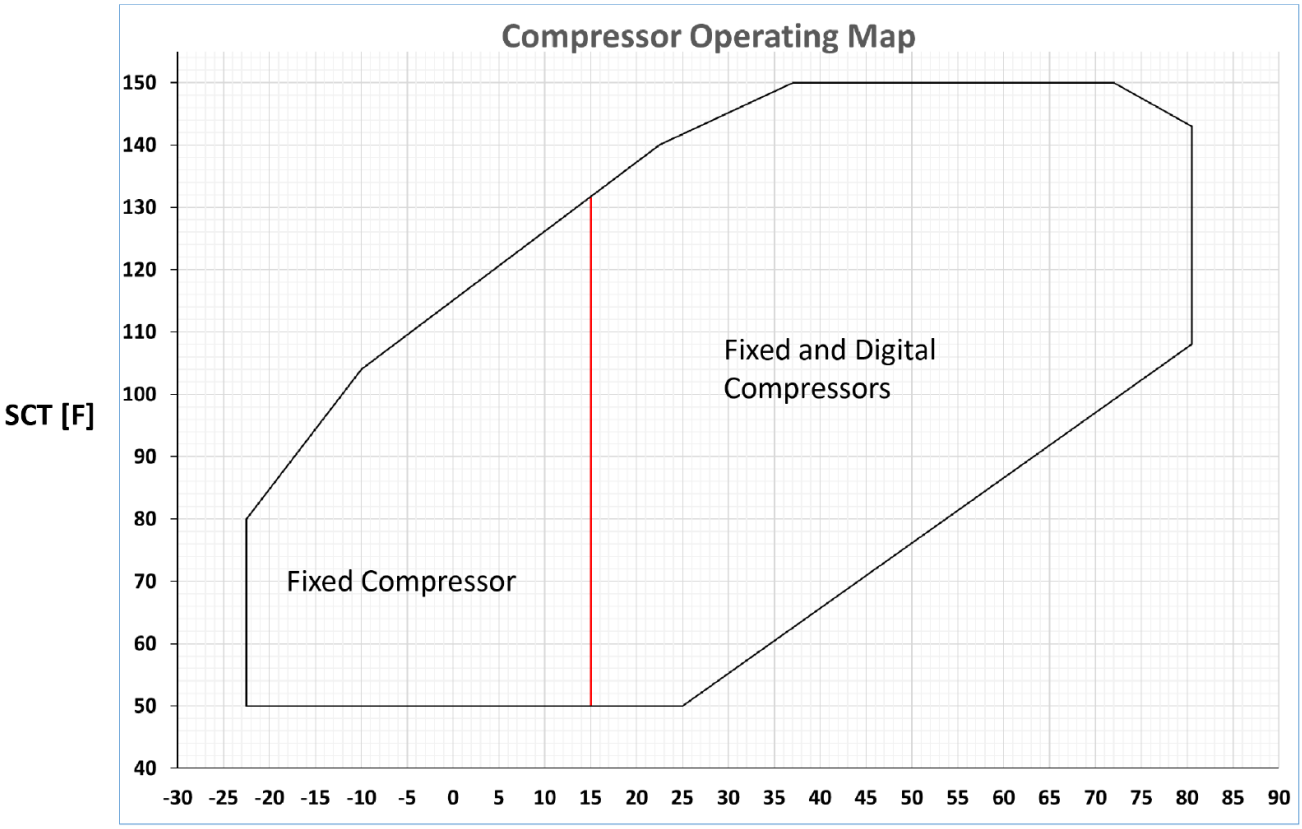


Fig. 48 — Operating Envelope

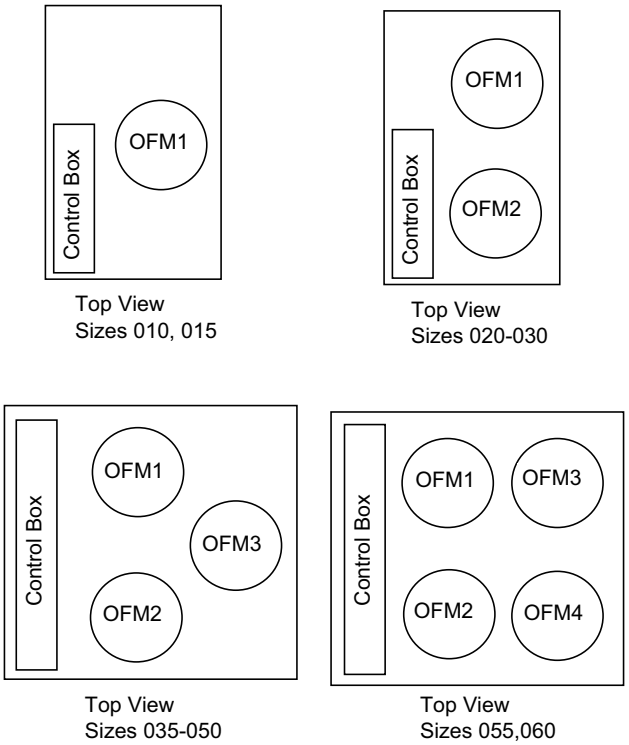


Fig. 49 — Condenser Fan Layout

Table 38 — Fan Stages, Standard Unit

30RC UNIT SIZE	FAN STAGES		
	FAN STAGE	CONTACTOR ENERGIZED	FANS OPERATING
010,015	STAGE 1	VFD	OFM1
018-030	STAGE 1 STAGE 2	FC1 FC1,2	OFM1 OFM1,2
035-050	STAGE 1 STAGE 2 STAGE 3	FC1 FC2 FC1,2	OFM3 OFM1,2 OFM1,2,3
055,060	STAGE 1 STAGE 2 STAGE 3 STAGE 4	FC3 FC1,3 FC3,2 FC1,2,3	OFM4 OFM4,3 OFM4,1,2 OFM1,2,3,4

LEGEND

FC — Fan Contactor
OFM — Outdoor Fan Motor
VFD — Variable Speed Fan

High-Efficiency Variable Condenser Fans (HEVCF) (with Greenspeed® Intelligence)

This option controls the speed of all fans for improvement in part load efficiency and sound levels. All fans on a circuit are controlled by a VFD and run at the same speed.

FAN DRIVE OPERATION

The HEVCF option uses Danfoss VLT®[1] 102 variable frequency drives. Drives are connected to the LEN communication bus. Fan speed is determined by the chiller controller and communicated to the drive. Table 39 lists required configurations for the Danfoss VLT HEVCF option. Variable speed fan and supply voltage are configured in the Factory Parameters screen (***Main Menu → Configuration Menu → Factory Parameters***).

Fan speed is controlled to maintain SCT setpoint. The setpoint is calculated from conditions and adjusted to the most efficient operating point. Fixed setpoints are also used at low ambient and transition conditions. If the unit is operated in Greenspeed Charging Mode (see the Refrigerant Charge section on page 90 for more information), then the SCT setpoint is fixed at 121°F (49.4°C) for adjusting charge.

Table 39 — Danfoss VLT Required Configurations, HEVCF Option

POINT NAME	DESCRIPTION	VALUE
vfan_sel	Variable Speed Fan	Yes
Voltage	Supply Voltage	Nameplate voltage (208,380,460,575)[a]

NOTE(S):
a. 208/230-v units should be configured for 208-v.

PRE-START-UP

Complete the Start-Up Checklist for 30RC Liquid Chillers at the end of this publication. The checklist assures proper start-up of a unit and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

Do not attempt to start the chiller until the following checks have been completed.

System Check

1. Check that auxiliary components, such as the chilled fluid circulating pump, air-handling equipment, or other equipment to which the chiller supplies liquid are operational. Consult manufacturer's instructions. If the unit has field-installed accessories, be sure all are properly installed and wired correctly. Refer to unit wiring diagrams.
2. Fill the chiller fluid circuit with clean water (with recommended inhibitor added) or other non-corrosive fluid to be cooled. Bleed all air out of high points of system. If outdoor temperatures are expected to be below 32°F (0°C), sufficient inhibited propylene glycol or other suitable corrosion inhibited antifreeze should be added to the chiller water circuit to prevent possible freeze-up.

   The chilled water loop must be cleaned before the unit is connected. For units equipped with the DX Cooler and Hydronic Package options, it is recommended that the chiller pumps be equipped with a start-up filter screen to remove particulates from the loop. The start-up filter should be replaced after 24 hours of operation.
3. Check tightness of all electrical connections.
4. Oil should be visible in the compressor sight glass. An acceptable oil level in the compressor is from 3/4 to 7/8 full sight glass. Adjust the oil level as required. No oil should be removed unless the crankcase heater has been energized for at least 24 hours. See Oil Charge section for Carrier-approved oils.
5. Electrical power source must agree with unit nameplate.
6. Crankcase heaters must be firmly seated under the compressor and must be energized for 24 hours prior to start-up.
7. Verify power supply phase sequence. If power monitor option is included with chiller, check reverse rotation board. If lower (red) LED is blinking, the phase sequence is incorrect. Reverse 2 of the power wires at the main terminal block. If no phase monitor is present, run a fan in quick test mode and verify correct orientation (airflow from bottom to top). If using variable speed fans with no phase monitor, verify proper sequence of L1-L2-L3.

1. Third-party trademarks and logos are the property of their respective owners.

START-UP

Actual Start-Up

Actual start-up should be done only under supervision of a qualified refrigeration technician.

1. Using the Carrier Controller control, set leaving-fluid setpoint (***Main Menu → Setpoint Configuration → Cooling Setpoint 1***). No cooling range adjustment is necessary.
2. If optional control functions or accessories are being used, then the unit must be properly configured. Refer to Configuration Options section for details.
3. Start the chilled fluid pump if unit is not configured for pump control (***Main Menu → Configuration Menu → Pump Configuration → Evaporator Pumps Sequence* = No Pumps (0)**).
4. Complete the Start-Up Checklist to verify all components are operating properly.
5. Press the Start/Stop button located in the upper right corner of the Carrier Controller display and then select Local On.
6. Allow unit to operate and confirm that everything is functioning properly. After unit operation stabilizes, check to see that leaving setpoint Control Point (***Main Menu → Setpoint Configuration → Cooling Setpoint 1***) agrees with leaving fluid temperature (***Main Menu → Temperatures → Leaving Fluid***).

Operating Limitations

TEMPERATURES

Unit operating temperature limits are listed in the table below.

TEMPERATURE	°F	°C
Maximum Ambient Temperature	125	51.7
Minimum Ambient Temperature[a]	32	0
Maximum Evaporator EWT [b]	95	35
Maximum Evaporator LWT	70	21.1
Minimum Evaporator LWT	40[c]	4.4
Maximum Evaporator Glycol EWT [b]	95	35
Minimum Evaporator Glycol LWT	38	3.3

NOTE(S):
a. Lowest allowable ambient temperature for the standard unit to start and operate is 32°F (0°C). With the inclusion of wind baffles and variable speed fans (field fabricated and installed), the unit is capable of starting as low as 0°F (–17.8°C) and operating as low as –20°F (–29°C) ambient temperature.
b. For sustained operation, EWT should not exceed 80°F (26.7°C).
c. Unit requires brine fluid for operation below this temperature.

LEGEND

EWT — Entering Fluid (Water) Temperature
LWT — Leaving Fluid (Water) Temperature

Low Ambient Temperature Operation

If unit operating temperatures below 32°F (0°C) are expected, the following measures are recommended:

- Consider higher loop volumes, at least 6 gallons per nominal ton.
- Loop freeze protection with glycol is strongly recommended to a minimum of 15°F (8.3°C) below lowest anticipated ambient temperature.
- Chilled water pump control is required.
- If wind velocity is expected to be greater than 5 mph (8 km/h), then the wind baffle accessory must be installed. See the 30RC Installation Instructions for more information.

VOLTAGE

Main Power Supply

Minimum and maximum acceptable supply voltages are listed in the Installation Instructions.

Unbalanced 3-Phase Supply Voltage

Never operate a motor where a phase imbalance between phases is greater than 2%.

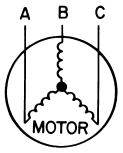
To determine percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

The maximum voltage deviation is the largest difference between a voltage measurement across 2 legs and the average across all 3 legs.

Example: Supply voltage is 240-3-60.

AB = 243-v
BC = 236-v
AC = 238-v



Corner Grounded Delta Supply

The optional Fan VFDs used on 30RC units are automatically compatible with a Corner Grounded Delta Power Supply to the system. No changes are required to be made to the VFDs.

1. Determine average voltage:

$$\text{Average voltage} = \frac{243 + 236 + 238}{3} = \frac{717}{3} = 239$$

2. Determine maximum deviation from average voltage:
   (AB) 243 – 239 = 4-v
   (BC) 239 – 236 = 3-v
   (AC) 239 – 238 = 1-v
   Maximum deviation is 4-v.
3. Determine percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{239} = 1.7\%$$

   This voltage imbalance is satisfactory as it is below the maximum allowable of 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact the local electric utility company immediately. Do not operate unit until imbalance condition is corrected.

MINIMUM FLUID LOOP VOLUME

To obtain proper temperature control, chilled water loop fluid volume must be at least 3 gallons per ton (3.25 L per kW) of chiller nominal capacity for air conditioning and at least 6 gallons per ton (6.5 L per kW) for process applications or systems that must operate at low ambient temperatures (below 32°F [0°C]).

FLOW RATE REQUIREMENTS

Standard chillers should be applied with nominal flow rates within those listed in the Minimum and Maximum Evaporator Flow Rates table. Higher or lower flow rates are permissible to obtain lower or higher temperature rises. Minimum flow rates must be exceeded to assure turbulent flow and proper heat transfer in the evaporator and partial heat recovery desuperheaters, if equipped. Maximum flow rates should not be exceeded so as to not fall below the minimum fluid temperature change across the heat exchangers, 5°F (2.8°C) for the evaporators. See Table 40. See Fig. 50-65 for evaporator pressure drop curves.

⚠ CAUTION

Operation below minimum flow rate could generate alarms, which could result in damage to the heat exchangers.

Consult application data section in the Product Data literature and job design requirements to determine flow rate requirements for a particular installation.

Table 40 — Minimum and Maximum Cooler Flow Rates

30RC UNIT SIZE	MINIMUM COOLER FLOW RATE (GPM)	MAXIMUM COOLER FLOW RATE (GPM)	MINIMUM COOLER FLOW RATE (L/S)	MAXIMUM COOLER FLOW RATE (L/S)
010	13	45	0.8	2.8
015	20	63	1.3	3.9
020	23	91	1.5	5.7
025	28	112	1.8	7.1
030	33	133	2.1	8.4
035	41	164	2.6	10.3
040	47	186	3.0	11.7
045	53	209	3.3	13.2
050	57	228	3.6	14.4
055	63	251	4.0	15.8
060	68	270	4.3	17.0

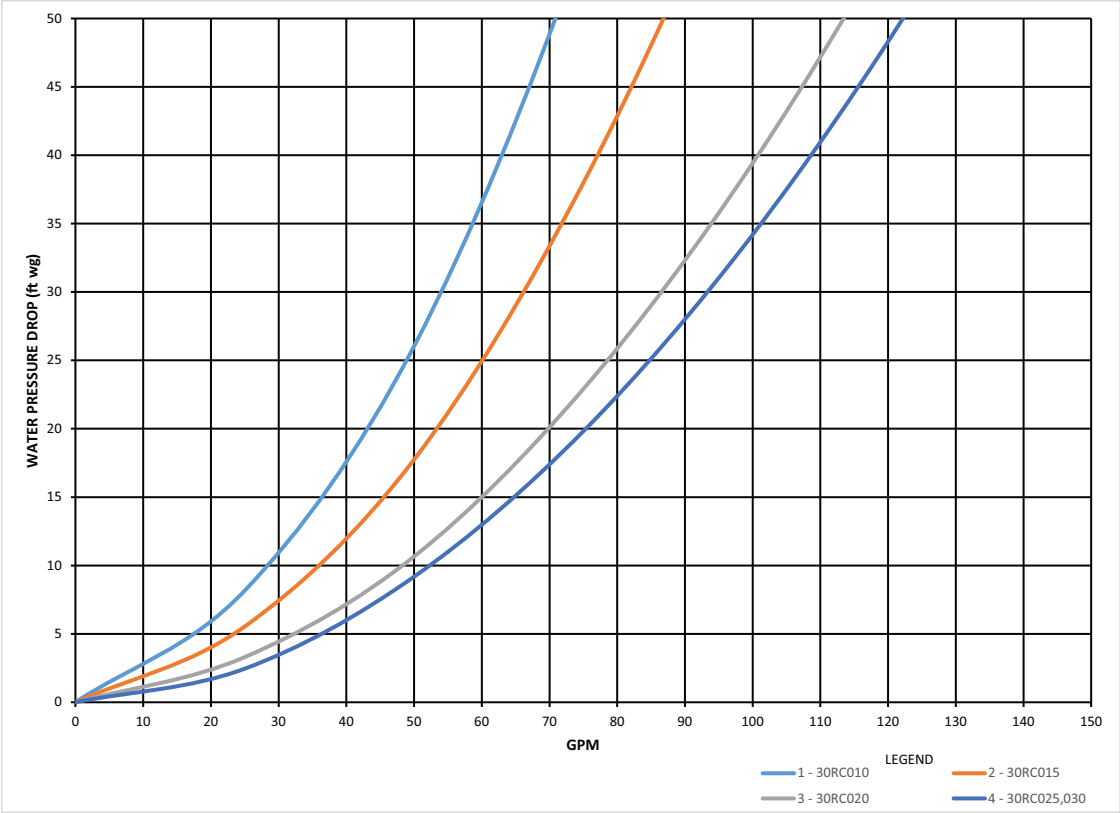


Fig. 50 — 30RC 010-030 BPHE Pressure Drop Curves (English)

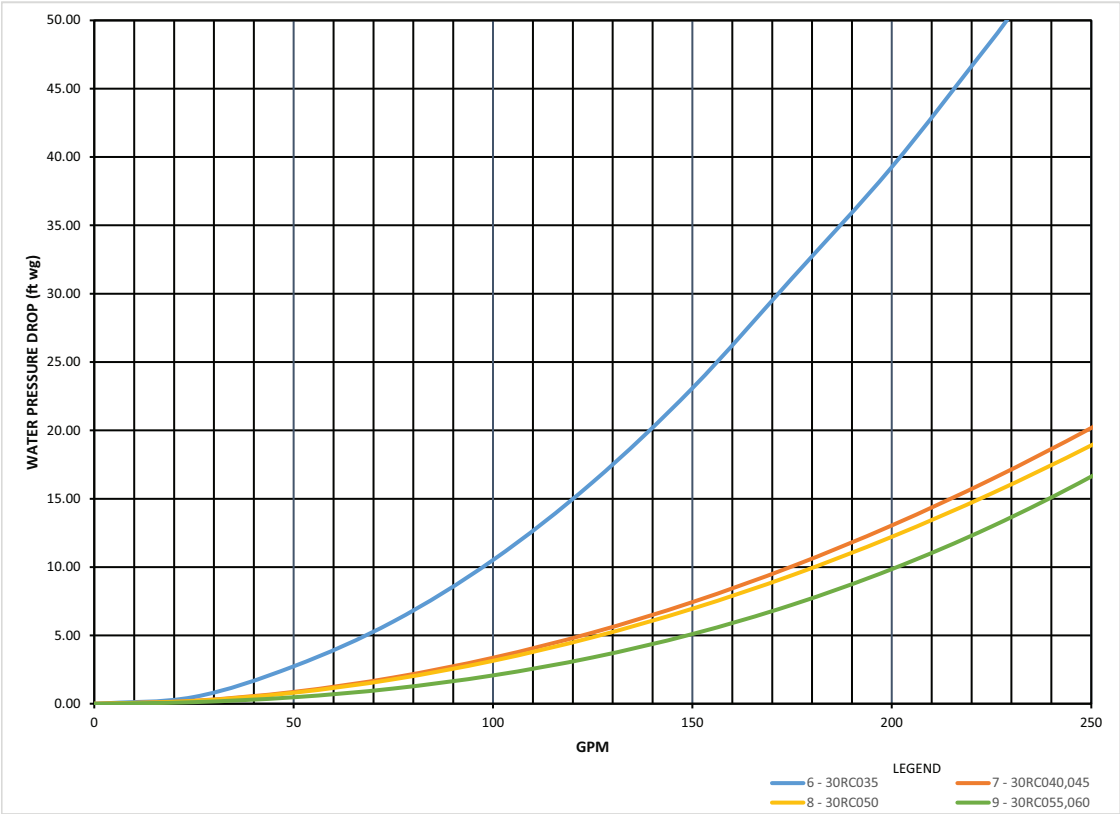


Fig. 51 — 30RC 035-060 BPHE Pressure Drop Curves (English)

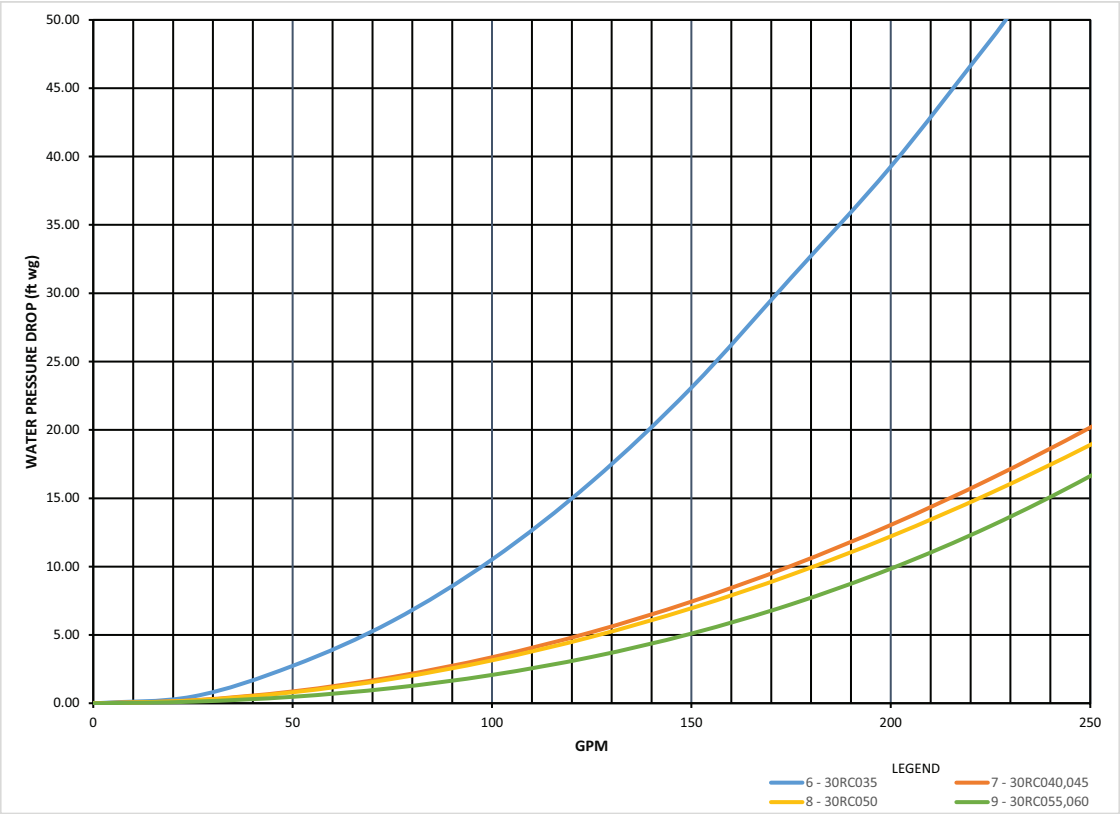


Fig. 52 — 30RC 010-030 BPHE Pressure Drop Curves (SI)

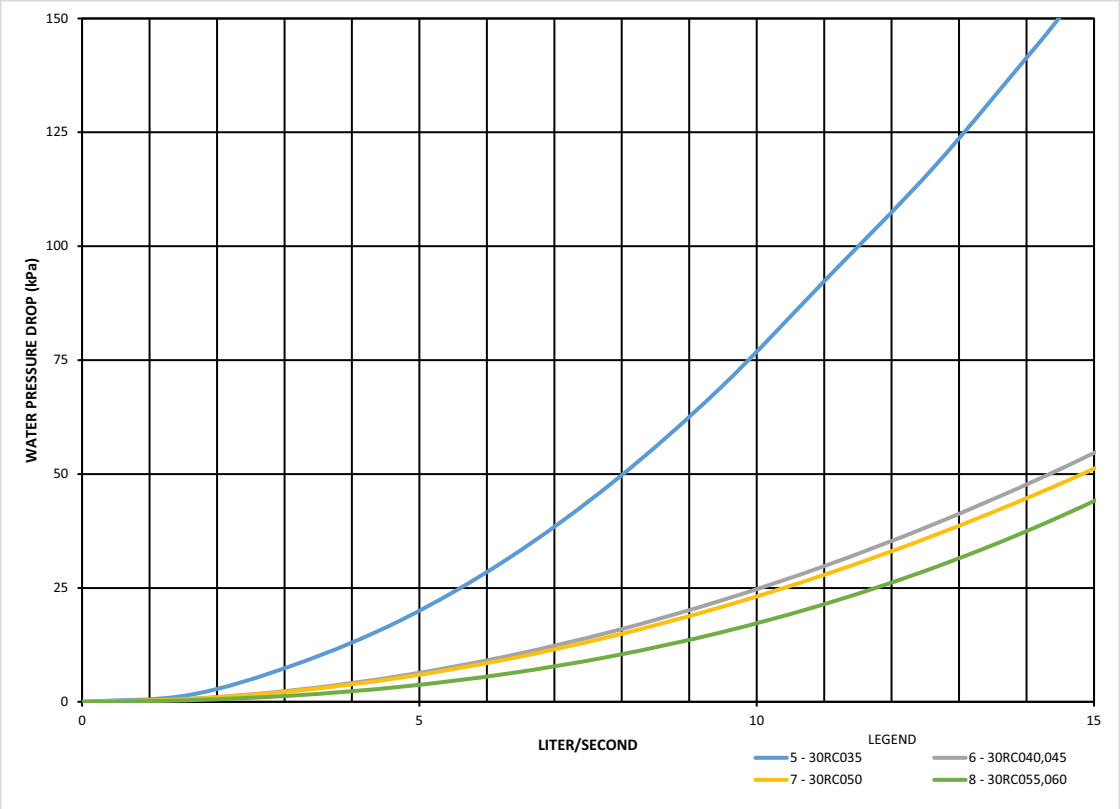


Fig. 53 — 30RC 035-060 BPHE Pressure Drop Curves (SI)

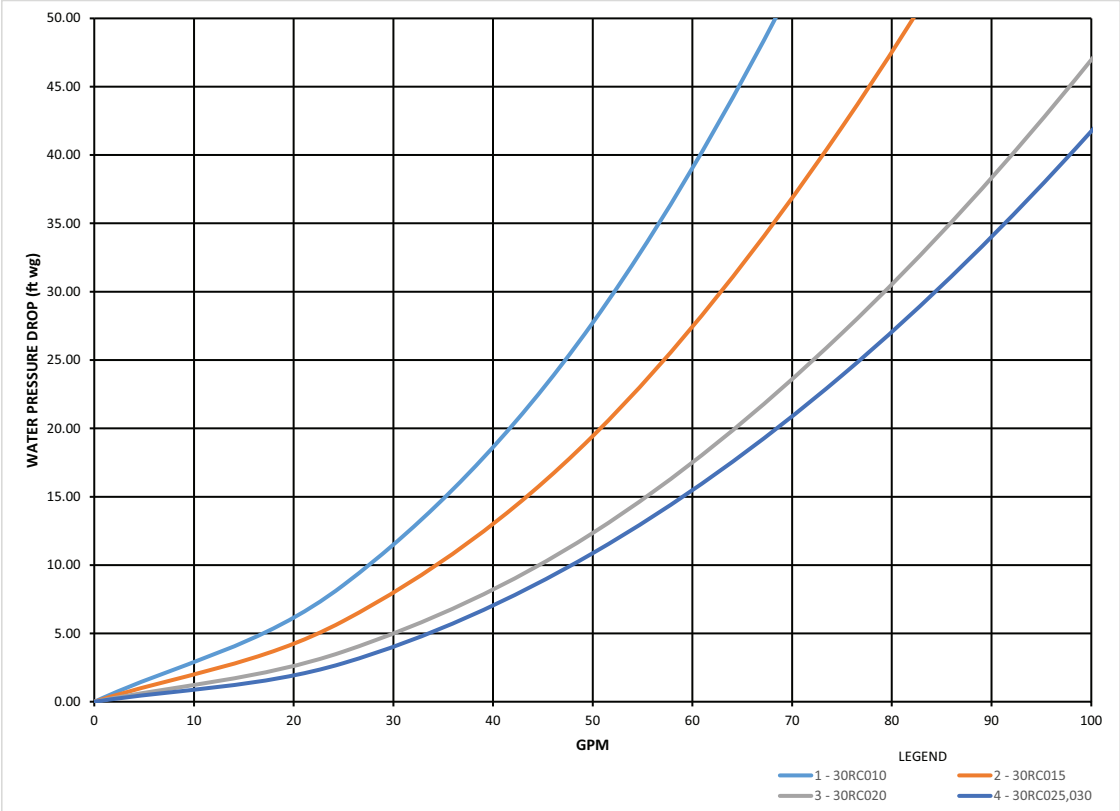


Fig. 54 — 30RC 010-030 Unit Pressure Drop Curves (English)

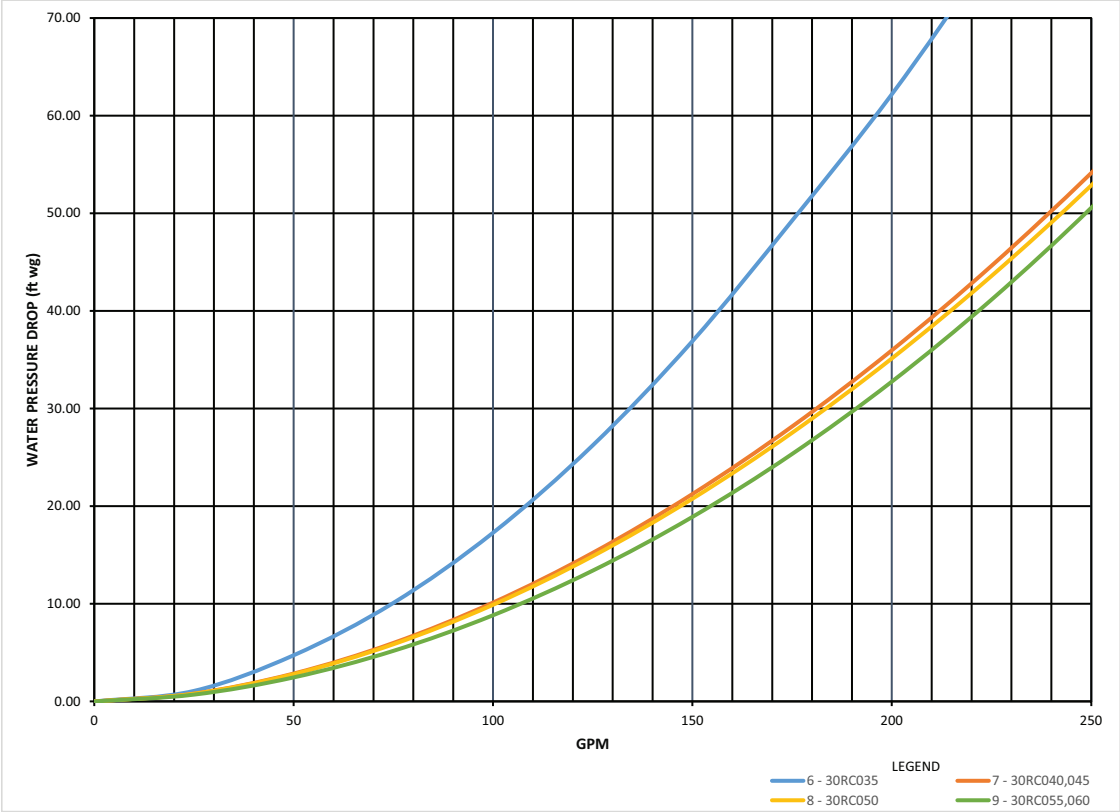


Fig. 55 — 30RC 035-060 Unit Pressure Drop Curves (English)

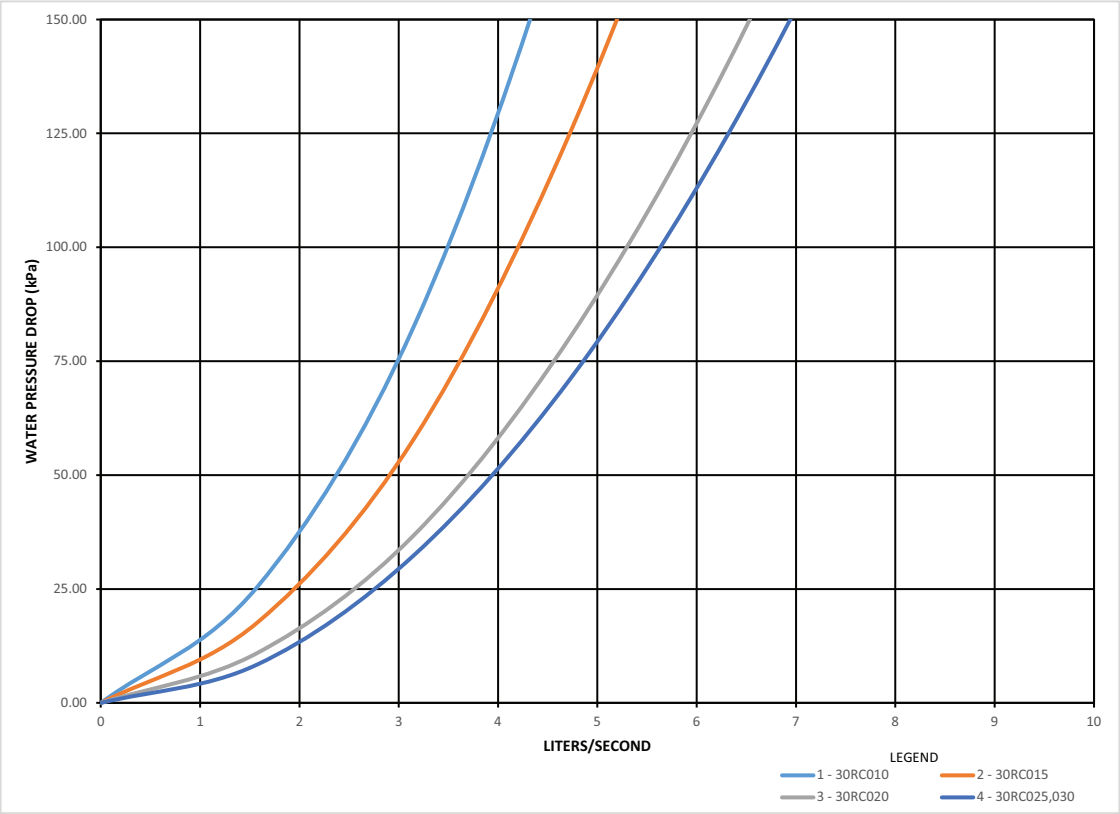


Fig. 56 — 30RC 010-030 Unit Pressure Drop Curves (SI)

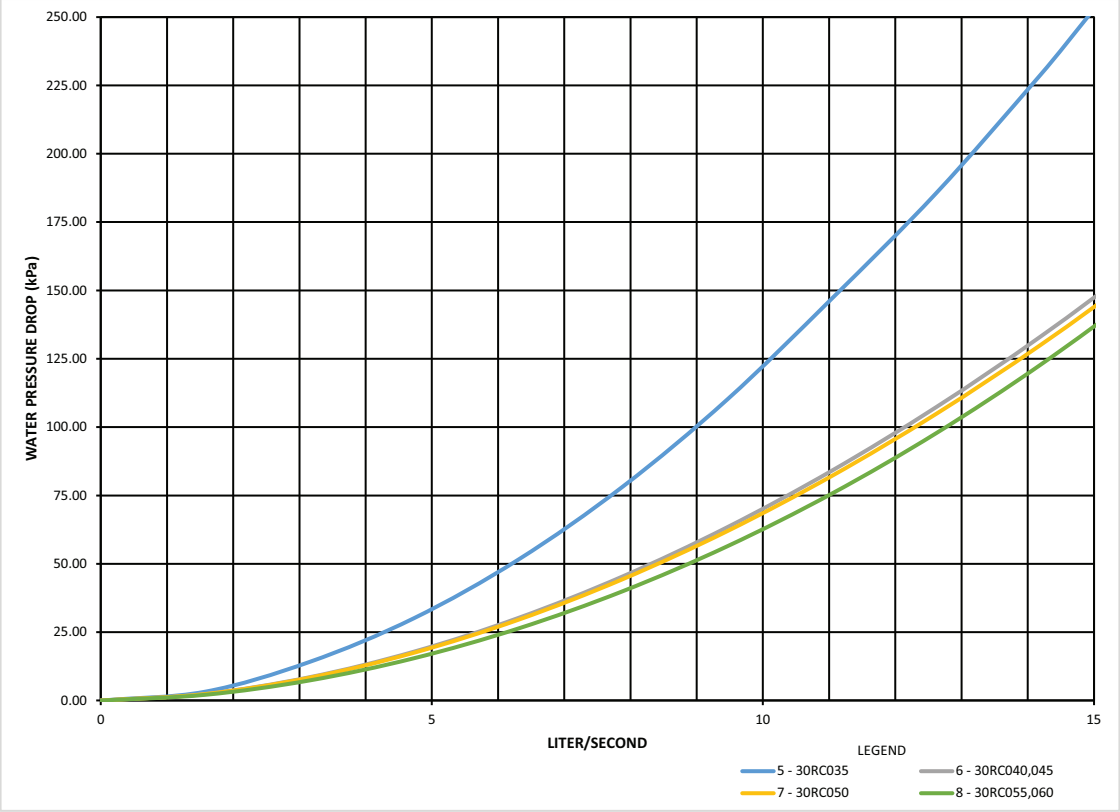


Fig. 57 — 30RC 035-060 Unit Pressure Drop Curves (SI)

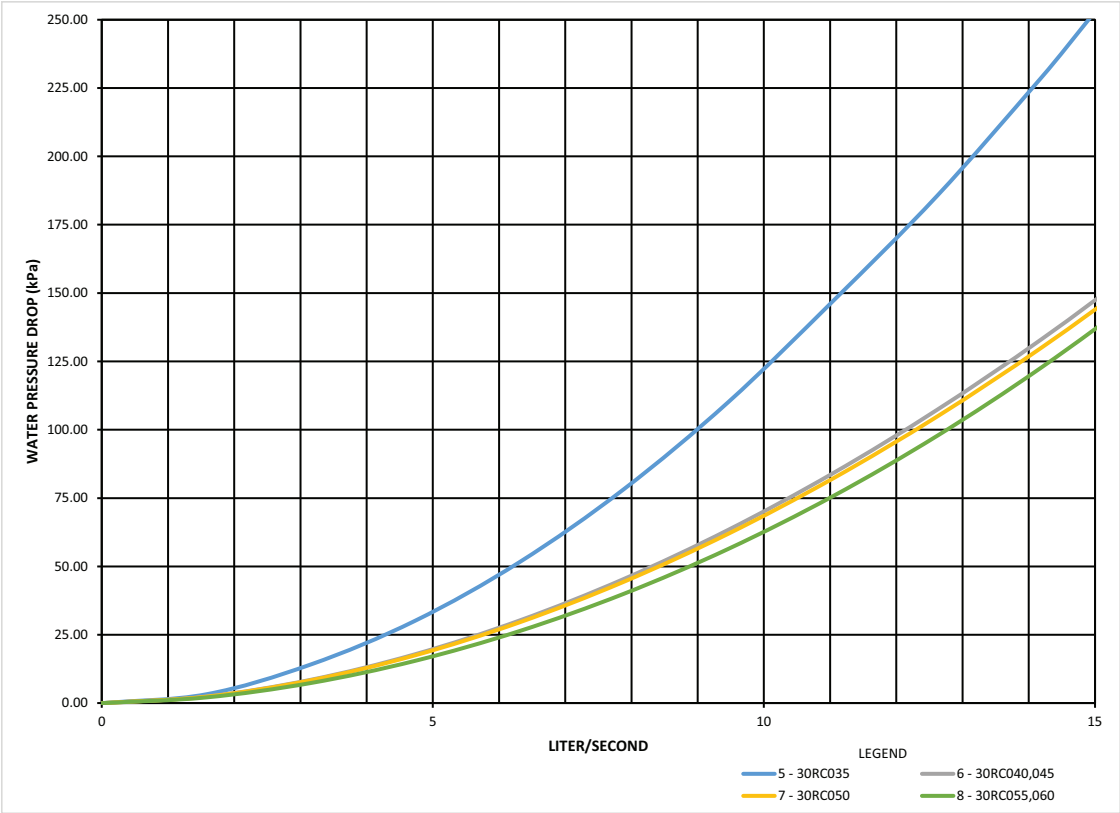


Fig. 58 — 30RC 010-030 Single Pump Pressure Drop Curves (English)

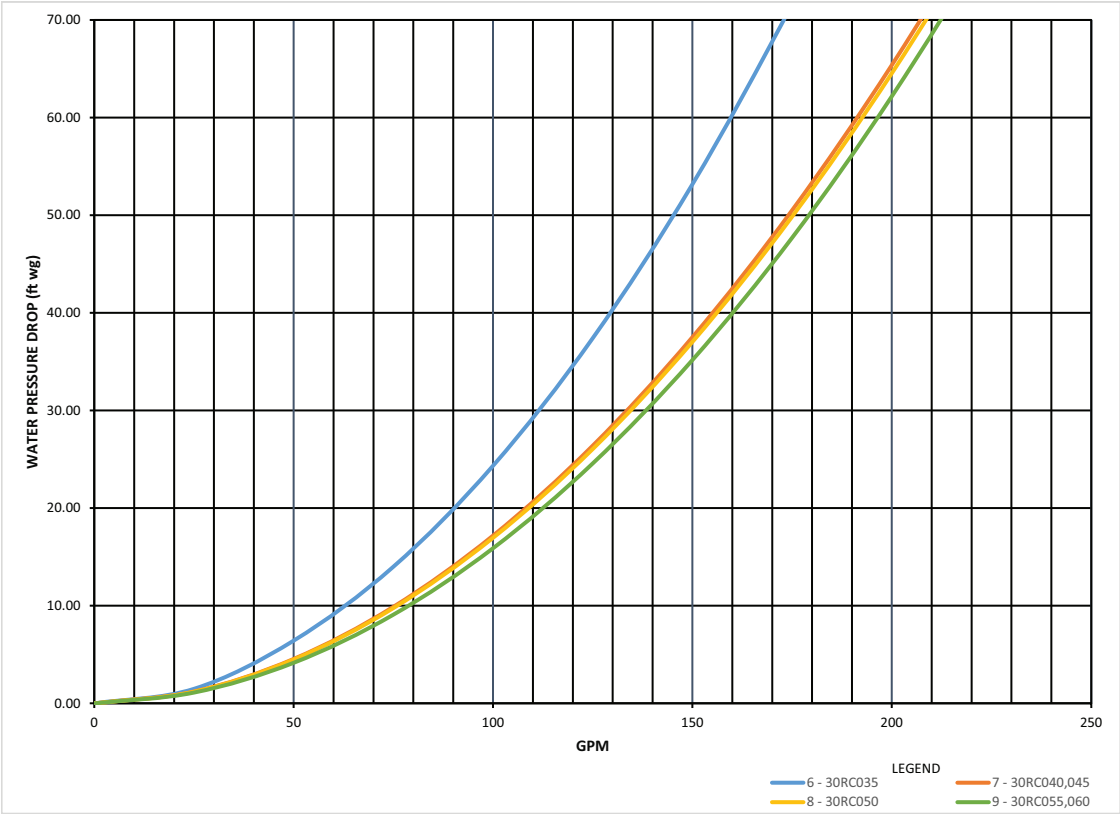


Fig. 59 — 30RC 035-060 Single Pump Pressure Drop Curves (English)

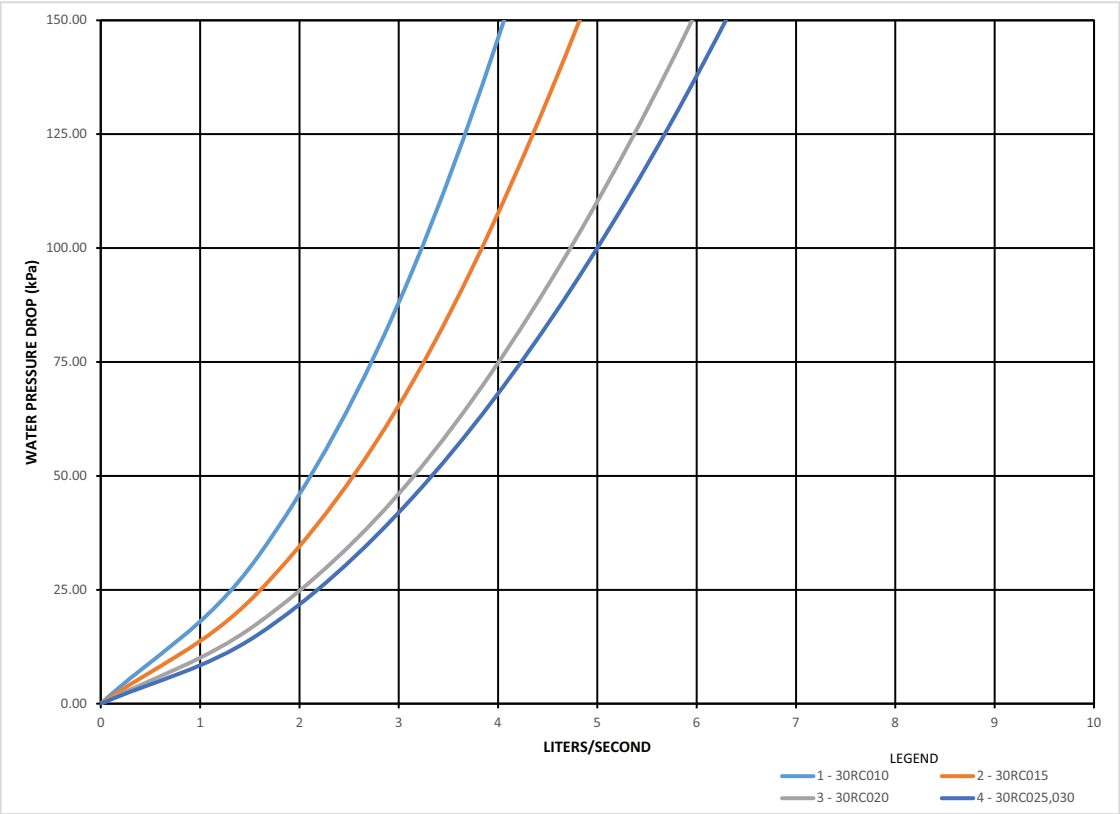


Fig. 60 — 30RC 010-030 Single Pump Pressure Drop Curves (SI)

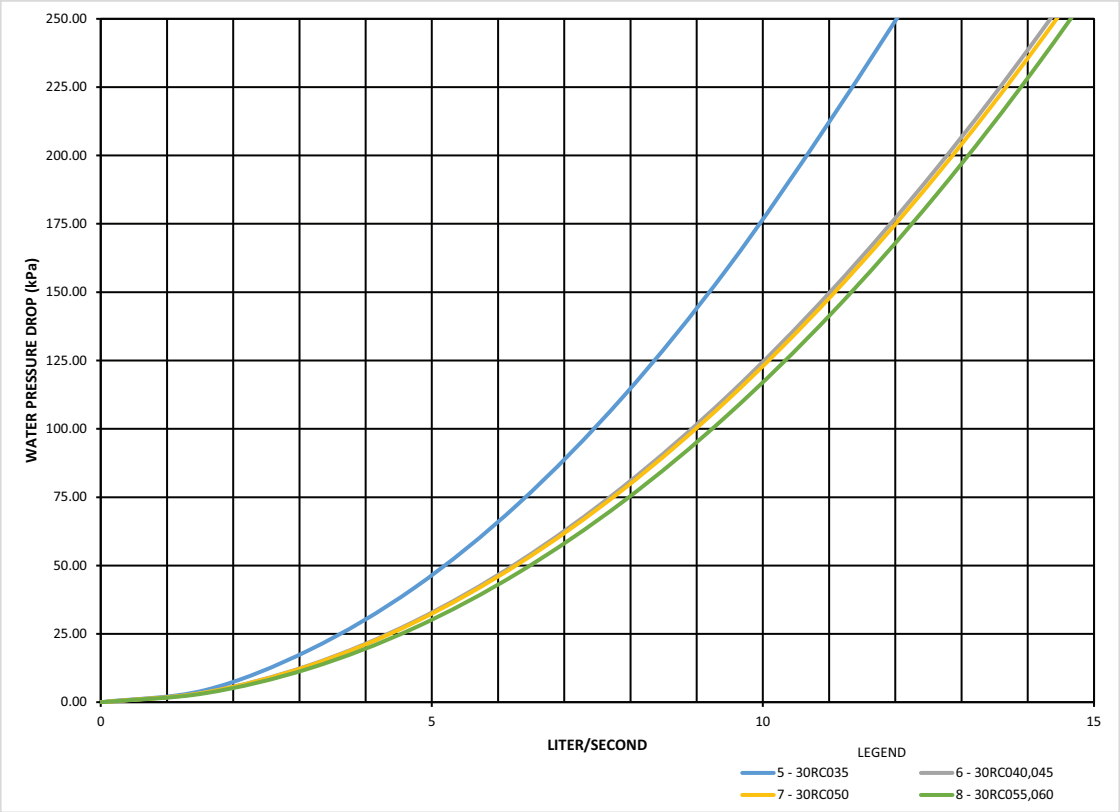


Fig. 61 — 30RC 035-060 Single Pump Pressure Drop Curves (SI)

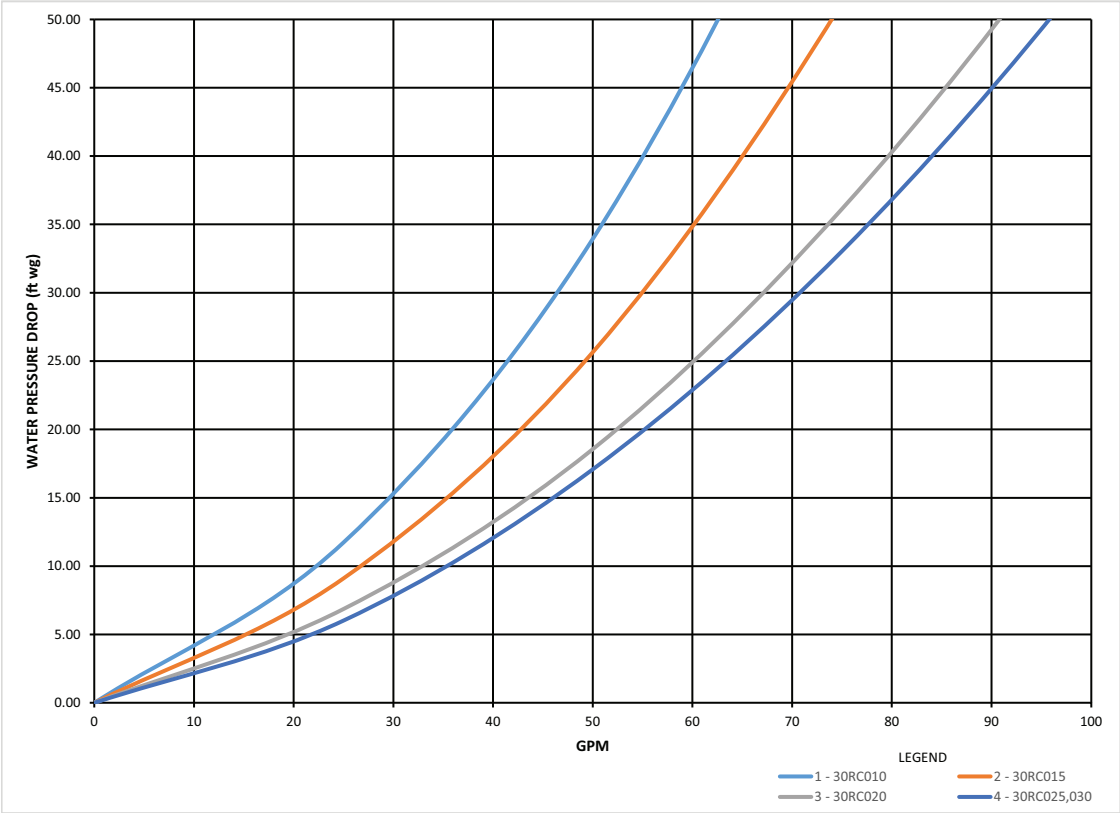


Fig. 62 — 30RC 010-030 Dual Pump Pressure Drop Curves (English)

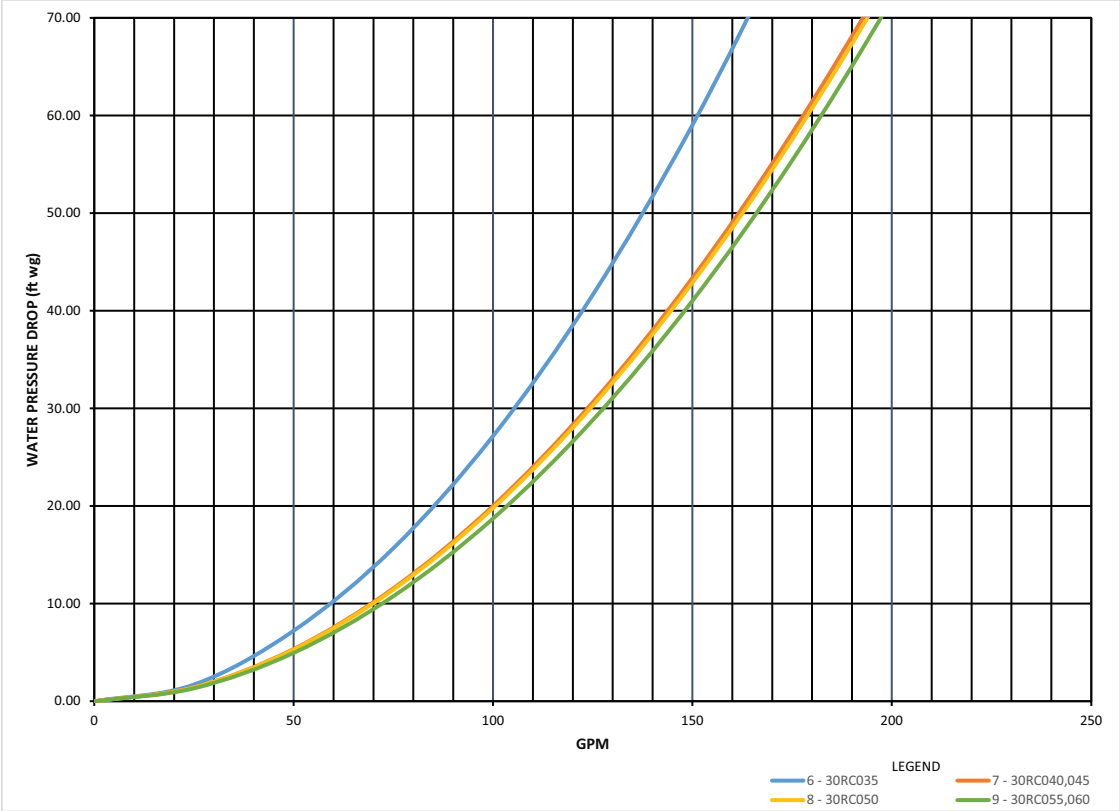


Fig. 63 — 30RC 035-060 Dual Pump Pressure Drop Curves (English)

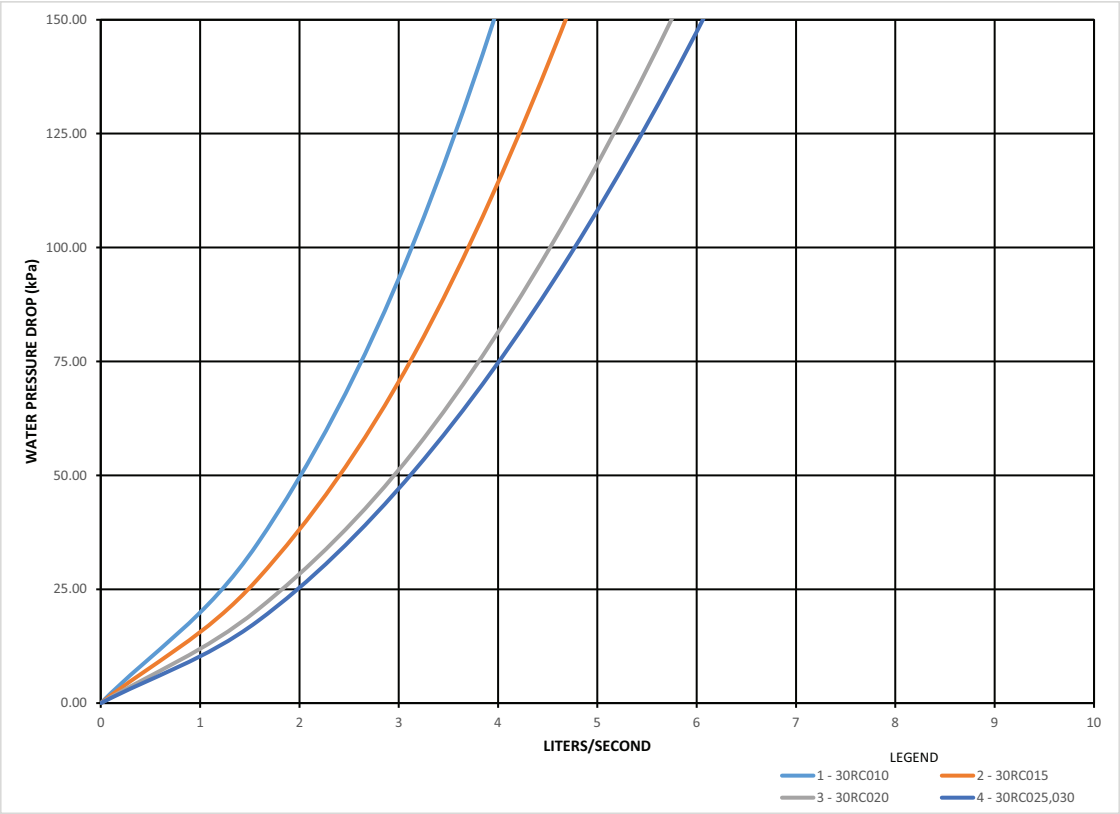


Fig. 64 — 30RC 010-030 Dual Pump Pressure Drop Curves (SI)

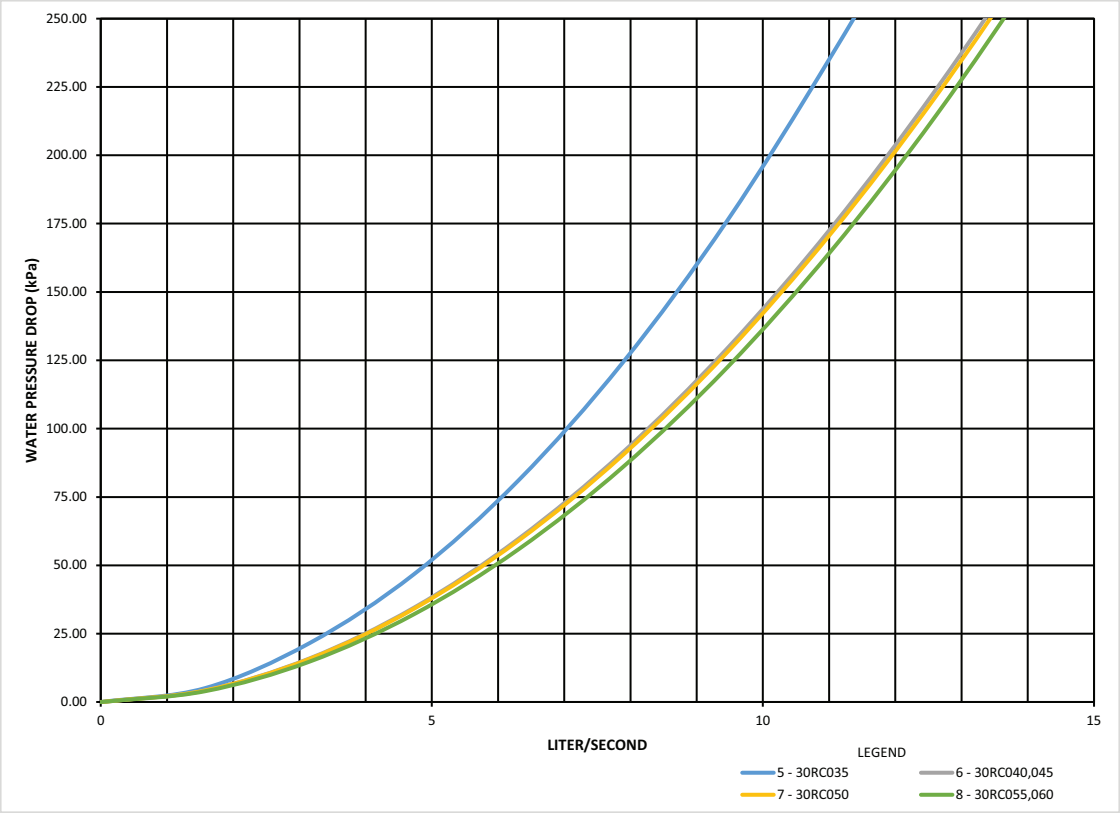


Fig. 65 — 30RC 035-060 Dual Pump Pressure Drop Curves (SI)

OPERATION

Sequence of Operation

With a command to start the chiller, the evaporator pump will start. After verifying water flow, the control will monitor the entering and leaving water temperature. At any time that a compressor is not operating, its crankcase heater is active. If the need for mechanical cooling is determined, the control decides which circuit and compressor to start. The compressor will de-energize the crankcase heater as it starts. Compressors will be staged to maintain LWT setpoint. Hot Gas Bypass (if equipped and configured) can be utilized as last stage to maintain LWT setpoint.

Shutdown of each circuit under normal conditions occurs sequentially. One compressor will be shut down every 8 to 16 seconds until all compressors have been de-energized. If hot gas bypass is equipped, then hot gas bypass will be the last stage before shutdown. The EXV will close completely 40 seconds after the last compressor has shut down. There are several abnormal conditions that, if detected, will shut down the circuit immediately. In this case, hot gas bypass and all compressors are turned off without an 8-second interval between them. The evaporator pump will remain ON for 1 minute after the last compressor has been turned OFF.

Dual Chiller Sequence of Operation

With a command to start the chiller, the primary chiller determines which chiller will become the lead chiller based on the configuration of Lead Lag Select (**lead_sel**) and Lead/Lag Balance Delta (**ll_bal_d**). The lead chiller is always started first and the lag chiller is held at 0% capacity by the primary chiller, forcing the lag demand limit value to 0%. If Lead Pulldown Time (**lead_pul**) has been configured, the lead chiller will continue to operate alone for that specified time. After the Lead Pulldown Time timer has elapsed, and when the lead chiller is fully loaded, either all available compression is on or at the primary demand limit value, then the lag start timer (**lstr_tim**) is initiated.

When the pulldown time and lag start time have elapsed and the combined leaving chilled water temperature is more than 4°F (–2.2°C) above the setpoint, then the lag chiller is started. If the lag chiller's water pump was not started when the machines went into occupied mode, then the lag chiller water pump will be started. The lag chiller will start with the primary chiller forcing the lag chiller demand limit value (**LAG_LIM**) to the primary's demand limit value. The primary will then be responsible for water loop capacity calculation and will determine which chiller (lead or lag) will increase or decrease capacity. When the load reduces, the lag chiller will be the first chiller to unload. To accomplish this, the lead chiller setpoint is decreased by 4°F (–2.2°C) until the lag chiller unloads.

PUMP OPERATION

For parallel chiller pump operation, the primary chiller's water pump will be started. The lag chiller's water pump will be maintained off if Lag Unit Pump Control = 0 (***Main Menu → Configuration Menu → Primary/Secondary → Lag Unit Pump Control***). The internal algorithm of the lead chiller will control capacity of the lead chiller.

Operating Modes

Operating modes are override modes that affect normal operation of the equipment. More than one operating mode can be in effect at the same time. Some operating modes have corresponding capacity control overrides (see the Capacity Control Overrides section on page 38).

For the Carrier Controller display, the status of the operating modes can be found by accessing the Modes Menu (***Main Menu → Modes***). Each operating mode and its status (Yes = active, No = inactive) is listed. See Table 41 for a list of operating modes.

Table 41 — 30RC Operating Modes

OPERATING MODE NUMBER	DESCRIPTION	STATUS
1	Start Up Delay in Effect	Yes/No
2	Second Setpoint in Use	Yes/No
3	Reset in Effect	Yes/No
4	Demand Limit Active	Yes/No
5	Ramp Loading Active	Yes/No
6	Water Exchanger Heater	Yes/No
7	Water Pump Rotation	Yes/No
8	Pump Periodic Start	Yes/No
9	Low Suction Circuit A	Yes/No
10	Low Suction Circuit B	Yes/No
11	High DGT Circuit A	Yes/No
12	High DGT Circuit B	Yes/No
13	High Press Override CirA	Yes/No
14	High Press Override CirB	Yes/No
15	Low Delta Press Cir A	Yes/No
16	Low Delta Press Cir B	Yes/No
17	Night Low Noise Active	Yes/No
18	System Manager Active	Yes/No
19	Primary Secondary Active	Yes/No
20	Auto Changeover Active	Yes/No
23	Boiler Active	Yes/No
25	Heating Low EWT Lockout	Yes/No
26	Ice Mode in Effect	Yes/No

STARTUP DELAY IN EFFECT

This mode is checked for when the unit is started. This mode is active when the Minutes Off Time (***Main Menu → Configuration Menu → General Configuration → Unit Off to On Delay***) timer is active. The unit will not start until the timer has expired. The mode will terminate when the timer expires.

SECOND SETPOINT IN USE

This mode is checked for when the unit is ON. The mode is active when Cooling Setpoint 2 (***Main Menu → Setpoint Configuration → Cooling Setpoint 2***) or Cooling Ice Setpoint (***Main Menu → Setpoint Configuration → Cooling Ice Setpoint***) is in use. While in this mode, the Current Setpoint (***Main Menu → General Parameters → Current Setpoint***) will show the Cooling Setpoint 2 or Cooling Ice Setpoint value.

While in this mode, the unit will operate to the Cooling Setpoint 2 or Cooling Ice Setpoint. The mode will terminate when the second setpoint is no longer in use.

RESET IN EFFECT

This mode is checked for when the unit is ON. The mode will be active when Cooling Reset Select (***Main Menu → Configuration Menu → Reset Configuration → Cooling Reset Select***) is enabled by setting the value (1 = Outside Air Temperature, 2 = Fluid Delta T, 3 = 4 to 20 mA Input, 4 = Space Temperature) and reset is active.

While in this mode, the Current Setpoint (***Main Menu → General Parameters → Current Setpoint***) will be modified according to the programmed information and will be displayed as the Control Point (***Main Menu → General Parameters → Control Point***). The mode will terminate when the Temperature Reset is not modifying the active leaving water setpoint, causing the Current Setpoint to equal the Control Point.

DEMAND LIMIT ACTIVE

This mode is checked for when the unit is ON. The mode is active when Demand Limit Type Select (***Main Menu → Configuration Menu → General Configuration → Demand Limit Type Select***) is enabled, either by setting the value to 1 = Switch Control or 2 = 4 to 20 mA Control or setting the Night Capacity Limit (***Main Menu → Configuration Menu → General Configuration → Night Capacity Limit***). The Active Demand Limit Value (***Main Menu → General Parameters → Active Demand Limit Value***) will display the current demand limit according to the programmed information, and the unit's capacity will be reduced to the amount shown or lower. The mode will terminate when the Demand Limit command has been removed.

RAMP LOADING ACTIVE

This mode is tested when the unit is ON. This mode is active when Ramp Loading (***Main Menu → Configuration Menu → General Configuration → Ramp Loading Select***) is enabled and the following conditions are met:

1. The leaving water temperature is more than 4°F (2.2°C) from the Control Point (***Main Menu → General Parameters → Control Point***), and
2. The rate of change of the leaving water temperature is greater than the Cool Ramp Loading (***Main Menu → Setpoint Configuration → Cooling Ramp Loading***).

The control will limit the capacity step increase until one of the 2 conditions is no longer true. This mode will terminate once both conditions are no longer true. This mode is in effect only when capacity is being limited by the ramp loading function.

WATER EXCHANGER HEATER

This mode is tested when unit is ON (operating mode) or OFF. This mode is active when the water exchanger heater is energized, if the Outdoor Air Temperature (***Main Menu → Temperatures → Outdoor Air Temp***) is less than the calculated value (Freeze Setpoint + Water Exchanger Heater Delta T Setpoint [***Main Menu → Configuration Menu → Service Configuration → Exch. Heater Delta Spt***] default – 3.4°F [1.9°C]) and either the Leaving Water Temperature (***Main Menu → Temperatures → Leaving Fluid Temp***) or the Entering Water Temperature (***Main Menu → Temperatures → Entering Fluid Temp***) are less than or equal to the Freeze Setpoint + Water Exchanger Heater Delta T Setpoint.

The Freeze Setpoint is 34°F (1.1°C) for comfort cooling units with fresh water. The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) is 1. The Freeze Setpoint is the Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***) for Low Temperature Brine systems (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type* = 3**).

The water exchanger heater will be de-energized when both the Entering Water Temperature (EWT) and Leaving Water Temperature (LWT) are above the Freeze Setpoint + Water Exchanger Heater Delta T Setpoint. This mode will be enabled for freeze protection. If the temperatures are not as described above, check the accuracy of the outside air, entering, and leaving water thermistors.

WATER PUMP ROTATION

This mode is always checked. The mode is active when the Evaporator Pump Sequence (***Main Menu → Configuration Menu → Pump Configuration → Evaporator Pumps Sequence***) value is set to 2 = Two Pumps Automatic Changeover and the Pump Auto Rotation Delay (***Main Menu → Configuration Menu → Pump Configuration → Pump Auto Rotation Delay)*** has expired. The control will switch the operation of the pumps. The lead pump will operate normally. The lag pump will be started, becoming the lead, and then the original lead pump will be shut down. This mode will terminate when the pump operation has been completed.

PUMP PERIODIC START

This mode is active when the evaporator pump is started due to the periodic pump start configuration (***Main Menu → Configuration Menu → Pump Configuration → Pump Sticking Protection* = YES**). If the pump has not run that day, a pump will be started and will run for 2 seconds at 2:00 PM. If the machine is configured for dual pumps, Pump 1 will run on even days (such as day 2, 4, and 6 of the month). Pump 2 will run on odd days (such as day 1, 3, and 5 of the month). The mode will terminate when the pump shuts down.

ECO PUMP MODE

To reduce pump power, an Ecologic Pump Operation was added to the pump control logic. If Eco Pump Enable (***Main Menu → Config → MSC_SERV***) is enabled (***Eco Pump Enable=Yes***) and the water loop is satisfied, the pump will stop and remain off for the configured time period, Eco Pump Mode Off Delay. Once the off delay timer has expired, the Chilled Water Pump will be started for the configured time period, Eco Pump Mode On Delay. This allows the controls to get an accurate water temperature for control. If no mechanical cooling is required, the Chilled Water Pump will shut down and the cycle will repeat. If the need for mechanical cooling is determined, the Start Timer, Unit Off to On Delay (***Main Menu → Config →***) is initiated prior to a compressor starting. While in Eco Pump mode (unit is satisfied and pump is cycling), Eco Pump Mode Active (***Main Menu → MSC_STAT***) will indicate Yes.

LOW SUCTION CIRCUIT A/
LOW SUCTION CIRCUIT B

The criteria are tested when the circuit is ON. The appropriate circuit mode will be active if one of the following conditions is true:

1. The circuit's Saturated Suction Temperature (SST) is more than 6°F (3.3°C) less than the freeze point and both the cooler approach (Leaving Water Temperature SST) and superheat (Suction Gas Temperature SST) are greater than 15°F (8.3°C).
2. There is more than one compressor ON in the circuit and the circuit's SST is greater than 18°F (10.0°C) below the freeze point for more than 90 seconds.
3. There is more than one compressor ON in the circuit, the circuit's SST is greater than –4°F (–20.0°C), and the SST 30 seconds ago was 18°F (10.0°C) below the freeze point.
4. The circuit's saturated suction temperature is greater than 6°F (3.3°C) below the freeze point for more than 3 minutes.

The freeze setpoint is 34°F (1.1°C) for comfort cooling units with fresh water. The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type***) is 1. For low temperature brine systems, (***Main Menu → Configuration Menu → Factory Parameters → Exchanger Fluid Type* = 3**), the freeze point is Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint***).

For criterion 1, no additional stages will be added. For criteria 2, 3 and 4, one stage of capacity will be removed.

The mode will terminate when the circuit's Saturated Suction Temperature is greater than the freeze point minus 6°F (3.3°C) or the circuit has alarmed.

HIGH DGT CIRCUIT A/
HIGH DGT CIRCUIT B

This mode is tested for when any circuit is running. The circuit saturated condensing and suction temperatures are monitored to ensure that the compressors always operate within their allowed "map." Operation at conditions at or outside the "map" boundaries will cause this mode to be in effect. Operation at extremely low suction pressures and high condensing temperatures will cause the mode to be generated. The circuit will not be allowed to increase capacity and may be automatically unloaded or stopped. See Fig. 66.

This mode will terminate when or if the circuit refrigerant conditions return to within the compressor "map."

This mode could be in effect due to a low fluid flow rate, overcharge of oil in a circuit, dirty condenser coils, refrigerant overcharge, or excessive brine concentration.

HIGH PRESS OVERRIDE CIR A/
HIGH PRESS OVERRIDE CIR B

Tested when the circuit is ON. The appropriate circuit mode will be active if the discharge pressure for the circuit, Discharge Pressure Circuit A (***Main Menu → Pressures → Discharge Pressure A***) or Discharge Pressure Circuit B (***Main Menu → Pressures → Discharge Pressure B***), is greater than the High Pressure Threshold. The High Pressure Threshold is defined by the SDT limit shown in Fig. 66.

The capacity of the affected circuit will be reduced. The affected circuit will not be allowed to add capacity for at least 5 minutes following the capacity reduction. If, after 5 minutes, the circuit's saturated condensing temperature is less than SDT minus 3°F (1.7°C), the SDT Limit Off_Threshhold, then if required, another stage of capacity will be added. If additional steps of capacity are required, then the control will look for other circuits to add capacity. This mode will terminate once the circuit's saturated condensing temperature is less than SDT minus 3°F (1.7°C).

LOW DELTA PRESS CIR A/
LOW DELTA PRESS CIR B

Tested when the circuit is ON. The appropriate circuit mode will be active when the difference between the suction pressure for the circuit, Main Suction Pressure Circuit A (***Main Menu → Pressures → Main Suction Pressure A***) or Main Suction Pressure Circuit B (***Main Menu → Pressures → Main Suction Pressure B***), and the discharge pressure for the circuit, Discharge Pressure A (***Main Menu → Pressures → Discharge Pressure A***) or Discharge Pressure Circuit B (***Main Menu → Pressures → Discharge Pressure B***), meets one of the following conditions:

1. The pressure difference is below 43.5 psi (300 kPa) for more than 15 consecutive minutes.
2. The pressure difference is below 29.0 psi (200 kPa) for more than 5 consecutive minutes.

In either condition, the affected circuit compressors will be stopped.

This mode is terminated when the timer is reset to 0 minutes. For condition 1, the timer is reset to 0 when the pressure difference rises above 44.96 psi. For condition 2, the timer resets to 0 when the pressure difference rises above 30.45 psi.

NIGHT LOW NOISE ACTIVE

This mode is active when the Night Time Low Noise Option has been configured and the time is within the configured time. Programming a Night Low Noise Start Time (***Main Menu → Configuration Menu → General Configuration → Night Mode Start Hour***) and a Night Low Noise End Time (***Main Menu → Configuration Menu → General Configuration → Night Mode End Hour***) configures the option. The control will raise the head pressure setpoint to reduce the number of condenser fans on, thereby reducing the sound of the machine. Additionally, if the Night Time Low Sound Capacity Limit (***Main Menu → Configuration Menu → General Configuration → Night Capacity Limit***) has been configured, the unit capacity will be limited to the programmed level. This mode will terminate once the Night Low Noise End Time has been reached. This mode is in effect only due to programming options.

SYSTEM MANAGER ACTIVE

Tested when the unit is ON or OFF. This mode is active if a System Manager, such as Building Supervisor, ChillerVu System Manager, or another CCN device, is controlling the machine. The machine will respond to the specific command received from the System Manager. The mode will be terminated if the System Manager control is released. This mode is in effect only due to programming options.

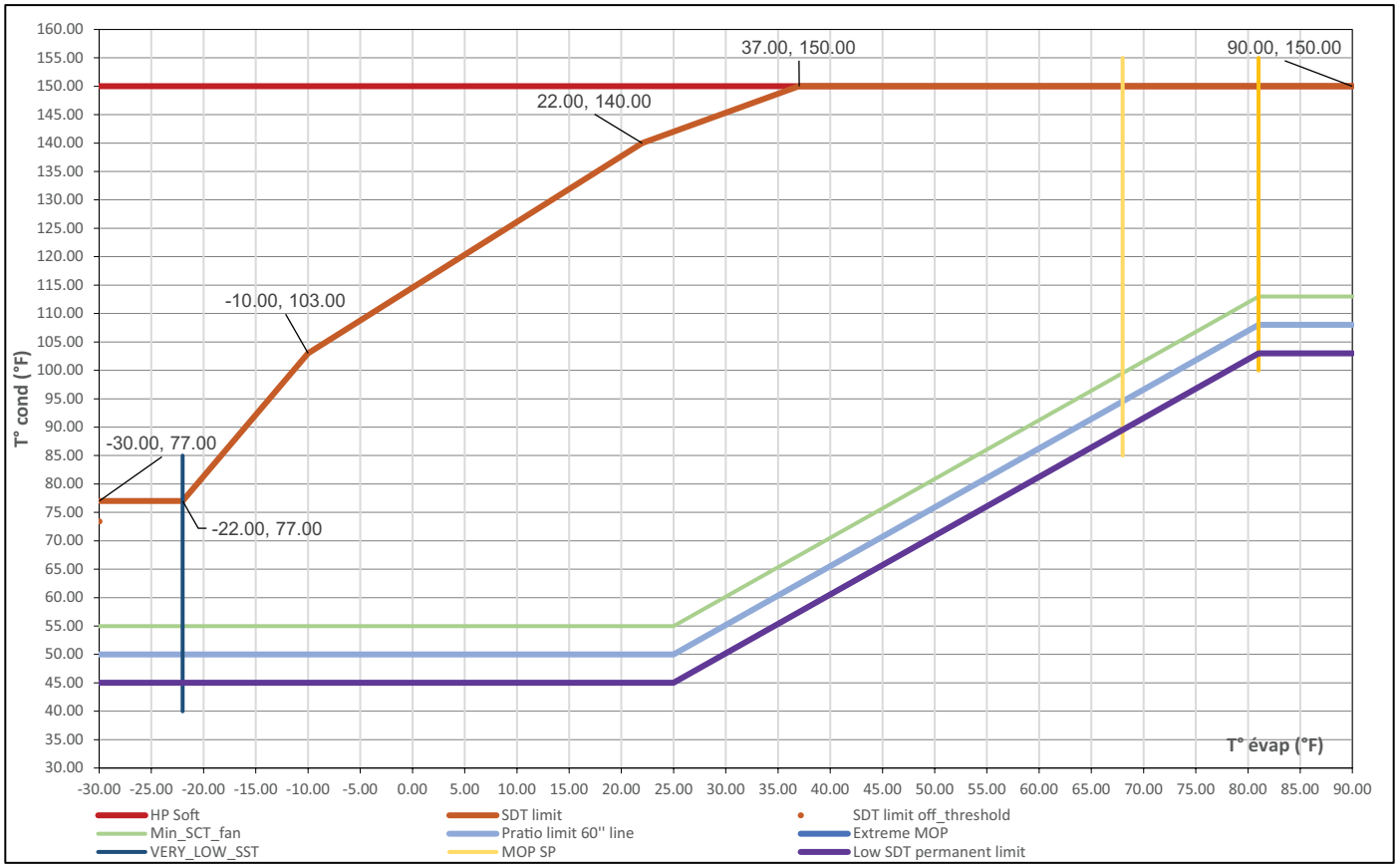


Fig. 66 — Compressor Map

PRIMARY SECONDARY ACTIVE

This mode is checked for if the machine is ON. This mode is active if Primary Secondary Control has been enabled. This occurs when 2 machines are programmed, one as the primary (***Main Menu → Configuration Menu → Primary/Secondary → Primary/Secondary Select* = Primary [1])** and the other as a secondary (***Main Menu → Configuration Menu → Primary/Secondary → Primary/Secondary Select* = Secondary [2]**). Both the primary and secondary machines will respond to the capacity control commands issued by the primary controller. This may include control point changes and demand limit commands. This mode will terminate when Primary Secondary Control has been disabled (***Main Menu → Configuration Menu → Primary/Secondary → Primary/Secondary Select* = Disable [0]**).

BOILER ACTIVE

This mode is not supported for Cooling Only units. This mode is in effect only due to programming options.

ICE MODE IN EFFECT

This mode is checked for when the unit is ON. This mode is active when the Cooling Ice Setpoint (***Main Menu → Setpoint Configuration → Cooling Ice Setpoint***) is in use. While in this mode, the Current Setpoint (***Main Menu → General Parameters → Current Setpoint***) will show the Cooling Ice Setpoint value, and the unit will operate to that value. This mode will terminate when the Cooling Ice Setpoint is no longer in use (ICE DONE switch is closed).

Sensors

The electronic control uses up to 11 thermistors to sense temperatures and up to 4 transducers to sense pressure for controlling chiller operation. These sensors are outlined below.

THERMISTORS

See Tables 42-46. Thermistors that monitor the chiller's operation include: evaporator entering water, evaporator leaving water, dual chiller leaving water, compressor suction gas temperature, compressor discharge gas temperature, and Outdoor Air Temperature thermistors. These thermistors, except for the compressor discharge gas temperature, are 5,000 ohms at 77°F (25°C) and are identical in temperature versus resistance. The compressor discharge gas temperature thermistor is 100,000 ohms at 77°F (25°C) and has a different temperature vs. resistance. Additionally, the space temperature thermistor is 10,000 ohms at 77°F (25°C) and has a different temperature vs. resistance. See Fig. 67 for thermistor locations.

Evaporator Leaving Water Sensor (LWT)

On all sizes, this thermistor is installed in a threaded well in the leaving water nozzle of the evaporator. See Fig. 68.

Evaporator Entering Water Sensor (EWT)

On all sizes, this thermistor is factory installed in a threaded well in the entering water nozzle of the evaporator.

Suction Gas Temperature (SGT)

On all sizes, this thermistor is factory installed in a threaded well located on the compressor of each circuit. There is one thermistor for each circuit.

Compressor Discharge Gas Temperature (DGT)

On all sizes, this thermistor is factory installed in a threaded well located in the discharge end of the compressor for the circuit. There is one thermistor for each circuit.

Outdoor Air Temperature (OAT)

This sensor is factory installed to the back of the control box.

Space Temperature

This sensor (part no. 33ZCT55SPT) is a field-installed accessory mounted in the indoor space and is used for water temperature reset. The sensor should be installed as a wall-mounted thermostat would be (in the conditioned space where it will not be subjected to either a cooling or heating source or direct exposure to sunlight, and 4 to 5 ft above the floor).

Space temperature sensor wires are to be connected to terminals in the unit main control box. See Fig. 69. The space temperature sensor includes a terminal block (SEN) and a RJ11 female connector. The RJ11 connector is used as access into the Carrier Comfort Network® at the sensor.

To connect the space temperature sensor (see Fig. 69):

1. Using a 20 AWG twisted pair conductor cable rated for the application, connect one wire of the twisted pair to one SEN terminal and connect the other wire to the other SEN terminal located under the cover of the space temperature sensor.
2. Connect the other ends of the wires to terminals 7 and 8 on TB6 located in the unit control box.

Units on the CCN can be monitored from the space at the sensor through the RJ11 connector, if desired. To wire the RJ11 connector into the CCN:

1. Cut the CCN wire and strip ends of the red (+), white (ground), and black (–) conductors. (If another wire color scheme is used, strip ends of appropriate wires.)
2. Insert and secure the red (+) wire to terminal 5 of the space temperature sensor terminal block.
3. Insert and secure the white (ground) wire to terminal 4 of the space temperature sensor.
4. Insert and secure the black (–) wire to terminal 2 of the space temperature sensor.
5. Connect the other end of the communication bus cable to the remainder of the CCN communication bus.

NOTE: The EMM is required for this accessory.

Table 42 — Thermistor Identification

THERMISTOR ID	DESCRIPTION	RESISTANCE AT 77°F (25°C)	CONNECTION POINT
EWT	Entering Water Temperature Thermistor	5k Ω	CIOB-A-J40-AI01
LWT	Leaving Water Temperature Thermistor	5k Ω	CIOB-A-J41-AI02
OAT	Outdoor Air Temperature Thermistor	5k Ω	CIOB-A-J42-AI03
SGTA	Circuit A Suction Gas Temperature Thermistor	5k Ω	CIOB-A-J43-AI04
SGTB	Circuit B Suction Gas Temperature Thermistor	5k Ω	CIOB-B-J19-AI07
DGTA	Circuit A Discharge Gas Temperature Thermistor	100k Ω	CIOB-A-J44-AI05
DGTB	Circuit B Discharge Gas Temperature Thermistor	100k Ω	CIOB-B-J11-AI06
DUAL CHILLER	Dual Chiller Leaving Water Temperature Thermistor	5k Ω	CIOB-B-J41-AI02
SPT	Space Temperature Thermistor	10k Ω	CIOB-B-J40-AI01

Table 43 — 5K Thermistor Temperature vs. Resistance

°F	°C	RESISTANCE (Ohms)
–40	–40	166,781
–38	–39	156,158
–36	–38	146,275
–35	–37	137,078
–33	–36	128,514
–31	–35	120,536
–29	–34	113,101
–27	–33	106,170
–26	–32	99,705
–24	–31	93,672
–22	–30	88,041
–20	–29	82,781
–18	–28	77,868
–17	–27	73,275
–15	–26	68,980
–13	–25	64,963
–11	–24	61,203
–9	–23	57,683
–8	–22	54,387
–6	–21	51,299
–4	–20	48,404
–2	–19	45,689
0	–18	43,143
1	–17	40,754
3	–16	38,511
5	–15	36,404
7	–14	34,426
9	–13	32,566
10	–12	30,818
12	–11	29,173
14	–10	27,626
16	–9	26,171
18	–8	24,800
19	–7	23,509
21	–6	22,292
23	–5	21,146
25	–4	20,065
27	–3	19,045
28	–2	18,084
30	–1	17,177
32	0	16,320
34	1	15,511
36	2	14,746
37	3	14,024
39	4	13,341
41	5	12,695
43	6	12,084
45	7	11,506
46	8	10,959
48	9	10,441
50	10	9,951
52	11	9,486
54	12	9,046
55	13	8,628
57	14	8,232
59	15	7,857
61	16	7,500
63	17	7,152
64	18	6,841
66	19	6,536
68	20	6,247
70	21	5,972
72	22	5,710
73	23	5,461
75	24	5,225

Table 43 — 5K Thermistor Temperature vs. Resistance (cont)

°F	°C	RESISTANCE (Ohms)
77	25	5,000
79	26	4,786
81	27	4,582
82	28	4,389
84	29	4,204
86	30	4,028
88	31	3,860
90	32	3,701
91	33	3,549
93	34	3,403
95	35	3,265
97	36	3,133
99	37	3,007
100	38	2,887
102	39	2,772
104	40	2,662
106	41	2,558
108	42	2,458
109	43	2,362
111	44	2,271
113	45	2,183
115	46	2,100
117	47	2,020
118	48	1,943
120	49	1,870
122	50	1,800
124	51	1,733
126	52	1,669
127	53	1,608
129	54	1,549
131	55	1,492
133	56	1,438
135	57	1,386
136	58	1,337
138	59	1,289
140	60	1,243
142	61	1,199
144	62	1,157
145	63	1,117
147	64	1,078
149	65	1,041
151	66	1,005
153	67	971
154	68	938
156	69	906
158	70	876
160	71	846
162	72	818
163	73	791
165	74	765
167	75	740
169	76	716
171	77	692
172	78	670
174	79	649
176	80	628
178	81	608
180	82	589
181	83	570
183	84	552
185	85	535
187	86	518
189	87	502
190	88	487
192	89	472

Table 43 — 5K Thermistor Temperature vs. Resistance (cont)

°F	°C	RESISTANCE (Ohms)
194	90	458
196	91	444
198	92	431
199	93	418
201	94	405
203	95	393
205	96	382
207	97	370
208	98	360
210	99	349
212	100	339
214	101	329
216	102	320
217	103	311
219	104	302
221	105	293
223	106	285
225	107	277
226	108	269
228	109	262
230	110	255
232	111	248
234	112	241
235	113	234
237	114	228
239	115	222
241	116	216
243	117	210
244	118	205
246	119	199
248	120	194
250	121	189
252	122	184
253	123	179
255	124	175
257	125	170
259	126	166
261	127	162
262	128	157
264	129	154
266	130	150
268	131	146
270	132	142
271	133	139
273	134	135
275	135	132
277	136	129
279	137	126
280	138	123
282	139	120
284	140	117
286	141	114
288	142	111
289	143	109
291	144	106
293	145	104
295	146	101
297	147	99
298	148	97
300	149	94
302	150	92

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	4.758	196,453
–24	4.750	189,692
–23	4.741	183,300
–22	4.733	177,000
–21	4.724	171,079
–20	4.715	165,238
–19	4.705	159,717
–18	4.696	154,344
–17	4.686	149,194
–16	4.676	144,250
–15	4.665	139,443
–14	4.655	134,891
–13	4.644	130,402
–12	4.633	126,183
–11	4.621	122,018
–10	4.609	118,076
–9	4.597	114,236
–8	4.585	110,549
–7	4.572	107,006
–6	4.560	103,558
–5	4.546	100,287
–4	4.533	97,060
–3	4.519	94,020
–2	4.505	91,019
–1	4.490	88,171
0	4.476	85,396
1	4.461	82,729
2	4.445	80,162
3	4.429	77,662
4	4.413	75,286
5	4.397	72,940
6	4.380	70,727
7	4.363	68,542
8	4.346	66,465
9	4.328	64,439
10	4.310	62,491
11	4.292	60,612
12	4.273	58,781
13	4.254	57,039
14	4.235	55,319
15	4.215	53,693
16	4.195	52,086
17	4.174	50,557
18	4.153	49,065
19	4.132	47,627
20	4.111	46,240
21	4.089	44,888
22	4.067	43,598
23	4.044	42,324
24	4.021	41,118
25	3.998	39,926
26	3.975	38,790
27	3.951	37,681
28	3.927	36,610
29	3.903	35,577
30	3.878	34,569
31	3.853	33,606
32	3.828	32,654
33	3.802	31,752
34	3.776	30,860
35	3.750	30,009
36	3.723	29,177

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
37	3.697	28,373
38	3.670	27,597
39	3.654	26,838
40	3.615	26,113
41	3.587	25,396
42	3.559	24,715
43	3.531	24,042
44	3.503	23,399
45	3.474	22,770
46	3.445	22,161
47	3.416	21,573
48	3.387	20,998
49	3.357	20,447
50	3.328	19,903
51	3.298	19,386
52	3.268	18,874
53	3.238	18,384
54	3.208	17,904
55	3.178	17,441
56	3.147	16,991
57	3.117	16,552
61	2.994	14,925
62	2.963	14,549
63	2.932	14,180
64	2.901	13,824
65	2.870	13,478
66	2.839	13,139
67	2.808	12,814
68	2.777	12,493
69	2.746	12,187
70	2.715	11,884
71	2.684	11,593
72	2.653	11,308
73	2.622	11,031
74	2.592	10,764
75	2.561	10,501
76	2.530	10,249
77	2.500	10,000
78	2.470	9,762
79	2.439	9,526
80	2.409	9,300
81	2.379	9,078
82	2.349	8,862
83	2.319	8,653
84	2.290	8,448
85	2.260	8,251
86	2.231	8,056
87	2.202	7,869
88	2.173	7,685
89	2.144	7,507
90	2.115	7,333
91	2.087	7,165
92	2.059	6,999
93	2.030	6,838
94	2.003	6,683
95	1.975	6,530
96	1.948	6,383
97	1.921	6,238
98	1.894	6,098
99	1.867	5,961
100	1.841	5,827
101	1.815	5,698
102	1.789	5,571

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
103	1.763	5,449
104	1.738	5,327
105	1.713	5,210
106	1.688	5,095
107	1.663	4,984
108	1.639	4,876
109	1.615	4,769
110	1.591	4,666
111	1.567	4,564
112	1.544	4,467
113	1.521	4,370
114	1.498	4,277
115	1.475	4,185
116	1.453	4,096
117	1.431	4,008
118	1.409	3,923
119	1.387	3,840
120	1.366	3,759
121	1.345	3,681
122	1.324	3,603
123	1.304	3,529
124	1.284	3,455
125	1.264	3,383
126	1.244	3,313
127	1.225	3,244
128	1.206	3,178
129	1.187	3,112
130	1.168	3,049
131	1.150	2,986
132	1.132	2,926
133	1.114	2,866
134	1.096	2,809
135	1.079	2,752
136	1.062	2,697
137	1.045	2,643
138	1.028	2,590
139	1.012	2,539
140	0.996	2,488
141	0.980	2,439
142	0.965	2,391
143	0.949	2,343
147	0.890	2,166
148	0.876	2,124
149	0.862	2,083
150	0.848	2,043
151	0.835	2,003
152	0.821	1,966
153	0.808	1,928
154	0.795	1,891
155	0.782	1,855
156	0.770	1,820
157	0.758	1,786
158	0.745	1,752
159	0.733	1,719
160	0.722	1,687
161	0.710	1,656
162	0.699	1,625
163	0.687	1,594
164	0.676	1,565
165	0.666	1,536
166	0.655	1,508
167	0.645	1,480
168	0.634	1,453

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
169	0.624	1,426
170	0.614	1,400
171	0.604	1,375
172	0.595	1,350
173	0.585	1,326
174	0.576	1,302
175	0.567	1,278
176	0.558	1,255
177	0.549	1,233
178	0.540	1,211
179	0.532	1,190
180	0.523	1,169
181	0.515	1,148
182	0.507	1,128
183	0.499	1,108
184	0.491	1,089
185	0.483	1,070
186	0.476	1,052
187	0.468	1,033

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
188	0.461	1,016
189	0.454	998
190	0.447	981
191	0.440	964
192	0.433	947
193	0.426	931
194	0.419	915
195	0.413	900
196	0.407	885
197	0.400	870
198	0.394	855
199	0.388	841
200	0.382	827
201	0.376	814
202	0.370	800
203	0.365	787
204	0.359	774
205	0.354	762
206	0.349	749

Table 44 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
207	0.343	737
208	0.338	725
209	0.333	714
210	0.328	702
211	0.323	691
212	0.318	680
213	0.314	670
214	0.309	659
215	0.305	649
216	0.300	639
217	0.296	629
218	0.292	620
219	0.288	610
220	0.284	601
221	0.279	592
222	0.275	583
223	0.272	574
224	0.268	566
225	0.264	557

Table 45 — 10K Thermistor Temperature (°C) vs. Resistance

TEMP (°C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–32	4.762	200,510
–31	4.748	188,340
–30	4.733	177,000
–29	4.716	166,342
–28	4.700	156,404
–27	4.682	147,134
–26	4.663	138,482
–25	4.644	130,402
–24	4.624	122,807
–23	4.602	115,710
–22	4.580	109,075
–21	4.557	102,868
–20	4.533	97,060
–19	4.508	91,588
–18	4.482	86,463
–17	4.455	81,662
–16	4.426	77,162
–15	4.397	72,940
–14	4.367	68,957
–13	4.335	65,219
–12	4.303	61,711
–11	4.269	58,415
–10	4.235	55,319
–9	4.199	52,392
–8	4.162	49,640
–7	4.124	47,052
–6	4.085	44,617
–5	4.044	42,324
–4	4.003	40,153
–3	3.961	38,109
–2	3.917	36,182
–1	3.873	34,367
0	3.828	32,654
1	3.781	31,030
2	3.734	29,498
3	3.686	28,052
4	3.637	26,686
5	3.587	25,396
6	3.537	24,171
7	3.485	23,013
8	3.433	21,918
9	3.381	20,883
10	3.328	19,903
11	3.274	18,972
12	3.220	18,090
13	3.165	17,255
14	3.111	16,464

Table 45 — 10K Thermistor Temperature (°C) vs. Resistance (cont)

TEMP (°C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
15	3.056	15,714
16	3.000	15,000
17	2.944	14,323
18	2.889	13,681
19	2.833	13,071
20	2.777	12,493
21	2.721	11,942
22	2.666	11,418
23	2.610	10,921
24	2.555	10,449
25	2.500	10,000
26	2.445	9,571
27	2.391	9,164
28	2.337	8,776
29	2.284	8,407
30	2.231	8,056
31	2.178	7,720
32	2.127	7,401
33	2.075	7,096
34	2.025	6,806
35	1.975	6,530
36	1.926	6,266
37	1.878	6,014
38	1.830	5,774
39	1.784	5,546
40	1.738	5,327
41	1.692	5,117
42	1.648	4,918
43	1.605	4,727
44	1.562	4,544
45	1.521	4,370
46	1.480	4,203
47	1.439	4,042
48	1.400	3,889
49	1.362	3,743
50	1.324	3,603
51	1.288	3,469
52	1.252	3,340
53	1.217	3,217
54	1.183	3,099
55	1.150	2,986
56	1.117	2,878
57	1.086	2,774
58	1.055	2,675
59	1.025	2,579
60	0.996	2,488
61	0.968	2,400

Table 45 — 10K Thermistor Temperature (°C) vs. Resistance (cont)

TEMP (°C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
62	0.940	2,315
63	0.913	2,235
64	0.887	2,157
65	0.862	2,083
66	0.837	2,011
67	0.813	1,943
68	0.790	1,876
69	0.767	1,813
70	0.745	1,752
71	0.724	1,693
72	0.703	1,637
73	0.683	1,582
74	0.663	1,530
75	0.645	1,480
76	0.626	1,431
77	0.608	1,385
78	0.591	1,340
79	0.574	1,297
80	0.558	1,255
81	0.542	1,215
82	0.527	1,177
83	0.512	1,140
84	0.497	1,104
85	0.483	1,070
86	0.470	1,037
87	0.457	1,005
88	0.444	974
89	0.431	944
90	0.419	915
91	0.408	889
92	0.396	861
93	0.386	836
94	0.375	811
95	0.365	787
96	0.355	764
97	0.345	742
98	0.336	721
99	0.327	700
100	0.318	680
101	0.310	661
102	0.302	643
103	0.294	626
104	0.287	609
105	0.279	592
106	0.272	576
107	0.265	561

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
–40.0	–40	3216
–38.2	–39	3016
–36.4	–38	2829
–34.6	–37	2655
–32.8	–36	2493
–31.0	–35	2342
–29.2	–34	2200
–27.4	–33	2068
–25.6	–32	1944
–23.8	–31	1829
–22.0	–30	1721
–20.2	–29	1620
–18.4	–28	1526
–16.6	–27	1437
–14.8	–26	1354
–13.0	–25	1277
–11.2	–24	1204
–9.4	–23	1136
–7.6	–22	1072
–5.8	–21	1012
–4.0	–20	955.4
–2.2	–19	902.5
–0.4	–18	852.8
1.4	–17	806.2
3.2	–16	762.3
5.0	–15	721.1
6.8	–14	682.4
8.6	–13	645.9
10.4	–12	611.6
12.2	–11	579.3
14.0	–10	548.8
15.8	–9	520.2
17.6	–8	493.2
19.4	–7	467.7
21.2	–6	443.7
23.0	–5	421.1
24.8	–4	399.7
26.6	–3	379.5
28.4	–2	360.5
30.2	–1	342.5
32.0	0	325.5
33.8	1	309.5
35.6	2	294.3
37.4	3	280
39.2	4	266.4
41.0	5	253.6
42.8	6	241.4
44.6	7	229.9
46.4	8	219
48.2	9	208.7
50.0	10	198.9
51.8	11	189.7
53.6	12	180.9
55.4	13	172.5
57.2	14	164.6
59.0	15	157.1
60.8	16	150
62.6	17	143.3
64.4	18	136.8
66.2	19	130.7
68.0	20	125
69.8	21	119.4
71.6	22	114.2

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
73.4	23	109.2
75.2	24	104.5
77.0	25	100
78.8	26	95.71
80.6	27	91.63
82.4	28	87.75
84.2	29	84.05
86.0	30	80.53
87.8	31	77.17
89.6	32	73.97
91.4	33	70.92
93.2	34	68.01
95.0	35	65.23
96.8	36	62.58
98.6	37	60.06
100.4	38	57.65
102.2	39	55.34
104.0	40	53.14
105.8	41	51.04
107.6	42	49.04
109.4	43	47.12
111.2	44	45.29
113.0	45	43.54
114.8	46	41.86
116.6	47	40.26
118.4	48	38.73
120.2	49	37.26
122.0	50	35.86
123.8	51	34.51
125.6	52	33.23
127.4	53	31.99
129.2	54	30.81
131.0	55	29.68
132.8	56	28.6
134.6	57	27.56
136.4	58	26.56
138.2	59	25.61
140.0	60	24.69
141.8	61	23.82
143.6	62	22.97
145.4	63	22.16
147.2	64	21.39
149.0	65	20.64
150.8	66	19.93
152.6	67	19.24
154.4	68	18.58
156.2	69	17.94
158.0	70	17.33
159.8	71	16.75
161.6	72	16.18
163.4	73	15.64
165.2	74	15.12
167.0	75	14.62
168.8	76	14.14
170.6	77	13.67
172.4	78	13.23
174.2	79	12.8
176.0	80	12.38
177.8	81	11.99
179.6	82	11.6
181.4	83	11.23
183.2	84	10.88
185.0	85	10.53

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
186.8	86	10.2
188.6	87	9.885
190.4	88	9.578
192.2	89	9.282
194.0	90	8.996
195.8	91	8.72
197.6	92	8.455
199.4	93	8.198
201.2	94	7.951
203.0	95	7.712
204.8	96	7.481
206.6	97	7.259
208.4	98	7.044
210.2	99	6.836
212.0	100	6.636
213.8	101	6.442
215.6	102	6.255
217.4	103	6.074
219.2	104	5.899
221.0	105	5.73
222.8	106	5.567
224.6	107	5.409
226.4	108	5.256
228.2	109	5.109
230.0	110	4.966
231.8	111	4.827
233.6	112	4.694
235.4	113	4.564
237.2	114	4.439
239.0	115	4.317
240.8	116	4.2
242.6	117	4.086
244.4	118	3.976
246.2	119	3.869
248.0	120	3.766
249.8	121	3.666
251.6	122	3.569
253.4	123	3.475
255.2	124	3.384
257.0	125	3.295
258.8	126	3.21
260.6	127	3.127
262.4	128	3.046
264.2	129	2.968
266.0	130	2.892
267.8	131	2.819
269.6	132	2.747
271.4	133	2.678
273.2	134	2.611
275.0	135	2.546
276.8	136	2.483
278.6	137	2.421
280.4	138	2.362
282.2	139	2.304
284.0	140	2.247
285.8	141	2.193
287.6	142	2.14
289.4	143	2.088
291.2	144	2.038
293.0	145	1.989
294.8	146	1.942
296.6	147	1.896
298.4	148	1.851

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
300.2	149	1.808
302.0	150	1.766
303.8	151	1.725
305.6	152	1.685
307.4	153	1.646
309.2	154	1.608
311.0	155	1.571
312.8	156	1.535
314.6	157	1.5
316.4	158	1.467
318.2	159	1.434
320.0	160	1.402
321.8	161	1.37
323.6	162	1.34
325.4	163	1.31
327.2	164	1.281
329.0	165	1.253
330.8	166	1.226
332.6	167	1.199
334.4	168	1.173
336.2	169	1.148
338.0	170	1.123
339.8	171	1.099
341.6	172	1.076
343.4	173	1.053
345.2	174	1.031
347.0	175	1.009
348.8	176	0.988
350.6	177	0.9674
352.4	178	0.9473
354.2	179	0.9277
356.0	180	0.9086
357.8	181	0.89
359.6	182	0.8718
361.4	183	0.854

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
363.2	184	0.8367
365.0	185	0.8198
366.8	186	0.8034
368.6	187	0.7873
370.4	188	0.7716
372.2	189	0.7562
374.0	190	0.7413
375.8	191	0.7267
377.6	192	0.7124
379.4	193	0.6985
381.2	194	0.6849
383.0	195	0.6716
384.8	196	0.6586
386.6	197	0.6459
388.4	198	0.6336
390.2	199	0.6215
392.0	200	0.6097
393.8	201	0.5981
395.6	202	0.5868
397.4	203	0.5758
399.2	204	0.565
401.0	205	0.5545
402.8	206	0.5442
404.6	207	0.5341
406.4	208	0.5243
408.2	209	0.5147
410.0	210	0.5052
411.8	211	0.496
413.6	212	0.487
415.4	213	0.4782
417.2	214	0.4696
419.0	215	0.4612
420.8	216	0.453
422.6	217	0.4449
424.4	218	0.437

Table 46 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
426.2	219	0.4293
428.0	220	0.4217
429.8	221	0.4143
431.6	222	0.4071
433.4	223	0.4
435.2	224	0.3931
437.0	225	0.3863
438.8	226	0.3797
440.6	227	0.3731
442.4	228	0.3668
444.2	229	0.3605
446.0	230	0.3544
447.8	231	0.3484
449.6	232	0.3426
451.4	233	0.3368
453.2	234	0.3312
455	235	0.3257
456.8	236	0.3203
458.6	237	0.315
460.4	238	0.3098
462.2	239	0.3048
464.0	240	0.2998
465.8	241	0.2949
467.6	242	0.2901
469.4	243	0.2854
471.2	244	0.2808
473.0	245	0.2763
474.8	246	0.2719
476.6	247	0.2676
478.4	248	0.2634
480.2	249	0.2592
482.0	250	0.2551

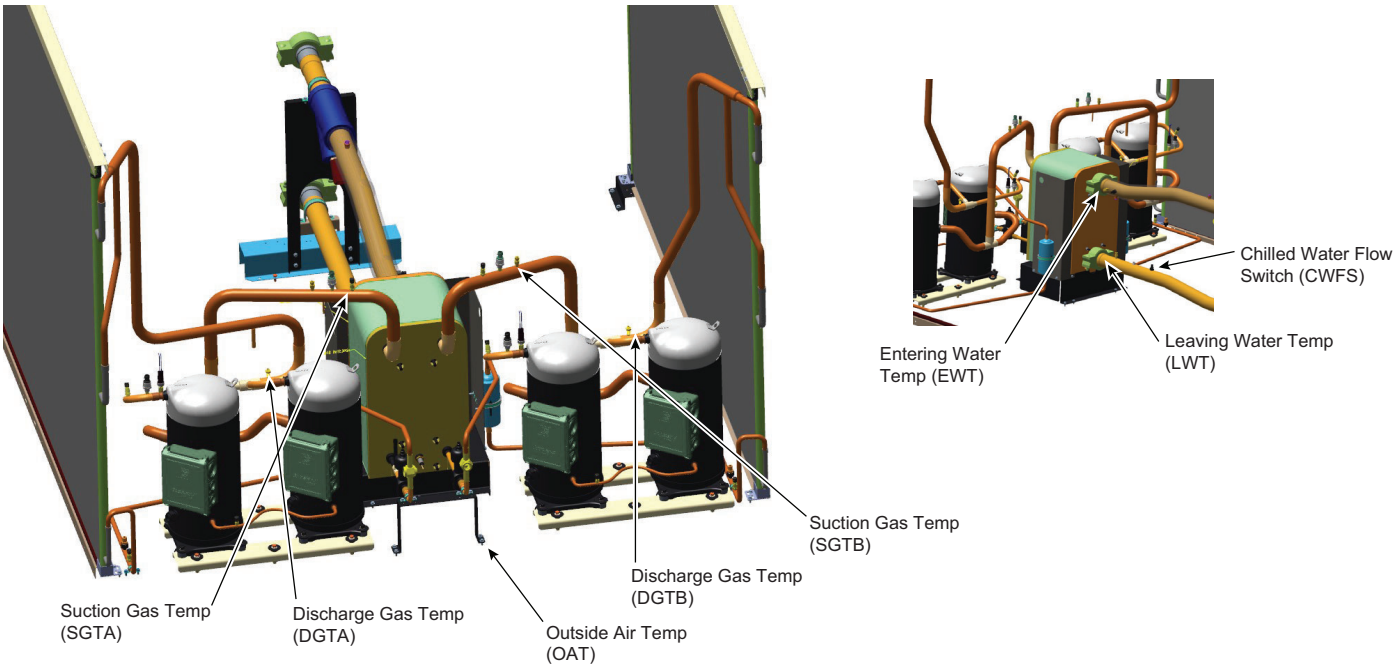


Fig. 67 — Thermistor Locations

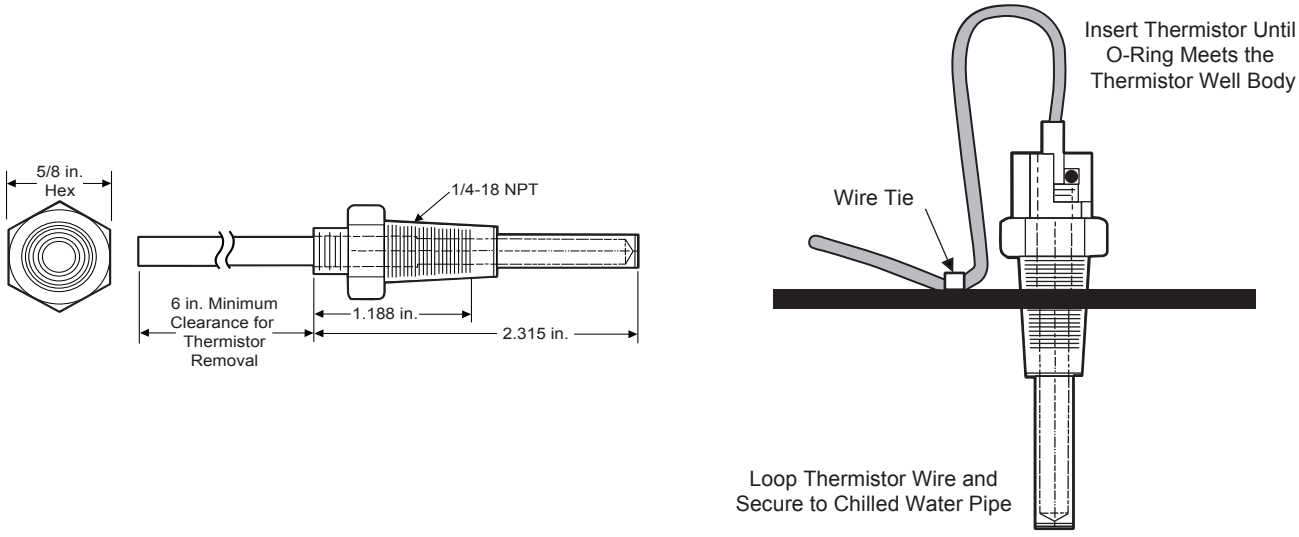


Fig. 68 — Dual Chiller Accessory Kit Leaving Water Thermistor and Well (P/N 00EFN900044000A)

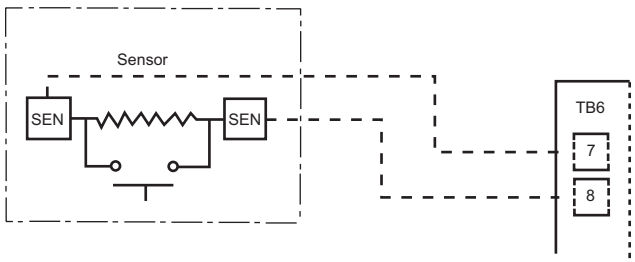


Fig. 69 — Typical Space Temperature Sensor (33ZCT55SPT) Wiring

TRANSDUCERS

There are 2 pressure transducers per circuit and 2 different types of transducers: low pressure (green connector) and high pressure (black connector).

- Low Pressure Type: Suction Pressure Transducer (SPT).
- High Pressure Type: Discharge Pressure Transducer (DPT).

Table 47 lists pressure transducers for controlling chiller operation. See Fig. 70 for transducer locations.

Table 47 — Pressure Transducers

TRANSDUCER ID	DESCRIPTION	PART NUMBER	CONNECTION POINT
DPTA	Ckt. A Discharge Pressure Transducer	00PPG000568300A[a]	CIOBA-J11-AI06
SPTA	Ckt. A Suction Pressure Transducer	00PPG000569700A[b]	CIOBA-J19-AI07
DPTB	Ckt. B Discharge Pressure Transducer	00PPG000568300A[a]	CIOBB-J11-AI06
SPTB	Ckt. B Suction Pressure Transducer	00PPG000569700A[b]	CIOBB-J19-AI07

NOTE(S):
a. High Pressure
b. Low Pressure

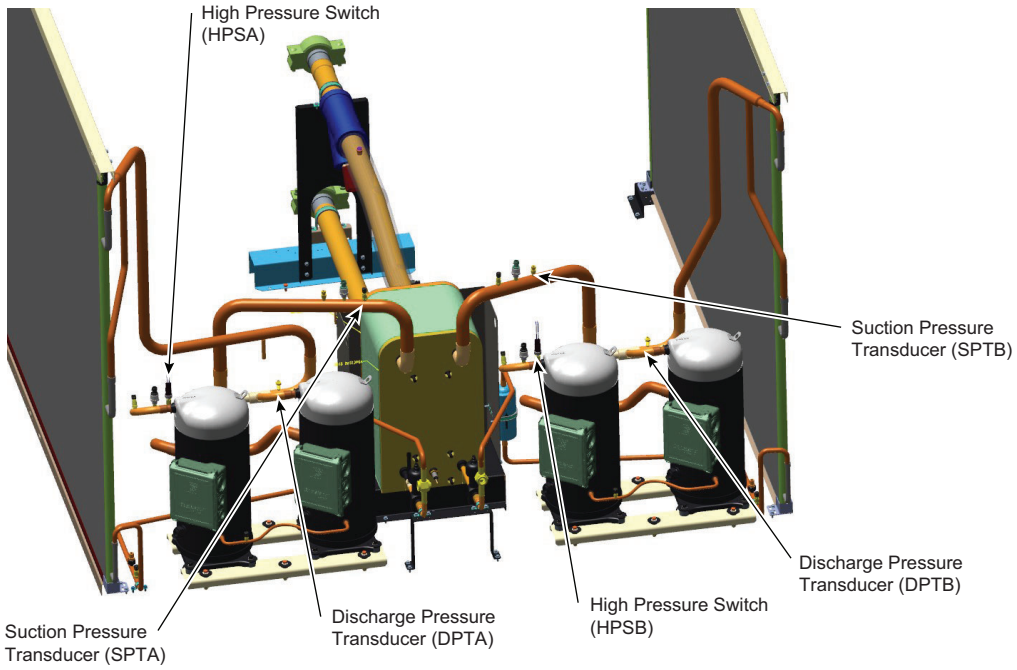


Fig. 70 — Transducer and Switch Locations

SERVICE

Electronic Expansion Valve

See Fig. 71 for a cutaway view of the electronic expansion valve (EXV). High-pressure liquid refrigerant enters the valve through the top. As refrigerant passes through the orifice, pressure drops and refrigerant changes to a 2-phase condition (liquid and vapor). The electronic expansion valve operates through an electronically controlled activation of a stepper motor. The stepper motor stays in position unless power pulses initiate the 2 discrete sets of motor stator windings for rotation in either direction. The direction depends on the phase relationship of the power pulses.

The motor directly operates the stem, which directly opens and closes the valve. There are 3 different EXVs: VPF12.5, VPF25, and VPF50. See Table 48. The total number of steps for all EXVs is 2600. The EXV motor moves at 150 steps per second. Commanding the valve to 0% will add an extra steps to the move to ensure the valve is closed completely. Overdriving in the open position is not allowed.

The EXV is controlled by the CIOB (J17-STPR1). Each circuit has a thermistor located in a well in the suction manifold before the compressor. Suction pressure, as measured by the suction pressure transducer, is converted to a saturated suction temperature. The thermistor measures the temperature of the superheated gas entering the compressor, and the pressure transducer determines the saturated temperature of suction gas. The difference between the temperature of the superheated gas and the saturated suction temperature is the superheat. The CIOB module controls the position of the electronic expansion valve stepper motor to maintain the superheat setpoint.

The CIOB controls the superheat leaving evaporator to approximately 9.0°F (5.0°C). Because EXV status is communicated to the Carrier Controller and is controlled by the CIOB, it is possible to track the valve position. The unit is then protected against loss of charge and a faulty valve. During initial start-up, the EXV is fully closed. After the initialization period, the valve position is tracked by the CIOB by constantly monitoring the amount of valve movement.

The EXV is also used to limit the evaporator saturated suction temperature to 68°F (20°C). This makes it possible for the chiller to start at higher evaporator fluid temperatures without overloading the compressor. This is commonly referred to as MOP (maximum operating pressure).

The position of the EXV may vary depending on the active override. EXV overrides can be verified in the Capacity Control menu (***Main Menu → Maintenance Menu → Capacity Control → EXV Override Circuit A*** or ***EXV Override Circuit B***). Refer to Table 49 for list of EXV overrides.

If it appears that the EXV module is not properly controlling circuit operation to maintain correct superheat, there are a number of checks that can be made using test functions and initialization features built into the microprocessor control. See the EXV Troubleshooting Procedure section on page 82 to test EXVs.

Table 48 — EXV Usage Guide

30RC UNIT	EXV SIZE	
	CKT A	CKT B
010	12.5	—
015	12.5	—
020	25	—
025	25	—
030	50	—
035	25	25
040	25	25
045	25	25
050	25	25
055	25	50
060	50	50

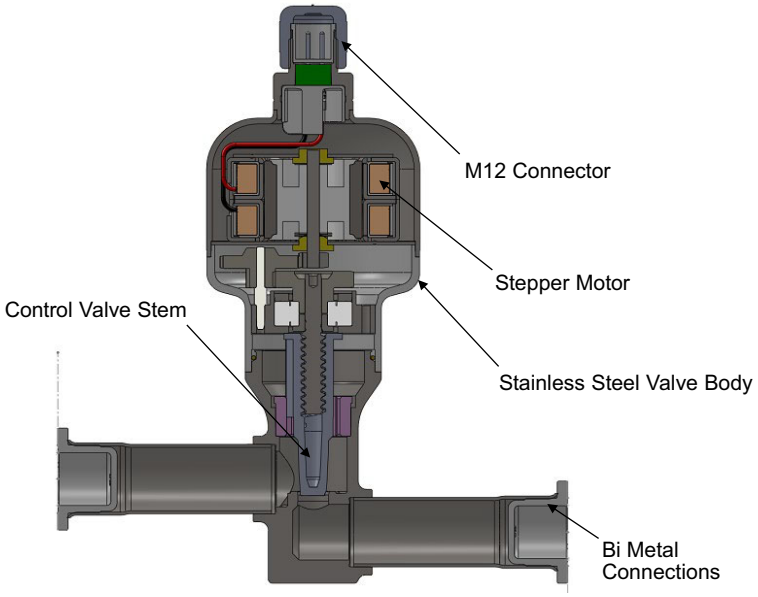


Fig. 71 — Cutaway View of the Electronic Expansion Valve

Table 49 — EXV Overrides

OVERRIDE NO.	OVERRIDE DESCRIPTION
1	Very Low Saturated Suction Temperature
2	Low Saturated Suction Temperature
3	Low Superheat prediction
4	Low Superheat
5	High Superheat
9	Over the MOP setpoint
10	Below to the MOP setpoint
11	Capacity Decrease
12	Capacity Increase
15	Fans Control During Low OAT
24	Setpoint Decrease When SH Unstable
25	Setpoint Increase Return from SH Unstable
30	Regular EXV Control with PID

EXV TROUBLESHOOTING PROCEDURE

⚠ CAUTION

Do not remove EXV cables from the CIOB with power applied to the board. Damage to the board may occur.

Follow the steps below to diagnose and correct EXV problems. Check EXV motor operation first. Switch the Enable-Off-Remote (EOR) Contact switch to the Off position. Check the appropriate circuit EXV, EXV Position Circuit A % Open (***Main Menu → Quick Test #1→ EXV Position Circuit A***) or EXV Position Circuit B % Open (***Main Menu → Quick Test #1 → EXV Position Circuit B***). Use the Quick Test procedure on page 113. The current value of 0 will be displayed. Increase the EXV position to select 100% valve position. The actuator should be felt moving through the EXV. To close the valve, select 0%. The actuator should knock when it reaches the bottom of its stroke.

If the valve is not working properly, continue with the following test procedure:

1. Check the EXV output signals at appropriate terminals on CIOB-A (J17-STPR1) and CIOB-B (J17-STPR1). Refer to Tables 7 and 8 for additional information.
2. Connect positive test lead to CIOB(X)-J17 terminal 12-v for EXV(X). Using the Quick Test procedure on page 113, move the valve output under Test to 100%. DO NOT short meter leads together or pin 12-v to any other pin, as board damage will occur. During the next several seconds, carefully connect the negative test lead to pins A, B, C, and D in succession. Digital voltmeters will average this signal and display approximately 6 vdc. If the output remains at a constant voltage other than 6 vdc, or shows 0 volts, then remove the connector to the valve and recheck.
3. Select 0% to close the valve.

NOTE: The output is 12 vdc from the CIOB when the valve is stationary.

If a problem still exists, replace the CIOB. If the reading is correct, then the expansion valve and EXV wiring should be checked. Check the EXV connector and interconnecting wiring.

1. Check color coding and wire connections. Make sure they are connected to the correct terminals at the CIOB and EXV plug and that the cables are not crossed.
2. Check for continuity and tight connections at all pin terminals.
   Check the resistance between Coil A and Coil B of the EXV. Remove the EXV module plug CIOB(X)-J17. Check the resistance of the 2 coils between pins 1 (brown wire) and 2 (white wire) for one coil and pins 3 (blue wire) and 4 (black wire) for the other coil. The resistance should be 10 ohms (± 1.0 ohms). Also check pins 1-4 for any shorts to ground. (See Fig 72.)

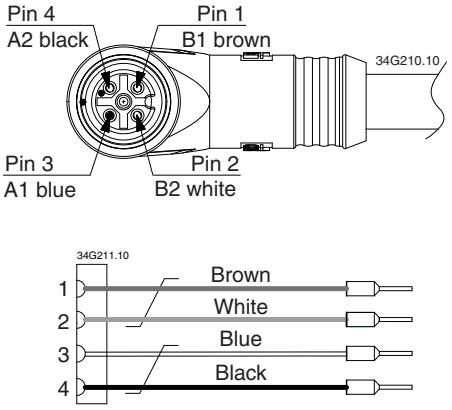


Fig. 72 — EXV Pins and Wiring Connections

REPLACING ELECTRONIC EXPANSION VALVES

The stepper motor cannot be replaced without unbrazing and changing the whole valve. It is not possible to change only the orifice; the defective EXV must be removed and replaced with a new one. To remove a defective EXV, the refrigerant must first be removed from the affected circuit.

The EXV may now be disconnected. Before unbrazing, any remaining oil must be drained from the surrounding piping and the circuit must be purged with nitrogen. The system must be purged with oxygen-free nitrogen to render the chiller safe. Compressed air or oxygen must not be used for purging. To drain the oil, drill a hole in the low point of the piping and ensure that no oil is left inside the piping. The defective EXV may now be unbrazed and replaced. For brazing temperature and recommended mounting method for the new EXV, refer to Fig 73.

Moisture Liquid Indicator

Clear flow of liquid refrigerant indicates there is sufficient charge in the system. Bubbles in the sight glass indicate an undercharged system or the presence of non-condensables. Moisture in system, measured in parts per million (ppm), changes the color of the indicator. See Table 50 for units with R-32. Change the filter drier at the first sign of moisture in the system.

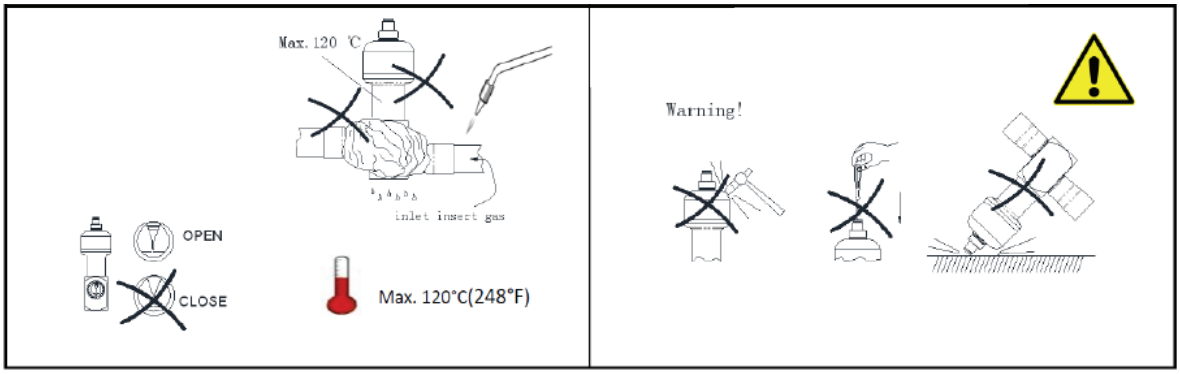


Fig. 73 — EXV Brazing

Table 50 — Color Indicators When Moisture Is Present

COLOR INDICATOR	R-32, 77°F (25°C) (ppm)	R-32, 109°F (43°C) (ppm)
Green — Dry	<64	<116
Yellow-Green — Caution	64-289	116-459
Yellow — Wet	>289	>459

IMPORTANT: Unit must be in operation for at least 12 hours before the moisture indicator can give an accurate reading.

With the unit running, the indicating element must be in contact with liquid refrigerant to give a true reading.

Filter Drier

Whenever the moisture-liquid indicator shows the presence of moisture, replace the filter drier(s). There is one filter drier assembly on each circuit. Refer to the Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants, for details on servicing filter driers.

Compressors

⚠WARNING

Do not supply power to unit with compressor cover removed. Failure to follow this warning can cause a fire, resulting in personal injury or death.

⚠WARNING

Exercise extreme caution when reading compressor currents when high-voltage power is on. Correct any of the problems described below before installing and running a replacement compressor. Wear safety glasses and gloves when handling refrigerants. Failure to follow this warning can cause a fire, resulting personal injury or death.

⚠CAUTION

Do not manually operate contactors. Serious damage to the machine may result.

COMPRESSOR REPLACEMENT

To change out a faulty compressor, refer to the compressor replacement procedure included with the new compressor.

Compressor oil equalization line fittings use rotolock fittings. If a leak is detected at these fittings, tighten fitting to 74-81 ft-lb (100-110 N•m). If leak persists, open system and inspect gasket surface for foreign material or damage. If debris is found, clean the surface and install a new gasket. If the gasket surface is damaged, replace the compressor. Do not reuse gaskets.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that A2L refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

OIL CHARGE

All units are factory charged with polyolester (POE) oil. All compressors on the circuit must be off when checking oil. At a full load, acceptable oil level for each compressor is 1/4 to 1/2 full in the sight glass. Refer to installation instructions for oil quantity.

⚠CAUTION

The compressor in an R-32 system uses a polyolester (POE) oil. This oil is extremely hygroscopic, meaning it absorbs water readily. POE oils can absorb 15 times as much water as other oils designed for HCFC and CFC refrigerants. Take all necessary precautions to avoid exposure of the oil to the atmosphere.

When additional oil or a complete charge is required, it must meet the following specifications:

Refrigerant	R-32
Type	Inhibited polyolester -based synthetic compressor lubricant
Supplier	Emerson
Oil	NGX 5020
ISO Viscosity Grade	46

Do not reuse drained oil or any oil that has been exposed to the atmosphere.

To add oil charge, follow these steps:

1. Recover charge from the unit. See System Burnout Cleanup Procedure section.
2. Add oil to the oil equalization line Schrader valve.

3. When oil can be seen at the bottom of the sight glass, add oil in 5oz increments, which is approximately 1/8 of the sight glass level.
4. Run all compressors for 20 minutes, then shut off to check oil level.
5. Repeat procedure until acceptable oil level is achieved.

SYSTEM BURNOUT CLEANUP PROCEDURE

Some compressor electrical failures can cause the motor to burn. When this occurs, byproducts such as sludge, carbon, and acids contaminate the system. There are 2 classifications of motor burnouts: mild and severe. Test the oil for acidity using a POE oil acid test kit to determine the severity of the burnout.

In a mild burnout, there is little or no detectable odor. Compressor oil is clear or slightly discolored. An acid test of the oil will be negative. This type of failure is treated the same as a mechanical failure. The liquid line filter drier or core should be replaced.

In a severe burnout, there is a strong, pungent rotten egg odor. Compressor oil is very dark. Evidence of burning may be present in the tubing connected to the compressor. An acid test of the oil will be positive. The following steps should be taken before restarting any compressors in the circuit.

1. Isolate compressors and recover refrigerant from compressor section.
2. Remove oil from all compressors in the circuit. An oil drain fitting is provided on each compressor. Pressurize the low side of the compressor circuit with nitrogen. Less than 10 psig (68.9 kPa) should be adequate. This will help in the removal of the oil from the compressor sump. Dispose of contaminated oil as per local codes and regulations.
3. Replace failed compressor as outlined under compressor replacement procedure.
4. Recharge the circuit with fresh oil. The circuit oil charge information is supplied in the 30RC Installation Instructions. Oil level should be approximately 7/8 sight glass.
5. Install activated carbon (burnout) filter drier/core.
6. Leak check, evacuate, and recharge refrigerant circuit.
7. Operate compressors. Check filter drier pressure drop periodically. Replace cores if pressure drop exceeds 4 psig (27.6 kPa).

Perform additional acid test after 24 hours of operation. Change liquid line filter drier/core if necessary. Replace with standard filter drier/core once circuit is clean. Use the Carrier Standard Service Techniques Manual as a reference source.

BPHE (Brazed Plate Heat Exchanger)

BRAZED-PLATE HEAT EXCHANGER REPLACEMENT

Brazed-plate heat exchangers (BPHE) cannot be repaired if they develop a leak. This applies to both the BPHE evaporator and the optional desuperheaters. If a leak (refrigerant or water) develops, then the heat exchanger **must be** replaced. To replace a brazed-plate heat exchanger:

1. Check that the replacement heat exchanger is the same as the original heat exchanger. The BPHE evaporator insulation covers the manufacturer's part number. Optional desuperheaters are not factory installed with insulation. Make sure the depths of the replacement and original heat exchangers are the same.
2. Disconnect the liquid-in and liquid-out connections at the heat exchanger.
3. Recover the refrigerant from the system, and unsolder the refrigerant-in and refrigerant-out connections.
4. Remove the old heat exchanger. Save the mounting hardware for use with the replacement heat exchanger. The replacement BPHE evaporator is supplied fully insulated. It also includes an evaporator heater. Use of the heater is not required unless the original evaporator contained a factory-installed heater. Replacement desuperheaters will not be supplied with any form of freeze protection.
5. Install the replacement heat exchanger in the unit and attach the mounting bracket hardware to the bottom bracket using the hardware removed in Step 4. For the BPHE evaporator, if the original evaporator was supplied with an evaporator heater, then reconnect the new evaporator heater. Torque the heater to 30 to 50 ft-lb (40.6 to 67.7 N•m).
6. *Carefully* braze the refrigerant lines to the connections on the heat exchanger. Lines should be soldered using silver as the soldering material, with a minimum of 45% silver. Keep the temperature below 1472°F (800°C) under normal soldering conditions (no vacuum) to prevent the copper solder of the brazed plate heat exchanger from changing its structure. Failure to do so can result in internal or external leakage at the connections, which cannot be repaired. Braze the liquid lines with a heat sink around the expansion valve to protect it from excess heat.
7. Reconnect the water/brine lines.
8. Dehydrate and recharge the unit. Check for leaks.

BRAZED-PLATE HEAT EXCHANGER CLEANING

Brazed-plate heat exchangers must be cleaned chemically. This applies to both the BPHE evaporators and the optional desuperheaters. A professional cleaning service skilled in chemical cleaning should be used. Use a weak acid (5% phosphoric acid or, if the heat exchanger is cleaned frequently, 5% oxalic acid). Pump the cleaning solution through the exchanger, preferably in a backflush mode. After cleaning, rinse with large amounts of fresh water to dispose of all the acid. Cleaning materials must be disposed of properly.

The strainer screen in front of the water/brine inlets of the heat exchangers should be cleaned periodically, depending on the condition of the water/brine. The BPHE evaporators are factory installed with the strainer screen, whereas the strainers for the optional desuperheaters must be field supplied and installed.

All Units

EVAPORATOR/DESUPERHEATER WATER TREATMENT

Untreated or improperly treated water may result in corrosion, scaling, erosion, or algae. The services of a qualified water treatment specialist should be obtained to develop and monitor a treatment program.

⚠ CAUTION

Water must be within design flow limits, clean, and treated to ensure proper machine performance and reduce the potential of evaporator/desuperheater damage due to corrosion, scaling, and algae. Carrier assumes no responsibility for evaporator/desuperheater damage resulting from untreated or improperly treated water.

PREPARATION FOR WINTER SHUTDOWN

If the unit is not operational during the winter months, at the end of the cooling season, complete the following steps.

⚠ CAUTION

Failure to remove power before draining heater-equipped evaporators, heat recovery desuperheaters, and hydronic packages can result in heater, tape, and insulation damage.

Evaporator Preparation for Winter Shutdown

1. To prepare the system for winter shutdown, draining the fluid from the system is highly recommended. Isolate the evaporator from the rest of the system with water shutoff valves. Be sure to de-energize heaters (if installed) by opening the fuse for the heaters (FU-9) or shut off power

to the chiller to prevent damage if the evaporator is drained.

2. Remove the evaporator drain plug. If the unit is equipped with a hydronic package, then there are additional drains in the pump housing that must be opened to allow for all of the water to drain. Follow all local codes and regulations regarding the fluid disposal.
3. Once fully drained, replace the drain plug(s) and completely fill the evaporator, and hydronic package if equipped, with suitable corrosion-inhibited antifreeze solution, such as propylene glycol. The concentration should be adequate to provide freeze protection to 15°F (8.3°C) below the expected low ambient temperature conditions. Antifreeze can be added through the vent on top of the evaporator head. Evaporator fluid volumes can be found in the Installation Instructions for the unit.
4. Leave the evaporator filled with the antifreeze solution for the winter to provide corrosion protection during the off season. The evaporator may be drained if desired. Follow all local codes and regulations regarding the fluid disposal.
5. At the beginning of the next cooling season, be sure that there is refrigerant pressure in each circuit before refilling the evaporator, adding recommended inhibitor, and resetting the fuse for the heater (FU-9), if opened, or restoring power.

Evaporator to Remain Filled for Winter Shutdown

1. If the evaporator will not be drained, do not shut off power disconnect during off-season shutdown.
2. If the chilled water loop is not protected with a suitable corrosion-inhibited antifreeze solution, such as propylene glycol, the unit must have evaporator pump control. In the event of a power failure with sub-freezing temperatures, the unit will not have any evaporator freeze protection and may be subject to damage.

⚠ CAUTION

Operation or winter shutdown with fresh water is not fail-safe should there be a loss of power to the chiller or to the circulating pump. Freeze damage due to power loss or disabling chiller pump control in fresh water systems will impair or otherwise negatively affect the warranty.

3. It is recommended that the loop be protected with a suitable corrosion-inhibited antifreeze solution such as propylene glycol. The concentration should be adequate to provide freeze protection to 15°F (8.3°C) below the expected low ambient temperature conditions. Evaporator heaters will not protect the evaporator from freeze-up in the event of power loss.

Partial Heat Recovery System Preparation

1. If the partial heat recovery loop will not be drained, do not shut off power disconnect during off-season shutdown. If the partial heat recovery loop will be drained, and field-supplied heat trace was added, then de-energize the heat trace to prevent damage and possible safety hazards when draining or when there is no liquid in the system.
2. If field-supplied service valves were installed, isolate the partial heat recovery system from the rest of the system and drain the fluid from the partial heat recovery system.
3. Replace drain plug(s) and add sufficient inhibited glycol (or other suitable inhibited antifreeze) solution to partial heat recovery system to prevent freezing of residual water. Do not drain the solution. Leaving the solution in the system will aid in preventing corrosion in exposed parts (piping and desuperheaters).
4. At the beginning of the next cooling season, be sure that there is refrigerant pressure on each circuit before refilling the desuperheaters and adding recommended inhibitor.

FREEZE PROTECTION

Evaporators are supplied with a factory installed heater. The Carrier Controller controls the evaporator heater(s) based on the outdoor-air temperature and the entering and leaving water thermistors. The Heater Trip Point is the sum of the freeze point and Water Exchanger Heater Delta Setpoint (***Main Menu → Configuration Menu → Service Parameters → Cooler Heater Delta Spt***).

If the outdoor air temperature is below the heater trip point minus 1.8°F, or the water exchanger's entering or leaving temperature is below the Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Parameters → Brine Freeze Setpoint***), then the heater shall be activated.

If the EWT is greater than the heater trip point plus 4.1°F and the LWT is greater than the heater trip point plus 3.6°F, then the heater shall be de-energized.

The entire evaporator is covered with closed-cell insulation applied over the heater. The heater(s) and insulation protect the evaporator against low ambient temperature freeze-up to 0°F (–28°C).

IMPORTANT: If the unit is installed in an area where ambient temperatures fall below 32°F (0°C), it is recommended that a suitable corrosion-inhibited antifreeze solution be used in chilled water circuit.

LOW FLUID TEMPERATURE

The Carrier Controller is programmed to shut the chiller down if leaving fluid temperature drops below 34°F (1.1°C) for comfort cooling units with water, 32°F (0°C) for comfort cooling units with glycol, or below Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Parameters → Brine Freeze Setpoint***) for low brine units. The unit will shut down, but the pump will continue to run. When fluid temperature rises to 3.6°F (2°C) above the leaving fluid setpoint, safety resets and chiller restarts. Reset is automatic as long as this is the first occurrence.

LOSS OF FLUID FLOW PROTECTION

All 30RC machines include an integral flow switch that protects the chiller against loss of cooler flow.

CHILLED WATER FLOW SWITCH

A factory-installed flow switch is installed in the leaving fluid piping for all units. (See Fig. 74.)

This is a thermal dispersion flow switch with field adjustments. The switch is set for approximately 0.66 ft/s (20 cm/s) of flow. The sensor tip houses 2 thermistors and a heater element. One thermistor is located in the sensor tip, closest to the flowing fluid. This thermistor is used to detect changes in the flow velocity of the liquid. The second thermistor is bonded to the cylindrical wall and is affected only by changes in the temperature of the liquid. The thermistors are positioned to be in close contact with the wall of the sensor probe and, at the same time, to be kept separated from each other within the confines of the probe.

In order to sense flow, it is necessary to heat one of the thermistors in the probe. When power is applied, the tip of the probe is heated. As the fluid starts to flow, heat will be carried away from the sensor tip. Cooling of the first thermistor is a function of how fast heat is conducted away by the flowing liquid.

The difference in temperature between the 2 thermistors provides a measurement of fluid velocity past the sensor probe.

When fluid velocity is high, more heat will be carried away from the heated thermistor and the temperature differential will be small. As fluid velocity decreases, less heat will be taken from the heated thermistor and there will be an increase in temperature differential.

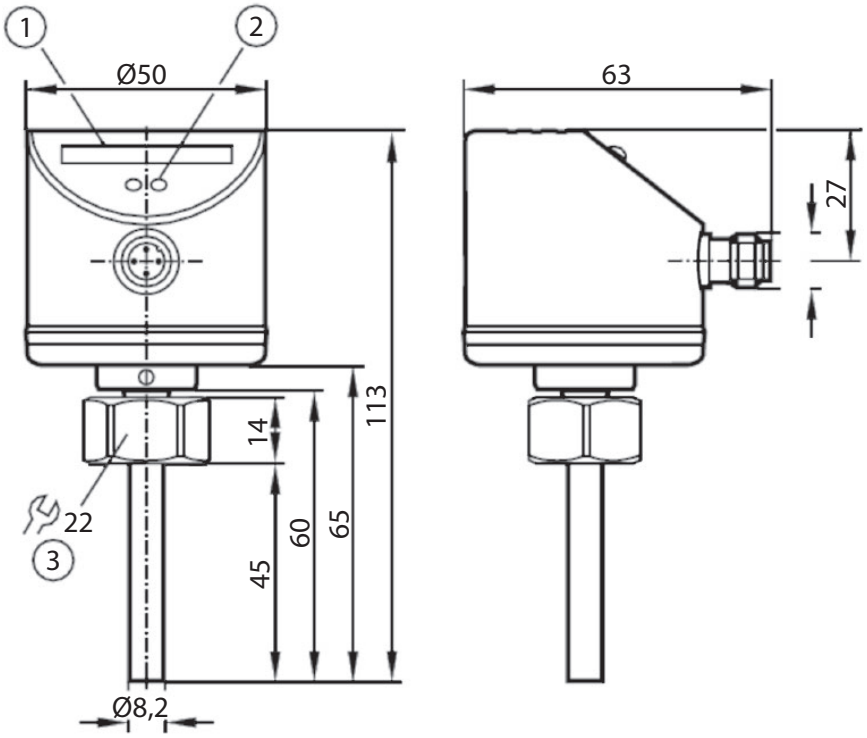
When unit flow rate is above the minimum flow rate, then the output is switched on, sending 24 vac to the CIOB-B (J1-DI-03) to prove flow has been established.

For recommended maintenance, check the sensor tip for build-up every 6 months. Clean the tip with a soft cloth. If necessary, build-up (e.g., lime) can be removed with a common vinegar cleansing agent.

This flow switch is equipped with a status LED display. When power is supplied to the device, an initialization period is started. During this period, all indicator LEDs are lit green and then turn off from 9 to 0 as the initialization period ends.

Once the initialization period is completed, the normal status LED sequence begins. If the flow is below the switch with increasing flow, sequential LEDs are lit. If the flow switch is open, LED 4 will be red. If the flow switch is closed, LED 4 will be orange.

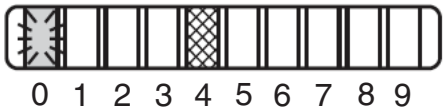
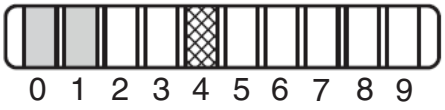
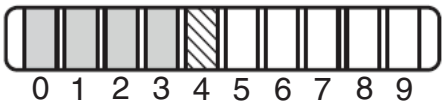
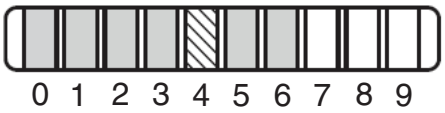
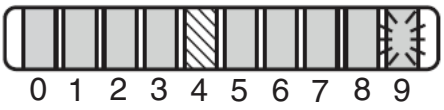
Table 51 indicates the status of the switch.



LEGEND
1 — LED display
2 — Setting push buttons
3 — Tightening torque 25 N·m

Fig. 74 — Chilled Water Flow Switch

Table 51 — Operating Indicators

	Current flow below the display range
	Current flow below the switch point
	Current flow corresponds to the switch point
	Current flow above the switch point
	Current flow above the display range
INTERFERENCE INDICATORS	
All LEDs are solid orange	Default Factory Setting restoration initiated
All LEDs are flashing orange	Default Factory Setting restoration in progress
Display OFF (no LED lights)	No LEDS will be lit for the following conditions: - Manual setpoint correction has been initiated - Default Factory Setting restored - No power to flow switch - The switch has failed
All LEDs are flashing red	Automatic adjustment not successful — the switch point is outside the measuring range

LEGEND


LED lights green


LED lights red


LED lights orange


LED lights flashing

Flow Switch Setpoint Adjustment

This thermal dispersion flow switch has the ability to adjust the flow trip point. This operation should only be completed after troubleshooting, once flow has been confirmed to be adequate.

⚠ CAUTION

Adjusting the flow switch setpoint to below the recommended minimum flow can result in evaporator freeze-up and damage to the system. Operation below minimum flow is not recommended. Damage caused by operation below minimum flow may be considered abuse of the systems and is not covered under warranty.

Flow Switch Parameter Setting

1. Set-up
   a. Supply voltage to flow switch from chiller 24-v control.
   b. All LEDs will go on and off again step by step. During this time, the output is closed.
   c. The switch is not in the operating mode.
2. Change the switch point (optional)

   A switch setpoint change is not recommend, but it can be adjusted if higher flow fluctuation or pulsation and faster response time of the flow switch is required. Low switch point means fast response with rising flow. High switch point means fast response with falling flow.
   a. To set switch setpoint, press the – or + button.
   b. All LEDs are off.
   c. Press the – or + button as often as required. Each press of the button shifts the flow by one half LED in the indicated direction.
   d. As soon as a button is pressed, the LEDs are switched on, with the LEDs of the current set value flashing.

   NOTE: If no button is pressed for 2 s, the unit returns to the operating mode with the newly set value.
3. Restore the factory setting (reset)
   a. Press the + button for at least 15 s.
   b. All LEDs first light up orange, then they flash orange.
   c. Release the button. All settings are reset to the factory setting: Switch point: 0.66 ft/s (20 cm/s).
   d. If the setpoint has not locked, then all LEDs go off for 2 s.
4. Lock / unlock the switch

   The switch can be locked electronically to prevent unintentional settings.
   a. Press both the **– and +** buttons simultaneously for 10 s in the operating mode.
   b. The indicator LED light will go out; the switch settings will lock or unlock. The replacement switch setting is in the "not locked" status when it is supplied. The switch setting is set and locked from factory.

Condenser Coil Maintenance and Cleaning

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following maintenance and cleaning procedures are recommended as part of the routine maintenance activities to extend the life of the RTPF (round tube plate fin) coil and MCHX (microchannel heat exchanger) coil.

REMOVE SURFACE-LOADED FIBERS

Surface-loaded fibers or dirt should be removed with a vacuum cleaner. If a vacuum cleaner is not available, then a soft, nonmetallic bristle brush may be used. In either case, the tool should be applied in the direction of the fins. Coil surfaces can be easily damaged if the tool is applied across the fins (fin edges can be easily bent over and damage the coating of a protected coil).

NOTE: The use of a water stream, such as a garden hose, against a surface-loaded coil will drive the fibers and dirt into the coil. This will make cleaning efforts more difficult. Surface-loaded fibers must be completely removed prior to using low velocity clean water rinse.

PERIODIC CLEAN WATER RINSE

A periodic clean water rinse is very beneficial for coils that are applied in coastal or industrial environments. However, it is very important that the water rinse is made with a very low velocity water stream to avoid damaging the fin edges. Monthly cleaning is recommended.

ROUTINE CLEANING OF COIL SURFACE

Routine cleaning with Totaline® environmentally balanced coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement Parts division as part number P902-0301 for a one gallon container and part number P902-0305 for a 5 gallon container. It is recommended that all coils, including MCHX, e-coated MCHX, standard copper tube aluminum fin, precoated fin, copper fin, and e-coated coils, be cleaned with the Totaline environmentally balanced coil cleaner as described below. Coil cleaning should be part of the unit's regularly scheduled maintenance procedures to ensure the long life of the coil. Failure to clean the coils may result in reduced durability in the environment.

Avoid the use of:

- coil brighteners
- acid cleaning prior to painting
- high pressure washers
- poor quality water for cleaning

Totaline environmentally balanced coil cleaner is non-flammable, hypoallergenic, nonbacterial, and a USDA accepted biodegradable agent that will not harm the coil or surrounding components, such as electrical wiring, painted metal surfaces, or insulation. Use of non-recommended coil cleaners is strongly discouraged since coil and unit durability could be affected.

Totaline Environmentally Balanced Coil Cleaner Application Equipment

- 2-1/2 gallon garden sprayer
- water rinse with low velocity spray nozzle

⚠ CAUTION

Harsh chemicals, household bleach, or acid or basic cleaners should not be used to clean outdoor or indoor coils of any kind. These cleaners can be very difficult to rinse out of the coil and can accelerate corrosion at the fin/tube interface, where dissimilar materials are in contact. If there is dirt below the surface of the coil, use the Totaline environmentally balanced coil cleaner.

⚠ CAUTION

High velocity water, from a pressure washer or garden hose, or compressed air should never be used to clean an RTPF coil. The force of the water or air jet will bend the fin edges and increase airside pressure drop. High velocity water, from a pressure washer or garden hose, or compressed air should never be used to clean an MCHX coil, as it may fracture the tube/fin bond. Reduced unit performance or nuisance unit shutdown may occur.

Totaline Environmentally Balanced Coil Cleaner Application Instructions

1. Proper eye protection, such as safety glasses, is recommended during mixing and application.
2. Remove all surface-loaded fibers and dirt with a vacuum cleaner as described above.
3. Thoroughly wet finned surfaces with clean water and a low velocity garden hose, being careful not to bend fins.
4. Mix Totaline environmentally balanced coil cleaner in a 2-1/2 gallon garden sprayer according to the instructions included with the cleaner. The optimum solution temperature is 100°F (37.8°C).

NOTE: DO NOT USE water in excess of 130°F (54.4°C), as the enzymatic activity will be destroyed.

5. Thoroughly apply Totaline environmentally balanced coil cleaner solution to all coil surfaces, including finned area, tube sheets, and coil headers.
6. Hold garden sprayer nozzle close to finned areas and apply cleaner with a vertical, up-and-down motion. Avoid spraying in a horizontal pattern to minimize the potential for fin damage.
7. Ensure cleaner thoroughly penetrates deep into finned areas.
8. Interior and exterior finned areas must be thoroughly cleaned.
9. Finned surfaces should remain wet with cleaning solution for 10 minutes. Ensure surfaces are not allowed to dry before rinsing. Reapply cleaner as needed to ensure 10-minute saturation is achieved.
10. Thoroughly rinse all surfaces with low velocity clean water using a downward rinsing motion of the water spray nozzle. Protect fins from damage from the spray nozzle.

Condenser Fans

AEROACOUSTIC™ (LOW SOUND) FANS

AeroAcoustic low sound fans are standard on the 30RC chillers. A wire form mount supports the fan motor. The fan is covered with a molded fan shroud.

IMPORTANT: Check for proper fan rotation (counterclockwise when viewed from above). If necessary, switch any 2 power leads to reverse fan rotation.

To remove the fan, a fan puller will likely be needed. The fan motor shaft is protected from weather by the fan cover. If fan motor must be removed for service or replacement, when reinstalling the motor be sure to mount the motor band in the proper location. Do not use grease on the shaft or key. The fan motor has a step in the motor shaft. For proper performance, fan should be positioned such that it is securely seated on this step. Apply Loctite 680 Retaining Compound to the hub and motor keyway only just prior to installing the key. See Fig. 75. Tighten bolt to 24 ± 2 ft-lb (32.5 ± 2.7 N•m). Fig. 76 shows the proper position of mounted fan.

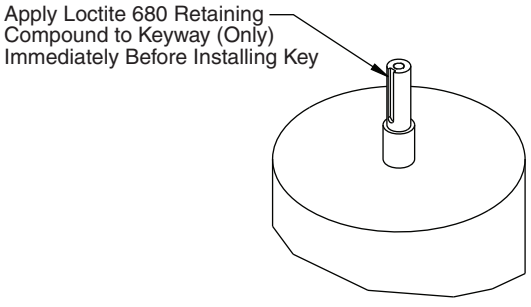


Fig. 75 — AeroAcoustic Fan Motor Keyway

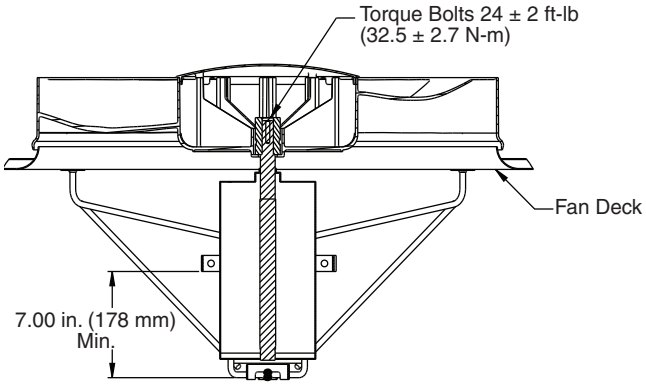


Fig. 76 — AeroAcoustic Fan Mounted Position

Refrigerant Circuit

LEAK TESTING

Units are shipped with complete operating charge of refrigerant and should be under sufficient pressure to conduct a leak test. If there is no pressure in the system, then introduce enough nitrogen to search for the leak.

Under no circumstances shall potential sources of ignition be used in the search for or detection of refrigerant leaks. A halide torch (or any other detector using a exposed flame) shall NOT be used.

The following leak detection methods are deemed acceptable for all refrigerant systems:

1. Electronic leak detectors may be used to detect refrigerant leaks, but in the case of A2L refrigerants, the sensitivity may not be adequate or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set to the LFL (lower flammability limit) of R-32, which is 14%.
2. Leak detection fluids are also suitable for use with most refrigerants, but the use of detergents containing chlorine shall be avoided, as the chlorine may react with the refrigerant and corrode the copper pipework. Examples of leak detection fluids are the bubble method and fluorescent method agents.

If a leak is suspected, all exposed flames shall be removed/extinguished. If a leakage of refrigerant is found that requires brazing, all of the refrigerant shall be recovered from the system or isolated (by means of shut off valves) in a part of the system remote from the leak. After leaks are repaired, the system must be evacuated and dehydrated if it has not been already.

REFRIGERANT REMOVAL AND EVACUATION

When breaking into the refrigerant circuit to make repairs—or for any other purpose—conventional procedures shall be used. However, for A2L refrigerants, it is important that best practices be followed, since flammability is a consideration. The following procedure shall be adhered to:

1. Safely remove refrigerant following local and national regulations.
2. Purge the circuit with inert gas.
3. Open the circuit by cutting.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used shall be designated for the recovered refrigerant and labeled for that refrigerant (i.e.,

special cylinders for the recovery of refrigerant). Cylinders shall be complete, with pressure-relief valve and associated shut-off valves, and in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order, with a set of instructions concerning the equipment that is at hand, and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, FLAMMABLE REFRIGERANTS. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete, with leak-free disconnect couplings, and in good condition. Before using the recovery machine, check that it is in satisfactory working order, it has been properly maintained, and any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.

The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units, and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that FLAMMABLE REFRIGERANT does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the supplier. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

For 30RC chillers requiring R-32, the system shall be purged with oxygen-free nitrogen to render the equipment safe for A2L refrigerants. This process may need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. Ensure that the outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

REFRIGERANT CHARGE

Refer to the Physical Data tables supplied in the 30RC Installation Instructions. There is a 1/4 in. Schrader connection near the lower coil connection, liquid line, for charging liquid refrigerant.

When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- safely remove refrigerant following local and national regulations;
- evacuate;
- purge the circuit with inert gas (optional for A2L);
- evacuate (optional for A2L);
- continuously flush or purge with inert gas when using flame to open circuit; and
- open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigerating system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

RECOVERY

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Charging with Unit Off and Evacuated

Weigh in charge shown on unit nameplate. Start unit and allow it to run for several minutes fully loaded. Check for a clear sight glass. Be sure clear condition is liquid and not vapor.

Charging with Unit Running

If charge is to be added to a circuit while the unit is operating, then all condenser fans and compressors for the respective circuit must be operating. It may be necessary to block condenser coils at low ambient temperatures to raise the condensing temperature to approximately 120°F (48.9°C) which is 429.3 psig for R-32. Do not totally block a coil to do this. Partially block all coils in a uniform pattern. Charge each circuit until the sight glass shows clear liquid and has the correct liquid line temperature corresponding to Fig. 77.

CONDENSER TYPE	LEAVING WATER TEMPERATURE	LIQUID LINE TEMPERATURE
MCHX	38.0°F (3.4°C) and above	See graph line A
Al-Cu (RTPF)	38.0°F (3.4°C) and above	See graph line B
MCHX	Below 37.9°F (3.3°C)	See graph line C

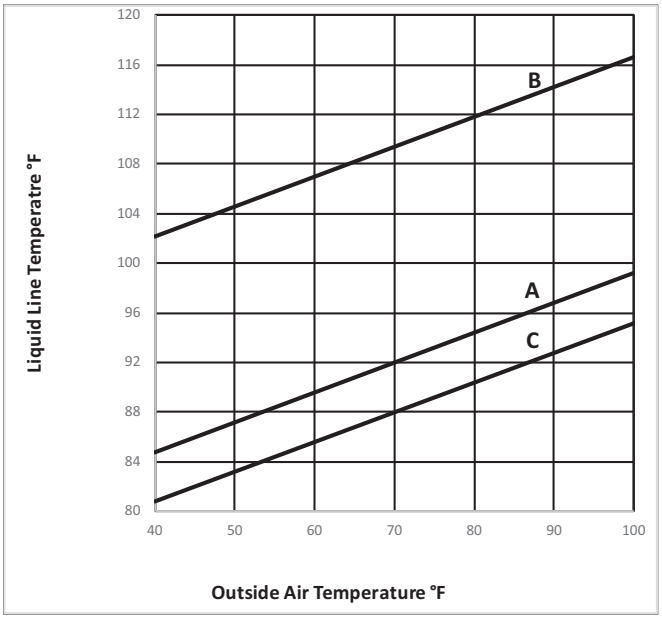


Fig. 77 — Liquid Line Temperature

If the unit has variable speed condenser fans, then the unit can be run in Greenspeed Charging Mode. This mode is enabled in the last screen of the Capacity Control menu (***Main Menu → Maintenance Menu → Capacity Control → Greenspeed Charging Mode* = On**). In this mode, the fans will adjust the high side pressure to maintain a 120°F (48.9°C) SCT (saturated condensing temperature). Charge each circuit to the liquid temperatures corresponding to Fig. 77. Unless manually disabled, the Greenspeed Charging Mode will remain in effect for 4 hours. If system load is low, one circuit should be charged at a time, while the other is disabled. The compressors for each circuit can be disabled manually through the Comp Disabled Cfg screen (***Main Menu → Configuration Menu → Compressors Unable***). For example, if charging circuit A, then manually disable all circuit B compressors by setting **Compressor B1 Disable**, **Compressor B2 Disable**, and **Compressor B3 Disable** to **Yes**.

IMPORTANT: When adjusting refrigerant charge, circulate fluid through evaporator continuously to prevent freezing and possible damage to the evaporator. Do not overcharge, and never charge liquid into the low-pressure side of system.

DECOMMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely.

Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate the system electrically.
3. Before attempting the procedure, ensure that:
   a. mechanical handling equipment is available, if required, for handling refrigerant cylinders
   b. all personal protective equipment is available and being used correctly
   c. the recovery process is supervised at all times by a trained, qualified, and competent person
   d. recovery equipment and cylinders conform to the appropriate standards
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that the cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with its instructions.
8. Do not overfill cylinders (no more than 80% volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from the site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Equipment shall be labeled stating that it has been decommissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

Safety Devices

Chillers contain many safety devices and protection logic built into the electronic control. This section presents a brief summary of major safeties.

COMPRESSOR PROTECTION

Circuit Breaker

Each compressor is equipped with one molded case circuit breaker to provide short circuit protection. Do not bypass or increase the size of a breaker to correct problems. Determine the cause for trouble and correct it before resetting the breaker. The circuit breaker current rating is listed on the individual circuit breakers. A high-pressure switch is mounted on the discharge line of each circuit. The switch is wired into CIOB-A for circuit A and CIOB-B-J4 for circuit B. If a switch opens, the Carrier Controller opens all compressor contactors in the circuit, and all compressors are locked off. See Table 52 for high pressure switch protection.

Table 52 — High-Pressure Switch Settings

DEVICE	CUT-OUT	CUT-IN
R-32 HP Switch	650 ± 10 psi (4482 ± 69 kPa)	500 ± 15 psi (3448 ± 103 kPa)

CRANKCASE HEATERS

Units with round tube plate fin design condenser coils have a 56W crankcase heater on each compressor to prevent the absorption of liquid refrigerant by oil in the crankcase when the compressor is not running. The heater power source is the control power transformer. Units with microchannel coils do not require crankcase heaters due to the small amount of refrigerant used.

IMPORTANT: Never open any switch or disconnect that de-energizes crankcase heaters unless unit is being serviced or is to be shut down for a prolonged period. After a prolonged shutdown or service, energize crankcase heaters for 24 hours before starting the unit.

Relief Devices

PROTECTION

The fusible plug is located between the condenser and filter drier.

This is designed to relieve pressure on a temperature rise to approximately 210°F (99°C).

⚠ CAUTION

The high-side fusible plug will not protect against overpressurization of liquid refrigerant between EXV and liquid service valve. The service valve should ONLY be closed for immediate service work. Extended closure of the service valve and EXV with full liquid charge could lead to hydrostatic failure.

PRESSURE RELIEF VALVES

Optional factory-installed pressure relief valves are installed in each circuit and are located on the suction and discharge lines. These valves are designed to relieve if an abnormal pressure condition arises. Relief valves on the suction line relieve at 445 psig (3068 kPa). Relief valves on the discharge line relieve at 630 psig (4344 kPa) for units with R-32 refrigerant and 650 psig (4482 kPa) for units with R-410A refrigerant. These valves should not be capped. If a valve relieves, it should be replaced. If the valve is not replaced, it may relieve at a lower pressure or leak due to trapped dirt from the system that may prevent resealing. See Table 53. Some local building codes require that relieved gases be exhausted to a specific location. This connection allows conformance to this requirement.

Table 53 — Relief Valve Specifications

LOCATION	CARRIER PART NO.	CONNECTION SIZE	PRESSURE SETTINGS PSI ±3%
Suction Line	EB51RW061	1/4 in. [M]	445
Discharge Line	EB51RW122	3/8 in. [M]	650

Inspection and Maintenance

The relief valves on this chiller protect the system against the potentially dangerous effects of overpressure. To ensure against damage to the equipment and possible injury to personnel, these devices must be kept in peak operating condition. At minimum, the following maintenance is required:

1. At least once a year, disconnect the vent piping at the valve outlet, if equipped. Inspect the vent piping for corrosion, a restriction, or blockage. If any is found, clean or replace the affected vent piping.
2. Carefully inspect the valve body and mechanism for any evidence of internal corrosion or rust, dirt, scale, leakage, etc. If corrosion or foreign material is found, do not attempt to repair or recondition; replace the valve.

If the chiller is installed in a corrosive atmosphere, or the relief valves are vented into a corrosive atmosphere, then inspect relief valves and piping at more frequent intervals.

Variable Frequency Drives

The 30RC units with Greenspeed® Intelligence are equipped with VFDs to control the condenser fans. The VFDs are configured through the Carrier Controller controls, and parameters should not be changed manually.

ADDRESSING AND COMMUNICATION

The 30RC units with Greenspeed Intelligence use Danfoss VFDs that operate through the Carrier controller, communicating commands to the drive over the LEN bus. As a result, each drive must have a unique address, as shown in Table 54. Addresses are factory set but can be verified in VFD Parameter 8-31.

Table 54 — VFD Addresses

VFD	ADDRESS
Fan Drive 1	184

COMMUNICATION WIRING

LEN wiring is connected to each drive at VFD Terminals 61 (Ground), 68 (+), and 69 (–). See Fig. 78. It is recommended that the BUS TER (Bus Termination) DIP Switch be turned ON at the last VFD in the daisy chain. This switch is located behind the Local Control Panel (LCP). See Fig. 78.

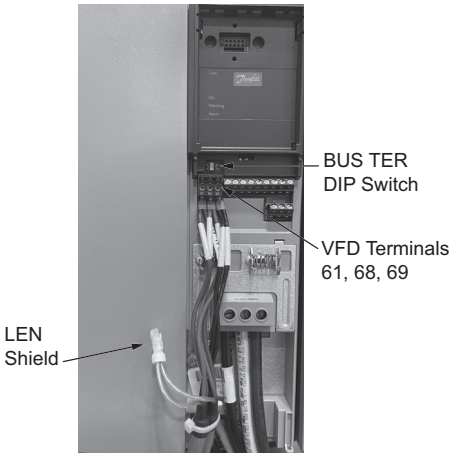


Fig. 78 — VFD LEN Wiring/BUS Termination

CONDENSER FAN DRIVES

Chiller with a 0, 3, or 6 in the 10th position of the model number will have condenser fans controlled by a VFD. All fans operate on a single VFD at the same frequency. Fan drives are located on the right side of the unit. Reference the component arrangement diagrams in Fig. 85 and 86 on pages 119-120 for VFD locations. For fixed speed fan sequencing, refer to Table 34 on page 41.

VFD CONFIGURATION TABLES

The configuration parameters for the VFD is stored in the control system and are automatically sent to the drives when addressed. The parameters should not need to be changed but are included as a reference for verification and troubleshooting. See Tables 55 and 56 for fan VFD parameters.

Table 55 — 30RC Fan — Common VFD Parameters

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	30RC010 - 30RC015	30RC020 - 30RC030	30RC035 - 30RC050	30RC055 - 30RC060
0-02	motor speed	Hz	1	1	1	1
1-03	torque profile	fan torque	1	1	1	1
1-20	motor kW	size dependent	1.6	4.6	6.9	9.2
1-22	motor volts	motor dependent	Refer to Table 56 for voltage-specific parameters			
1-23	motor frequency	motor dependent	60	60	60	60
1-24	motor amperage	size dependent	Refer to Table 56 for voltage-specific parameters			
1-25	motor rpm	size dependent	850	850	850	850
1-73	flying Restart	yes	1	1	1	1
1-80	function at stop	coast	0	0	0	0
1-90	motor thermal protection	no	0	0	0	0
1-91	motor external fan	no	0	0	0	0
1-93	thermistor src	no	0	0	0	0
3-02	min ref	0	0	0	0	0
3-03	max reference	size dependent	60	60	60	60
3-13	type reference	remote	0	0	0	0
3-15	src ref#1	no function	0	0	0	0
3-16	src ref#2	no function	0	0	0	0
3-41	ramp up	s	20	20	20	20
3-42	ramp down	s	20	20	20	20
4-10	motor speed direct	Clockwise	0	0	0	0
4-12	motor speed low limit	Hz	0	0	0	0
4-14	motor speed high limit	size dependent	60	60	60	60
4-16	torque limit	size dependent	150	150	150	150
4-18	current limit	size dependent	110	110	110	110
4-19	max output frequency	size dependent	61	61	61	61
5-12	DI #27	no operation	0	0	0	0
8_01	control site	digital & control word	2	2	2	2
8-02	control source	FC port=RS485	1	1	1	1
8-03	control timeout	s	10	10	10	10
8-04	control time out function	stop	2	2	2	2
8-05	funtion at time out	resume setup	1	1	1	1
8-10	function at time end	fc profile	0	0	0	0
8-30	protocol	LEN	20	20	20	20
8-31	address	184	184	184	184	184
8-32	baud rate	38400	4	4	4	4
8-33	parity/stop bit	1=stop parity 2=no parity,	2	2	2	2
8-34	estimated cycle time	msec	0	0	0	0
8-37	max intercharacter delay	msec	5	5	5	5
14-01	switching frequency	4kHz	6	6	6	6
14-03	overmodulation	yes	1	1	1	1
14-40	VT level zero mag level		66	66	66	66
14-60	function at overtemp	derate	1	1	1	1
14-61	function at inverter overload	derate	1	1	1	1

Table 56 — 30RC Fan — Voltage Specific VFD Parameters

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	30RC010-30RC16	30RC020-30RC030	30RC035-30RC50	30RC055 - 30RC060
Voltage: 208V-60Hz						
1-22	motor volts	motor dependent	208	208	208	208
1-24	motor amperage	size dependent	6	12	18	24
Voltage:380V-60Hz						
1-22	motor volts	motor dependent	380	380	380	380
1-24	motor amperage	size dependent	3.9	7.8	11.7	15.6
Voltage: 460V-60Hz						
1-22	motor volts	motor dependent	460	460	460	460
1-24	motor amperage	size dependent	2.9	5.8	8.7	11.6
Voltage:575V-60Hz						
1-22	motor volts	motor dependent	575	575	575	575
1-24	motor amperage	size dependent	2.4	4.8	7.2	9.6

VFD ALARM RESET

As long as communication is established between the Carrier Controller controls and the VFD, most alarms can be reset directly through the chiller control system.

VFD REPLACEMENT PROCEDURE

If required, VFDs can be replaced and programmed with the procedure below.

1. Disconnect power from unit. Wait a minimum of 15 minutes before continuing. After waiting, verify that there is no voltage on the power terminals.

⚠ WARNING

After unit power is disconnected, wait at least 15 minutes for the VFD capacitors to discharge before opening the drive. Failure to do so presents an electrical shock hazard and may result in personal injury.

2. Disconnect electrical power and communication connections from drive.
3. Unbolt and remove the drive taking care to support the drive at all times during the procedure.

⚠ CAUTION

Use all proper rigging procedures and precautions when moving VFDs to avoid damage to the equipment.

4. Lift, position, and fasten the replacement drive to the unit. Tighten all bolts securely.
5. Connect power and LEN control wiring to the drive. For wiring details for fan drives, see Fig 79. Use the same knockout openings on the new drive as on the drive being replaced. Torque connections are 16 ft-lb for lug terminals.
6. Turn on power to the unit and allow the drive screen to become active. The drive will need to be manually addressed for the control system to export the correct parameters. Use this procedure to address the VFDs:
   a. Using the display interface on the VFD drive, select Main Menu with the Menu button. Navigate to menu item 8-30 and confirm that the LEN option is selected. Using the up/down arrows and OK button, follow the following path: ***8-** (Command Options) → 8-3* (FC Port Settings) → 8-30 (Protocol)***. If LEN is not selected, press the OK button and use the arrows to scroll through the options and select it. If no LEN option appears, LEN communication is not enabled on the drive. Follow the process described in the next section, Enable LEN Communication, and then complete the remainder of this addressing procedure.
   b. Navigate to menu item 8-31 on the VFD display and enter the address for the drive being configured, using the following path: ***8-** (Command Options) → 8-3* (FC Port Settings) → 8-31 (Address)***. Press the OK button and use the up/down arrows to select the drive address. Set the address to 184.
   c. Turn the chiller power off and then on again. Cycling the power will cause the control system to send the correct configuration data files to the new drive.

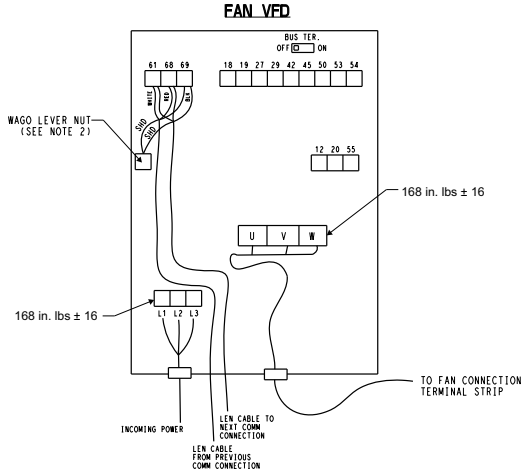


Fig. 79 — Fan Drive Wiring

Enable LEN Communication

If the replacement drive received does not have LEN as an option under menu item 8-30 on the VFD display, then LEN will need to be manually enabled before the drive can be addressed. To enable the LEN communication option:

1. Navigate to menu item 14-29 on the VFD display. Select Main Menu with the Menu button, and then navigate through the following path: ***14-** (Special Functions) → 14-2* (Reset Functions) → 14-29 (Service Code)***. Set the 14-29 parameter to 00006222. Press OK.
2. Power down the drive, and then wait until the display is completely blank. Power up the drive again (power cycle) and check that the LEN protocol is selected on 8-30.
3. Proceed with the procedure for addressing the VFD above to complete the configuration process (see the VFD Replacement Procedure section, Step 6.b).

LONG TERM STORAGE

If the unit is stored for long periods of time without use, then special procedures must be performed to ensure the safe and efficient operation of the VFD capacitor banks. If the unit has been stored for more than 3 years without power applied to the drives, then contact Carrier Service to obtain information and instructions for reforming the capacitor banks.

MAINTENANCE

Recommended Maintenance Schedule

The following are only recommended guidelines. Jobsite conditions may dictate that maintenance tasks be performed more often than recommended.

Routine for machines with e-coat condenser coils:

- Check condenser coils for debris; clean as necessary with Carrier approved coil cleaner.
- Periodic clean water rinse, especially in coastal and industrial applications.

Every month:

- Check condenser coils for debris; clean as necessary with Carrier approved coil cleaner.
- Check moisture-indicating sight glass for possible refrigerant loss and presence of moisture.
- Record water pressure differential.
- Record system superheat.

Every 3 months:

- Check all refrigerant joints and valves for refrigerant leaks; repair as necessary.
- Check chilled water flow switch operation.
- Check all condenser fans for proper operation.
- Check sight glass moisture indicator for moisture.
- Check compressor oil level.
- Check crankcase heater operation.
- Inspect pump seal, if equipped with hydronic pump package.
- Check the back of all fan drives for any debris. If present, clean each by blowing air from top to bottom.

Every 12 months:

- Check refrigerant charge.
- Check all electrical connections; tighten as necessary.
- Inspect all contactors and relays; replace as necessary.
- Check accuracy of thermistors; replace if greater than ±2°F (1.2°C) variance from calibrated thermometer.
- Check accuracy of transducers; replace if greater than ±5 psig (34.47 kPa) variance.
- Check to be sure that the proper concentration of antifreeze is present in the chilled water loop, if applicable.
- Verify that the chilled water loop is properly treated.
- Check refrigerant filter driers for excessive pressure drop; replace as necessary.
- Check chilled water strainers; clean as necessary.
- Check evaporator heater operation.
- Check pump heater operation, if equipped.
- Check condition of condenser fan blades and that they are securely fastened to the motor shaft.
- Perform Service Test to confirm operation of all components.
- Check for excessive evaporator approach (Leaving Chilled Water Temperature – Saturated Suction Temperature), which may indicate fouling. Clean evaporator vessel if necessary.

Every 3-5 years:

- Inspect pressure relief valves, if equipped.

TROUBLESHOOTING

Alarms and Alerts

The integral control system constantly monitors the unit and generates warnings when abnormal or fault conditions occur. Alarms may cause either a circuit (Alert) or the whole machine (Alarm) to shut down. Alarms and Alerts are assigned codes as described in Table 57.

To view information about current and past alarms or to reset alarms, press the Alarm bell button in the top right corner of the Carrier Controller display. A solid gray icon is present during normal operation. A ringing yellow bell icon indicates that there is an alarm, but the unit is still running. A ringing red bell icon indicates that the unit is shut down due to a detected fault.

CURRENT ALARMS

To access the current alarms view, press the Alarm bell button in the top right corner of the Carrier Controller display, and then select Current Alarms . This screen displays up to 10 current alarms with the time and date as well as a one line description of each alarm. See Table 57 for a list of possible alarms sorted alphabetically by description.

RESETTING ALARMS

The alarms can be reset without stopping the machine. The controller generates 2 types of alarms. Automatic reset alarms will reset without any intervention if the condition that caused the alarm corrects itself. Manual reset alarms require the service technician to check for the alarm cause and manually reset the alarm.

To reset any active alarms, press the Alarm button and then press the Reset Alarms icon . For Alarm Reset, press the YES button and select SET in the pop-up window. When resetting the alarm manually, the reset can be performed through the Carrier Controller display or remotely through the web interface (Reset Alarms menu).

Only logged-in users can access the Reset Alarms menu. The menu displays up to 5 alarm codes that are currently active on the unit, corresponding to the first 5 items displayed in the Current Alarms menu. Each alarm is also described by a numeric code. See Tables 57-59 for lists of alarms by code. See Table 60 for Primary/Secondary alarm codes.

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.

Before resetting any alarm, first determine the cause of the alarm and correct it. Do not reset the chiller at random without first investigating and correcting the cause(s) of the failure.

ALARM HISTORY

Once the cause of the alarm has been identified and corrected, it will be displayed in the alarm history. Information regarding resolved alarms is stored in the Alarm history menu, which is divided into 50 recent alarms and 50 recent major alarms. General alarms indicate pumps failure, transducers faults, network connection problems, etc. Major alarms indicate process failure.

To access the Alarm history menu, press the Alarm button and select Alarm Historic or Major Alarm Historic. The 50 most recent alarms of each type are stored in memory and are replaced on a first-in, first-out basis.

Table 57 — Alarm Reference Lists, By Name

Description	Name	Alarm Code
Circuit A CIOB Low Voltage Failure	CIOB_A_LOW_VOLT_F	57001
Circuit A Discharge Gas Thermistor Failure	DGT_A_F	15015
Circuit A Discharge Pressure Transducer Failure	DP_A_F	12001
Circuit A High Pressure Switch Failure	HP_SWITCH_A_F	10063
Circuit A Low Saturated Suction Temperature	LOW_SUCTION_A_F	10005
Circuit A Low Superheat	LOW_SH_A_F	10011
Circuit A Repeated High Discharge Gas Overrides	REPEATED_HI_DGT_A_F	10037
Circuit A Repeated Low Suction Temp Overrides	REPEATED_LO_SST_A_F	10040
Circuit A Suction Gas Thermistor Failure	SUCTION_T_A_F	15012
Circuit A Suction Pressure Transducer Failure	SP_A_F	12004
Circuit A VFD Fan Drive Failure	FAN_VFD_DRIVE_F	17001
Circuit B CIOB Low Voltage Failure	CIOB_B_LOW_VOLT_F	57002
Circuit B Discharge Gas Thermistor Failure	DGT_B_F	15016
Circuit B Discharge Pressure Transducer Failure	DP_B_F	12002
Circuit B High Pressure Switch Failure	HP_SWITCH_B_F	10064
Circuit B Low Saturated Suction Temperature	LOW_SUCTION_B_F	10006
Circuit B Low Superheat	LOW_SH_B_F	10012
Circuit B Repeated High Discharge Gas Overrides	REPEATED_HI_DGT_B_F	10038
Circuit B Repeated Low Suction Temp Overrides	REPEATED_LO_SST_B_F	10041
Circuit B Suction Gas Thermistor Failure	SUCTION_T_B_F	15013
Circuit B Suction Pressure Transducer Failure	SP_B_F	12005
Compressor A1 Not Started Or Pressure Increase not Established	CPA1_REVERSE_ROT_F	10016
Compressor A2 Not Started Or Pressure Increase not Established	CPA2_REVERSE_ROT_F	10017
Compressor A3 Not Started Or Pressure Increase not Established	CPA3_REVERSE_ROT_F	10018
Compressor B1 Not Started Or Pressure Increase not Established	CPB1_REVERSE_ROT_F	10020
Compressor B2 Not Started Or Pressure Increase not Established	CPB2_REVERSE_ROT_F	10021
Compressor Running Outside MAP - cir A	RUN_OUT_MAP_A_F	10210
Compressor Running Outside MAP - cir B	RUN_OUT_MAP_B_F	10211
Condenser Entering Fluid Thermistor Failure	COND_EWT_F	15006
Condenser Flow Switch Failure	CONDENSER_LOCK_F	10015
Condenser Leaving Fluid Thermistor Failure	COND_LWT_F	15007
Condenser Pump Default	COND_PUMP_F	10073
Condenser Water Exchanger Temperature Sensors Swapped	COND_SENSORS_SWAP_F	10098
Cooler Interlock Failure	COOLER_LOCK_F	10014
Cooler Pump 1 Default	COOL_PUMP1_F	10032
Cooler Pump 2 Default	COOL_PUMP2_F	10033
Current Phase Reversal	REV_ROT_BOARD_F	10053
Illegal configuration	ILL_FACT_CONF_F	7001
Initial factory Parameters required	INI_FACT_CONF_F	8000
Lenscan module Failure	LENSCAN_F	56001
Loss of communication with AUX Board	AUX_COM_F	4601
Loss of communication with CIOB Board Number A	CIOB_CIR_A_COM_F	4901
Loss of communication with CIOB Board Number B	CIOB_CIR_B_COM_F	4902
Loss of communication with System Manager	LOSS_COM_SM_F	10029
Loss of communication with VFD Fan Drive	FAN_DRIVE_COM_F	4701
OAT Thermistor Failure	OAT_F	15010
Possible Refrigerant Leakage Failure	FLUIDE_FAIL	10099
Primary chiller configuration error	M_S_CONFIG_F	9001
Primary/Secondary Common Fluid Thermistor Failure	DLWT_F	15011
Primary/Secondary communication Failure	LOSS_COM_MS_F	10030
Service maintenance alert	SERVICE_MAINT_ALERT	13001
Space Temperature Thermistor Failure	SPACETEMP	15021
Unit is in Network emergency stop	NETWORK_EMSTOP_F	10031
Water Exch. Temp. Sensors Swapped or 4-way valve not switching	SENSORS_SWAP_F	10097
Water Exchanger Entering Fluid Thermistor Failure	COOL_EWT_F	15001
Water Exchanger Freeze Protection	COOLER_FREEZE_F	10001
Water Exchanger Leaving Fluid Thermistor Failure	COOL_LWT_F	15002

LEGEND

EMM — Energy Management Module
EXV — Electronic Expansion Valve
OAT — Outdoor Air Temperature
CIOB — Standard Input Output Board
VFD — Variable Frequency Drive

Table 58 — Alarm Reference Lists, By Code

ALARM CODE	NAME	DESCRIPTION
4601	AUX_COM_F	Loss of communication with AUX Board
4701	FAN_DRIVE_COM_F	Loss of communication with VFD Fan Drive
4901	CIOB_CIR_A_COM_F	Loss of communication with CIOB Board Number A
4902	CIOB_CIR_B_COM_F	Loss of communication with CIOB Board Number B
7001	ILL_FACT_CONF_F	Illegal configuration
8000	INI_FACT_CONF_F	Initial factory Parameters required
9001	M_S_CONFIG_F	Primary chiller configuration error
10001	COOLER_FREEZE_F	Water Exchanger Freeze Protection
10005	LOW_SUCTION_A_F	Circuit A Low Saturated Suction Temperature
10006	LOW_SUCTION_B_F	Circuit B Low Saturated Suction Temperature
10011	LOW_SH_A_F	Circuit A Low Superheat
10012	LOW_SH_B_F	Circuit B Low Superheat
10014	COOLER_LOCK_F	Cooler Interlock Failure
10015	CONDENSER_LOCK_F	Condenser Flow Switch Failure
10016	CPA1_REVERSE_ROT_F	Compressor A1 Not Started Or Pressure Increase not Established
10017	CPA2_REVERSE_ROT_F	Compressor A2 Not Started Or Pressure Increase not Established
10018	CPA3_REVERSE_ROT_F	Compressor A3 Not Started Or Pressure Increase not Established
10020	CPB1_REVERSE_ROT_F	Compressor B1 Not Started Or Pressure Increase not Established
10021	CPB2_REVERSE_ROT_F	Compressor B2 Not Started Or Pressure Increase not Established
10029	LOSS_COM_SM_F	Loss of communication with System Manager
10030	LOSS_COM_MS_F	Primary/Secondary communication Failure
10031	NETWORK_EMSTOP_F	Unit is in Network emergency stop
10032	COOL_PUMP1_F	Cooler Pump 1 Default
10033	COOL_PUMP2_F	Cooler Pump 2 Default
10037	REPEATED_HI_DGT_A_F	Circuit A Repeated High Discharge Gas Overrides
10038	REPEATED_HI_DGT_B_F	Circuit B Repeated High Discharge Gas Overrides
10040	REPEATED_LO_SST_A_F	Circuit A Repeated Low Suction Temp Overrides
10041	REPEATED_LO_SST_B_F	Circuit B Repeated Low Suction Temp Overrides
10053	REV_ROT_BOARD_F	Current Phase Reversal
10063	HP_SWITCH_A_F	Circuit A High Pressure Switch Failure
10064	HP_SWITCH_B_F	Circuit B High Pressure Switch Failure
10073	COND_PUMP_F	Condenser Pump Default
10097	SENSORS_SWAP_F	Water Exch. Temp. Sensors Swapped or 4-way valve not switching
10098	COND_SENSORS_SWAP_F	Condenser Water Exchanger Temperature Sensors Swapped
10099	FLUIDE_FAIL	Possible Refrigerant Leakage Failure
10210	RUN_OUT_MAP_A_F	Compressor Running Outside MAP - cir A
10211	RUN_OUT_MAP_B_F	Compressor Running Outside MAP - cir B
12001	DP_A_F	Circuit A Discharge Pressure Transducer Failure
12002	DP_B_F	Circuit B Discharge Pressure Transducer Failure
12004	SP_A_F	Circuit A Suction Pressure Transducer Failure
12005	SP_B_F	Circuit B Suction Pressure Transducer Failure
13001	SERVICE_MAINT_ALERT	Service maintenance alert
13005	FGAS_NEEDED	Fgas check needed, call your maintenance company
15001	COOL_EWT_F	Water Exchanger Entering Fluid Thermistor Failure
15002	COOL_LWT_F	Water Exchanger Leaving Fluid Thermistor Failure
15006	COND_EWT_F	Condenser Entering Fluid Thermistor Failure
15007	COND_LWT_F	Condenser Leaving Fluid Thermistor Failure
15010	OAT_F	OAT Thermistor Failure
15011	DLWT_F	Primary/Secondary Common Fluid Thermistor Failure
15012	SUCTION_T_A_F	Circuit A Suction Gas Thermistor Failure
15013	SUCTION_T_B_F	Circuit B Suction Gas Thermistor Failure
15015	DGT_A_F	Circuit A Discharge Gas Thermistor Failure
15016	DGT_B_F	Circuit B Discharge Gas Thermistor Failure
15021	SPACETEMP	Space Temperature Thermistor Failure
17001	FAN_VFD_DRIVE_F	Circuit A VFD Fan Drive Failure
56001	LENSCAN_F	Lenscan module Failure
57001	CIOB_A_LOW_VOLT_F	Circuit A CIOB Low Voltage Failure
57002	CIOB_B_LOW_VOLT_F	Circuit B CIOB Low Voltage Failure

Table 59 — Alarm Details by Code

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
4601	Loss of Communication with AUX1 Board	Tested when the unit is On or Off and only: - Digital compressor for all units. - HGBP on Air cooled units. If communication with the AUX board is lost then the alarm shall be tripped after 3 seconds.	1. If the alarm is tripped then the unit shall be stopped immediately. 2. Alarm icon shall be set to blinking. Alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - power supply to the CIOB - local equipment network (LEN) wiring - confirm unit configuration - board addressing DIP switches
4701	Loss of Communication with VFD Fan Drive 1 Circuit A	Tested when the unit is On or Off and only. Fan drives mounted (FACTORY_vfan_sel = YES)	1. If the alarm is tripped with “Co-V1” code then the alarm is tripped, the unit shall be stopped immediately. 2. Alarm icon shall be set to blinking. Alarm relay shall be energized. Alarm shall be tripped after 3 seconds.	Automatic	If this condition is encountered, then check the following items for faults: - power supply to the fan drive board - local equipment network (LEN) wiring - VFD parameters against list - VFD address - unit configuration for correct unit size, low ambient selection, voltage, frequency, and tie
4901	Loss of Communication with CIOB Board Number A	Tested when the unit is On or Off. If communication with the CIOB board Number A is lost then the alarm shall be tripped. If communication with the CIOB board Number B is lost then the alarm shall be tripped. Alarm shall be tripped after 4 seconds.	1. CIOB_A: If the alarm is tripped then the unit shall be stopped immediately. CIOB_B: If the alarm is tripped then the circuit B shall be stopped immediately. 2. Alarm icon shall be set to blinking. Alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - power supply to the CIOB - local equipment network (LEN) wiring - confirm unit configuration - board addressing DIP switches
4902	Loss of Communication with CIOB Board Number B				
7001	Undefined unit size	Tested when the unit is On and Off. If unit size configured is not a valid size, then alarm shall be tripped	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	If this condition is encountered, then confirm unit configuration
7002	Illegal fan configuration	Tested when the unit is On and Off. If cooling only unit (FACTORY_unit_typ) has one fan and fan configuration is fixed speed (FACTORY_vfan_sel) then alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	
7003	Illegal voltage configuration	Tested when the unit is On and Off. If voltage (FACTORY_voltage) for drive is different than 208V or 230V or 380V or 460V or 575V , then alarm shall be tripped	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	
7004	Illegal option configuration	Tested when the unit is On and Off. If Digital compressor option (FACTORY_dus_sel) is enable and hotgas bypass option (FACTORY_hgbp_sel) is enable, then alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	
7005	Illegal ice mode configuration	Tested when the unit is On and Off. If fluid type (FACTORY_flui_typ) is WATER (1) and ice configuration (GENCONF_ice_cnfg) is enable, then alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	
7006	Illegal unit type configuration	Tested when the unit is On and Off. If unit type (FACTORY_unit_typ) is 2, then alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	
7007	Illegal unit type configuration	Tested when the unit is On and Off. If unit type (FACTORY_unit_typ) is not 3 and condenser EWT/LWT is enabled (SERVICE_cond_en), then alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
8000	Initial Factory Parameters Required	Tested when the unit is On and Off. If the Factory Parameters parameter unit size = 0 then the alarm shall be tripped.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized. 3. Reinitialize all the other factory Parameters parameters to 0.	Automatic	If this condition is encountered, then check the following item for faults: - Set proper configuration in Factory Config Table
90nnn	Primary/Secondary Configuration Error	Tested when the unit is On and Off 1. If the unit is primary (ms_sel = primary) and is in Primary operating type and a primary/secondary configuration errors (ms_error) is detected then the alert shall be tripped. 2. If the unit is secondary (ms_sel = secondary) and is in CCN operating type and a primary/secondary configuration error (ms_error, see primary/secondary error code description) shall be tripped.	1. The machine shall be prevented from starting in primary secondary operation. 2. Alarm icon shall blink.	Automatic	If this condition is encountered, then check the following items for faults: - CCN wiring - control power to each CIOB, Primary and Secondary - confirm correct configuration
10001	Water Exchanger Freeze Protection	Tested when the unit is On or Off. 1. if fluid_typ = 1 then freeze = 34°F. else freeze = brine freeze setpoint (from SERVICE1 table). 2. If the water exchanger leaving or entering water temperatures are below freeze, then alarm shall be tripped.	1. If unit is on, then unit shall be stopped. The cooler pump shall continue to run until while the conditions for alarm trip are true. If the cooler pump is not operating then cooler pump#1 shall be active if OAT below freeze threshold - 1.8°F. 2. Alarm icon shall be on. Alarm relay shall be energized.	1. If the same alarm did not exist in the alarm history from last 24 hours then the reset shall be automatic when the water exchanger leaving fluid temperature is 6^F above freeze temperature (the unit shall restart normally) else the reset shall be manual. 2. Reset shall be manual if the same alarm existed in the alarm history within 24 hours. The unit shall be restarted normally.	If this condition is encountered, check the following items: - confirm solution and concentration and compare the value with Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration***) - entering and leaving fluid thermistors accuracy - water flow rate - loop volume (Low loop volume at nominal flow rates can, in extreme cases, bypass cold water to the evaporator.) - evaporator heater operation If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters***) to 3 for Low Temperature Brine to utilize the Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration***) instead of the 34°F (1.1°C) or 32°F (0°C) minimums for fluid type 1.

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10005	Circuit A Low Saturated Suction Temperature	Tested only when the circuit is ON. If the circuit is running AND the Saturated Suction Temperature (SST) is 6 ^F or more below the freeze point for more than 3 minutes then the circuit shall be unloaded of 1 stage and an override 29 (circuit A), 30 (circuit B). If only one compressor is running on affected circuit AND if OAT > 32°F (0°C), then the circuit alarm shall be tripped AND if SST is below - 22°F (-30°C) for more than 8 sec then the circuit alarm shall be tripped If the circuit is running AND the Suction Pressure is below 12 PSI (82kPa), the circuit alarm shall be tripped.	1. If the circuit is running and the Saturated Suction Temperature is 6^F below the freeze point, then affected circuit capacity increase shall be disabled and the mode_state[LOW_SST_CIR_MODE] shall be set to ON. See Override #29 circuit A, #30 circuit B: Repeated Low SST during more than 3 minutes 2. If the circuit is running and more than one stage is active, a stage capacity on the affected circuit shall be removed in case of very low SST and the mode_state[LOW_SST_CIR_MODE] shall be set to ON. See Override #34 circuit A, #35 circuit B: Low refrigerant charge at startup or low sst 3. If the alarm is tripped, the circuit shall be stopped. Alarm Icon shall blink. Alarm relay shall be energized.	1. Reset shall be automatic 2. Reset shall become manual if the same alarm has been occurred within the last 24 hours or if the alarm is present and OAT > 50°F (10°C).	If this condition is encountered, check the following items for faults: - Sensor wiring to CIOB - Board for faulty channel - Faulty suction transducer - Evaporator water flow switch - Loop volume - EXV operation / blocked - Liquid line refrigerant restriction, filter drier, service valve, etc. - Refrigerant charge If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type (***Main Menu*** → ***Configuration Menu*** → ***Factory Parameters***) to 3 for Low Temperature Brine to utilize the Brine Freeze Setpoint (***Main Menu*** → ***Configuration Menu*** → ***Service Configuration***) instead of the 34°F (1.1°C) or 32°F (0°C) for fluid type 1.
10006	Circuit B Low Saturated Suction Temperature				
10011	Circuit A Low Superheat	Tested only when the circuit is On. If the EXV position is less than or equal to the 5% and either the (suction superheat is less than the 3.6^F (2^C) or the saturated suction temperature is greater than the MOP setpoint) for more than 2 minutes then the alarm shall be tripped.	1. The circuit shall be stopped after going through stopping process (refer to stopping function). 2. Alarm icon shall blink.	Manual	Faulty transducer, faulty thermistor, faulty wiring, faulty EXV, or incorrect configuration
10012	Circuit B Low Superheat				

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10014	Cooler Interlock Failure	A. Tested only when the unit is On. 1. If the interlock switch fails to close within the Off to On delay (m_state=ON) then the alarm shall be tripped. 2. If the primary/secondary control is active and if the unit is the lag and if the cooler flow switch fails to close within 1 minute after the cooler pump was restarted then the alarm shall be tripped (the lag pump is stopped when the lag chiller is forced off through a command emitted by the primary). Alarm shall be ignored when the lag cooler pump is stopped due to primary/ secondary control. 3. If pump interlock switches are opened (with pump factory) during normal operation then the alarm shall be tripped. If the flow switch is opened, a debounce delay of 6 seconds is applied. B. Tested only when the unit is OFF. These conditions are checked only when unit does not embed factory pumps. 1. If the cooler pump control is enabled (pump_seq > 0) and cooler_flow_switch_checking_when_pump_stop (pump_loc) is enabled in USER table and if the cooler flow switch is closed after the cooler pump is commended OFF for more than 1 minute then the alarm shall be tripped. 2. If the interlock switch fails to close within the off to on delay after the cooler pump has been turned to protect cooler from freezing (pump_seq > 0) then the alarm shall be tripped. If the freeze protection alarm is active, the water pump remains on in order to try to save the water exchanger. If unit embeds factory pump and flow switch (Low Brine), following condition is checked: If pump_loc is enabled, flow switch is open but delta pressure is above 30 kPa, then the alarm shall be tripped.	1. All compressors shall be stopped without going through stopping process. 2. Cooler pump shall be stopped with no delay. 3. Alarm Icon shall be On. Alarm relay shall be energized.	Reset shall be automatic if alarm happened while unit was not running (CAP_T = 0) and no cooler water pump configured or if the unit used a dual pump and one of them working. Otherwise, reset shall be manual.	If this condition is encountered, then check the following items for faults: - remote lockout switch is closed (Connection EMM-J1-DI03) - pump interlock is opened (Connection CIOBB-J1-DI02)
10015	Condenser Flow Switch Failure	Condenser flow switch opened and unit not running (compressor, ehs, boiler off)	1. Pump shall be stopped with no delay. 2. The unit shall be stopped after going through stopping process. 3. Alarm icon shall be ON. Alarm relay shall be energized.	Reset shall be automatic if alarm occurs less than 7 times per 24h. Otherwise, reset should be manual.	If this condition is encountered, then check the following items for faults: - flow switch operation - flow switch wiring

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10016	Compressor A1 Failure Not started or no pressure increase	Tested only during quick test or in operation. A. In Quick test 1. If during the rotation test of compressor, the suction pressure (sp_a, sp_b) has not a decrease of 10 psi, an alarm shall be announced and the alert relay shall be energized. B. In normal operation 1. Between 1 and 2 min after the start of the first compressor, suction pressure (sp_a, sp_b) is expected to decrease at least of 10 psig. The difference between the Highest and the Lowest SP value shall be at least of 3 psig otherwise an alarm shall be triggered. In the meantime the pressure (dp_a, dp_b) and the delta pressure (dp_a – sp_a or dp_b – sp_b) are expected to increase. 2. 2 min after the start of the compressor, the discharge pressure shall have increased of 3 psig and the delta pressure shall have reached at least 29 psig. This verification is not applied if a fan has been energized during this delay to avoid nuisance trip especially at low ambient. 3. Alarm icon shall blink. Alert relay shall be On.	Circuit shuts down	Manual	No power to the compressor, faulty compressor contactor, low control voltage, faulty discharge or suction pressure transducers, wiring error, improper electrical phasing
10017	Compressor A2 Failure Not started or no pressure increase				
10018	Compressor A3 Failure Not started or no pressure increase				
10020	Compressor B1 Failure Not started or no pressure increase				
10021	Compressor B2 Failure Not started or no pressure increase				
10029	Loss of Communication with System Manager	Tested when the unit is On and Off If the System Manager POC has established communication with the control and the communication is lost (for more than 2 minutes) then the alert shall be tripped.	1. If auto_sm from SERVICE table has been enabled the chiller shall continue to run. The control will force the CHIL_S_S variable to enable All points forced by the System Manager (CHIL_S_S, CTRL_PNT, LCW_STPT, DEM_LIM) shall be autoed. The unit shall revert to standalone operation. 2. If auto_sm from SERVICE table has been set to disable then the control will force the chiller should be stopped. 3. Alarm icon shall blink.	Automatic	Faulty communication wiring, no power supply to the external controller
10030	Primary/Secondary Communication Failure	Tested when the unit is On and Off If the primary_enabled = true or (Secondary_ enable = true and start mode = network) and the communication is lost between the primary or secondary (for more than 2 minutes) then the alert shall be tripped.	1. See Primary/secondary function. 2. Alarm icon shall blink.	Automatic	Faulty communication wiring, no power or control power to the main base board for either module
10031	Unit is in CCN Emergency Stop	Tested when the unit is On and Off using any operating mode (Local, Network …) The only way this safety can be tripped is when the CCN command for an Emergency Stop is sent across the network.	1. The unit shall be stopped. 2. Alarm Icon shall be on. Alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following item for faults: - CCN Emergency Stop command

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10032	Cooler Pump 1 Default	Tested only when the unit is On. Multiple pump configuration only 1. If no water flow is detected when pump #1 is commanded to be on then, the alarm shall be tripped. 2. If no water flow is detected after the delay period while pump #1 is commanded to be on then, the alarm shall be tripped. [debounce = 3 when starting the pump; when unit is running, debounce = 3 if a flow switch is mounted, debounce = 0 otherwise]	1. If the cooler pump #2 exists (pump_seq > 1) and if it is not failed (alarm 10033 = no) then, the unit and the pump #1 shall be turned off. The pump #2 shall be started immediately and the unit shall be allowed to restart, Alarm Icon shall blink and alarm relay shall be energized. 2. If low temperature situation, cooler heater protection active, this pump is the last operating pump, keep pump running in order to protect the water exchanger. 3. Else, then the pump and the unit shall be stopped. Alarm Icon shall be On and alarm relay shall be energized. If the freeze protection alarm is active, the water pump remains on in order to try to save the water exchanger.	Manual	If this condition is encountered, then check the following items for faults: - interlock wiring circuit (CIOB-A J3 pins 1 through 4) - control signal to pump controller CIOB-A J6) - evaporator pump contactor for proper operation - control voltage for proper voltage - open chilled water flow switch (CIOB-A J34)
10033	Cooler Pump 2 Default	Tested only when the unit is On. Multiple pump configuration only 1. If no water flow is detected when cooler pump #2 is commanded to be on then, the alarm shall be tripped. 2. If no water flow is detected after the delay period while pump #2 is commanded to be on then, the alarm shall be tripped.	1. If the pump #1 is not failed (alarm 10032 = no) then, the unit and the cooler pump #2 shall be turned off. The pump #1 shall be started immediately and the unit shall be allowed to restart, Alarm Icon shall be blink and alarm relay shall be energized. 2. If low temperature situation, cooler heater protection active, this pump is the last operating pump, keep pump running in order to protect the water exchanger. 3. Else, then the pump and the unit shall be stopped. Alarm Icon shall be ON and alarm relay shall be energized. If the freeze protection alarm is active, the water pump remains on in order to try to save the water exchanger.	Manual	
10037	Circuit A Repeated High Discharge Gas Overrides	Tested only when the circuit is On. If the circuit is running and if more than 6 successive circuit capacity decreases have occurred because of high pressure overrides (based on the HP threshold) then, alert shall be tripped. If no override has occurred for more than 30 minutes then, the override counter shall be reset to zero (high_discharge_count = 0).	Alarm icon shall blink. Alert relay shall be energized.	Automatic	Condenser air recirculation, dirty or plugged condenser coils, inaccurate discharge transducer, faulty condenser fan
10038	Circuit B Repeated High Discharge Gas Overrides				

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10040	Circuit A Repeated Low Suction Temp Overrides	Tested only when the circuit is On. If the circuit is running and if more than 6 successive circuit capacity decreases have occurred because of low suction temperature protection overrides then, the circuit alarm shall be tripped. If no override has occurred for more than 30 minutes then, the override counter shall be reset to zero (low_suction_count. = 0).	1. The circuit shall be stopped. 2. Alarm Icon shall blink. Alarm relay shall be energized.	Manual	If this condition is encountered, check the following items for faults: - Sensor wiring to CIOB - Board for faulty channel - Faulty suction transducer - Evaporator water flow switch - Loop volume - EXV operation / blocked - Liquid line refrigerant restriction, filter drier, service valve, etc. - Refrigerant charge If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Parameters***) to 3 for Low Temperature Brine to utilize the Brine Freeze Setpoint (***Main Menu → Configuration Menu → Service Configuration***) instead of the 34°F (1.1°C) or 32°F (0°C) for fluid type 1.
10041	Circuit B Repeated Low Suction Temp Overrides				
10053	Current Phase Reversal	If electrical box input (INPUTS_REV_ROT) is opened, then the alarm shall be tripped. Note : the input is opened when there is a main power supply fault or high temperature in the control box (units with high ambient temperature option)	1. The unit shall be stopped through stopping process. 2. Alarm Icon shall be on. Alarm relay shall be energized	Automatic	Check power phasing, improper wiring, or faulty detection board
10063	Circuit A High Pressure Switch Failure	If CIOB board #1 DI-09 input for compressor A1 and A2 is opened then A1 and A2 compressors are stopped, the alarm shall be tripped immediately. If CIOB board #2 DI-09 input for compressor B1 and B2 is opened then B1 and B2 compressor is stopped, the alarm shall be tripped immediately. If alarm HP and just after Alarm low voltage Or during alarm low voltage or just after, reset alarm HP is automatic Alarm HP automatic reset 8 sec before and 8 sec after alarm low voltage Because Alarm HP is not a real HP alarm but due to low voltage	If the alarm is tripped then the circuit shall stop immediately. Alarm Icon shall blink. Alarm relay shall be energized.	Manual	Switch fault
10064	Circuit B High Pressure Switch Failure				
10097	Water Exchanger Temperature Sensors Swapped	Tested only when the unit is running. 1. If the unit is running and in cooling mode and the leaving temperature is greater than the entering temperature + 2°F (1.1°C) for more than 2 minutes then the alarm shall be tripped. 2. If the unit is a heat pump, is running and in heating mode and the leaving temperature + 2°F (1.1°C) is lower than the entering temperature for more than 2 minutes then the alarm shall be tripped.	Unit Shutdown. Alarm Icon shall be turned On. Alarm relay shall be energized.	Manual	If this condition is encountered, then check the following items for faults: - LWT (CIOB-A J41) and EWT (CIOB-A J40) wiring - faulty entering or leaving water temperature sensors - evaporator nozzles for proper water temperature sensor locations
10210	Compressor Running Outside MAP - cir A	If circuit is running outside of the compressor operating map, actions will be taken to correct this. If these are not successful, the alarm shall be tripped.	1. The circuit shall be stopped. 2. Alarm Icon shall be on. Alarm relay shall be energized	Reset shall be automatic if 3 occurrences or less happens in 24 hours, manual others times. Automatic reset is active when the capacity of the circuit is 0%.	Circuit running in part load with all available compressors and low delta pressure during operation. Not enough capacity available/failed or disabled due to compressor(s).
10211	Compressor Running Outside MAP - cir B				

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
12001	Circuit A Discharge Pressure Transducer Failure	Tested when the unit is On or Off. If the sensor voltage reading value is less than 12 psi (82kPa) then the alarm shall be tripped.	1. If the alarm is tripped then the affected circuit shall be stopped through stopping process (refer to stopping function). 2. Alarm icon shall blink and alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
12002	Circuit B Discharge Pressure Transducer Failure				
12004	Circuit A Suction Pressure Transducer Failure	Tested when unit is On or Off. 1. If the sensor voltage reading value is less than 12 psi (82kPa) then: if the circuit is stopped an alarm shall be tripped, if the circuit is running then a LOW_SUCTION alarm (see LOW_SUCTION alarm) will be set 2. If the sensor voltage reading value is greater than 12 psi (82 kPa) then: In cooling mode and if the saturated suction temperature (sst_tmp) is higher than the referenced cooler leaving temperature for more than 60s then an alarm shall be tripped. Referenced cooler leaving temp = TEMP_ewt-(TEMP_ewt-TEMP_lwt) * circuit_running_in_ton / total_running_in_ton.	1. If the alarm is tripped then the affected circuit shall be stopped immediately. 2. Alarm icon shall blink and alarm relay shall be energized.	1. Reset shall be automatic when the suction pressure reading is within the range except if it was with criteria 2. 2. Reset shall be manual if it was with criteria 2 or if it has been occurred more than 3 times during last 24 hours.	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
12005	Circuit B Suction Pressure Transducer Failure				
13nnn	Service maintenance alert	Tested when the unit is On and Off and If the Servicing Alert decision is enabled 1. If any of the following is true then, an alert shall be tripped. Refrigerant charge is low (charge_c = enable and charge_m = low) Scheduled Service Maintenance is near (regarding maintenance period set in MAINTCFG) F-Gas Scheduled Check is near (regarding maintenance period set in MAINTCFG) 2. If any of the following is true then, an alarm shall be tripped. Scheduled Service Maintenance is reached F-Gas Scheduled Check is reached	1. No action. Alarm Icon shall blink. Alert relay shall be energized. 2. No action. Alarm Icon shall blink. But, alarm relay shall be energized	1. Reset shall be manual. After reset, this alert shall not be issued anymore even if the maintenance alert point (S_RESET) has not been reset and is still zero. 13001: Circuit A Loss of charge (refer to control capacity, low refrigerant charge override) 13002: Circuit B Loss of charge (refer to control capacity, low refrigerant charge override) 2. Reset shall be automatic, after a new date is set with S_RESET. 13004:Maintenance servicing required 13005:F-Gas Scheduled Check required	Servicing action required (the scheduled date has been reached)
15001	Water Exchanger Entering Fluid Thermistor Failure	If the temperature measured by the water exchanger entering fluid sensor is outside the range of -40 to 304°F then the alarm shall be tripped.	3. If unit is On the unit shall be stopped through stopping process (refer to stopping function). 4. Alarm icon shall be set to On. Alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15002	Water Exchanger Leaving Fluid Thermistor Failure	If the temperature measured by the water exchanger leaving fluid sensor is outside the range of -40 to 304°F then the alarm shall be tripped.	1. If unit is On the unit shall be stopped through stopping process (refer to stopping function). 2. Alarm icon shall be set to On. Alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15010	OAT Thermistor Failure	Tested when the unit is On or Off. If the temperature measured by the OAT is outside the range of -40 to 302°F then the alarm shall be tripped.	1. The unit shall be stopped through stopping process (refer to stopping function) and not allowed to start. 2. Alarm icon shall be On and alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy

Table 59 — Alarm Details by Code (cont)

ALARM CODE[a]	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
15011	Primary/Secondary Common Fluid Thermistor Failure	Tested when the unit is On or Off. If the unit is configured as a primary or a secondary (ms_sel = disable) and leaving temperature control is selected (ewt_opt=NO), and M/S units in parallel (MST_SLV_ll_serie = NO) and if the temperature measured by the CHWS fluid sensor is outside the range of -40 to 240°F then, the alarm shall be tripped.	1. Alarm icon shall blink 2. Alert relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15012	Circuit A Suction Gas Thermistor Failure	Tested when the circuit is On or Off. If the circuit suction gas sensor reading is outside the range of -40 to 240°F then the alarm shall be tripped.	1. If the alarm is tripped then the effected circuit shall be stopped be stopped through stopping process (refer to stopping function). 2. Alarm icon shall blink and alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15013	Circuit B Suction Gas Thermistor Failure				If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15015	Circuit A Discharge Gas Thermistor Failure	Tested when the unit is On or Off for segment 1 heat pump units size (040 to 080). If the temperature measured by the DGT is outside the range (mean input is fully open or shortcut) then the alarm shall be tripped.	1. The unit shall be stopped through stopping process (refer to stopping function) and not allowed to start. 2. Alarm icon shall be On and alarm relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15016	Circuit B Discharge Gas Thermistor Failure				If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
15021	Space Temperature Thermistor Failure	Tested when the unit is On or Off. If the temperature measured by the SPACETMP is outside the range of -40 to 302°F then the alarm shall be tripped.	1. Alarm icon shall blink. 2. Alert relay shall be energized.	Automatic	If this condition is encountered, then check the following items for faults: - sensor wiring to the CIOB - faulty channel on the board - sensor accuracy
17nnn	VFD Fan Drive Failure	Tested when the unit is On and Off and VLT drive configuration selected. 1. If any alert on the drive is true then, the alert shall be tripped. 2. If any alarm on the drive is true then, the alarm shall be tripped. When an alarm or alert is tripped for variable speed pumps drive, an alarm or alert identifying the pump shall be tripped.	Alarm: unit shall be stopped.	Automatic	See Table 62 for VFD Alarm/Alert Codes
56001	Lenscan module failure	Tested when the unit is On or Off. Lenscan module return an error.	Unit action: Stop Output: All alarm On Alarm Icon: turn red	Manual	Software malfunction. Power cycle the display.
57001	Circuit A CIOB Low Voltage Failure	Tested all the time. Low Voltage flag is set in the CIOB board. This flag reports that the supply voltage has dropped below 17V.	1. The machine shall be prevented from starting. 2. Alarm Icon shall be on. Alarm relay shall be energized.	The reset shall be automatic is the supply voltage returns above 19V and the Low voltage flag is cleared in the CIOB board. Manual reset is required if appeared more than 6 times in a day.	Unstable electrical supply or electrical issue
57002	Circuit B CIOB Low Voltage Failure				
57020	Main EXV stepper motor Failure- cir A	Tested when the unit is ON or OFF. If the CIOB board detect an EXV motor failure, the alarm is set.	Circuit shall be stopped.	Manual	Check EXV connections on CIOB J17 Check connection on EXV
57021	Main EXV stepper motor Failure - cir B				

NOTE:

a. For VFD alarms, “nnn” corresponds to the alarm code listed in Table 62.

Table 60 — Primary/Secondary Alarm Codes

ALARM CODE	ALARM DESCRIPTION
9001	Lag_pump control is selected while pump configuration is disabled
9002	Primary and secondary have the same address
9003	No secondary configured
9004	Primary Lag_pump is selected while secondary pump configuration is disabled
9005	Primary and secondary will have the same water control type
9006	Primary and secondary will have the same water control type
9007	Primary lag pump control is configured
9008	Primary lag pump control is not configured
9009	Primary dem_lim (demand limiting), CHIL_S_S (start/stop command), control point, or setpoint is forced with force < 4 (unit continues to operate)
9010	Secondary dem_lim (demand limiting), CHIL_S_S (start/stop command), control point, or setpoint is forced with force < 4 (unit fails)
9013	Primary and secondary heat/cool selection conflict
9014	Primary and secondary parallel and series selection conflict
9015	Primary and secondary EWT option in conflict with chiller in series
9016	Secondary EWT option in conflict with chiller in series

LEGEND

CCN — Carrier Comfort Network®

EWT — Entering Water Temperature

VFD ALARMS AND ALERTS

Alarms and alerts associated with the VFD function follow a different naming convention than general unit faults. These alarms and alerts can be viewed and reset following the procedures outlined in the sections Current Alarms and Resetting Alarms on page 96. Table 61 lists the VFD alarm and alert naming conventions, while Table 62 lists the Danfoss codes associated with the alarms and alerts. These represent the most common alarms and alerts associated with VFD malfunction. Refer to the appropriate Danfoss documentation for more information on other alarms.

Table 61 — VFD Alarm/Alert Naming Conventions

VFD ALARMS AND ALERTS	ALARM FORMAT[a]	ALERT FORMAT[a]
Circuit A VFD Fan Drive 1 Failure	17nnn	35nnn
Circuit A VFD Fan Drive 2 Failure	18nnn	36nnn
Circuit B VFD Fan Drive 1 Failure	19nnn	37nnn
Circuit B VFD Fan Drive 2 Failure	20nnn	38nnn

NOTE:
a. The Danfoss Alarm/Alert code is represented by nnn. See Table 61.

Table 62 — VFD Alarms List

NNN CODE	WARNING/ ALARM[a]	DESCRIPTION	POSSIBLE CAUSES	ACTION TO BE TAKEN	REFERENCE PARAMETER
002	NOTE 1	Live Zero Error	This warning or alarm only appears if programmed in parameter 6-01 Live Zero Timeout Function. The signal on one of the analog inputs is less than 50% of the minimum value programmed for that input. Broken wiring or a faulty device sending the signal can cause this condition.	• Check the connections on all the analog mains terminals. - Control card terminals 53 and 54 for signals, terminal 55 common. - MCB 101 terminals 11 and 12 for signals, terminal 10 common. - MCB 109 terminals 1, 3, and 5 for signals, terminals 2, 4, and 6 common. • Check that the frequency converter programming and switch settings match the analog signal type. • Perform an input terminal signal test.	6-01 Live Zero Timeout
004	NOTE 1	Mains Phase Loss	A phase is missing on the supply side, or the mains voltage imbalance is too high. This message also appears for a fault in the input rectifier on the frequency converter. Options are programmed in parameter 14-12 Function at Mains Imbalance.	Check the supply voltage and supply currents to the frequency converter.	14-12 Function at Mains Imbalance
007	NOTE 1	DC Overvoltage	If the DC-link voltage exceeds the limit, then the frequency converter trips after a time.	• Extend the ramp time. • Change the ramp type.	3-42 Ramp 1 Ramp Down Time
008	NOTE 1	DC Undervoltage	If the DC-link voltage drops below the undervoltage limit, then the frequency converter checks if a 24-v DC backup supply is connected. If no 24-v DC backup supply is connected, then the frequency converter trips after a fixed time delay. The time delay varies with unit size.	• Check that the supply voltage matches the frequency converter voltage. • Perform an input voltage test. • Perform a soft charge circuit test.	—
009	NOTE 1	Inverter Overloaded	The frequency converter has run with more than 100% overload for too long and is about to cut out. The counter for electronic thermal inverter protection issues a warning at 98% and trips at 100% while giving an alarm. The frequency converter cannot be reset until the counter is below 90%.	• Compare the output current shown on the Drive Maintenance 2 screen (***Main Menu → Maintenance Menu → Drive Maintenance 2***) from the Carrier controller with the frequency converter rated current. • Compare the output current shown on the Drive Maintenance 2 screen (***Main Menu → Maintenance Menu → Drive Maintenance 2***) from the Carrier controller with the measured motor current.	—
010	NOTE 1	Motor ETR Overtemperature	According to the electronic thermal protection (ETR), the motor is too hot. Select whether the frequency converter issues a warning or an alarm when the counter reaches 100% in parameter 1-90 Motor Thermal Protection. The fault occurs when the motor runs with more than 100% overload for too long.	• Check for motor overheating. • Check if the motor is mechanically overloaded. • Check that the motor current set in 1-24 Motor Current is correct. • Ensure that the motor data in parameters 1-20 to 1-25 are set correctly.	1-90 Motor Thermal Protection (this parameter should be set to [0])
011	NOTE 1	Motor Thermistor Overtemperature	Check whether the thermistor is disconnected. Select whether the frequency converter issues a warning or an alarm in parameter 1-90 Motor Thermal Protection.	• Check for motor overheating. • Check if the motor is mechanically overloaded.	1-90 Motor Thermal Protection (this parameter should be set to [0])
013	NOTE 1	Overcurrent	The inverter peak current limit (approximately 200% of the rated current) is exceeded. The warning lasts approximately 1.5 s, and then the frequency converter trips and issues an alarm. Shock loading or quick acceleration with high-inertia loads can cause this fault. If the acceleration during ramp-up is quick, then the fault can also appear after kinetic backup. If extended mechanical brake control is selected, a trip can be reset externally.	• Remove the power and check if the motor shaft can be turned. • Check that the motor size matches the frequency converter. • Check that the motor data is correct in parameters 1-20 to 1-25.	—
014	Alarm	Earth Fault	There is current from the output phase to ground, either in the cable between the frequency converter and the motor or in the motor itself. This fault is detected during motor operation.	• Remove power to the frequency converter and repair the ground fault. • Check for ground faults in the motor by measuring the resistance to ground of the motor cables and the motor with a megohmmeter.	—
016	Alarm	Short Circuit	There is short-circuiting in the motor or motor wiring.	Remove the power to the frequency converter and repair the short circuit.	—
017	NOTE 1	Control Word Timeout (Serial Communication Failure)	There is no communication to the frequency converter. The warning is only active when 8-04 Control Word Timeout Function is NOT set to [0] Off. If 8-04 Control Word Timeout Function is set to [5] Stop and Trip, then a warning appears and the frequency converter ramps down until it stops and then displays an alarm.	Check the connections on the serial communications cables, including the shields and termination resistors.	8-03 Control Timeout Time 8-04 Control Timeout Function
030	Alarm	U Phase Loss	Motor phase U between the frequency converter and the motor is missing.	Remove the power from the frequency converter and check motor phase U.	4-58 Missing Motor Phase Function

Table 62 — VFD Alarms List (cont)

NNN CODE	WARNING/ ALARM[a]	DESCRIPTION	POSSIBLE CAUSES	ACTION TO BE TAKEN	REFERENCE PARAMETER
031	Alarm	V Phase Loss	Motor phase V between the frequency converter and the motor is missing.	Remove the power from the frequency converter and check motor phase V.	4-58 Missing Motor Phase Function
032	Alarm	W Phase Loss	Motor phase W between the frequency converter and the motor is missing.	Remove the power from the frequency converter and check motor phase W.	4-58 Missing Motor Phase Function
038	Alarm	Internal Fault	Contact Carrier Service.	Contact Carrier Service.	—
044	Alarm	Earth Fault	Discharge from output phases to ground using the value of parameter 15-31 *InternalFaultReason*, if possible.	• Remove power to the frequency converter and repair the ground fault. • Check for ground faults in the motor by measuring the resistance to ground of the motor cables and the motor with a megohmmeter.	—
046	Alarm	Control Voltage Fault	Control voltage is low — contact Carrier Service.	Contact Carrier Service	—
047	NOTE 1	24-v Supply Low	24-v DC supply may be overloaded.	Contact Carrier Service.	—
059	Warning	Current Limit Exceeded	The current is higher than the value in parameter 4-18 Current Limit.	Ensure that motor data in parameters 1-20 to 1-25 are set correctly. Contact Carrier Service.	—
060	Alarm	External Interlock	External interlock has been activated.	To resume normal operation, apply 24-v DC to the terminal programmed for external interlock and reset the frequency converter (via serial communication or digital I/O).	For 060 Reference Parameter: Digital inputs configured on 5-1* (e.g., 5-10, 5-11, etc.)
066	Warning	Heat Sink Temperature Low	The frequency converter is too cold to operate. This warning is based on the temperature sensor in the IGBT module.	Confirm that the VFD heater is working properly by checking voltage across the heater terminals,.120-v should be present at low temperatures that would trigger this warning.	—
069	Alarm	Power Card Temperature	The temperature sensor on the power card is either too hot or too cold.	• Check that the ambient operating temperature is within limits. • Check for clogged filters. • Check fan operation. • Check the power card.	—
070	Alarm	Illegal FC Configuration	The control card and power card are not matched.	Contact Carrier Service.	—
079	NOTE 1	Illegal Power Section Configuration	Internal fault.	Contact Carrier Service.	—
080	Alarm	Drive Initialized	All parameter settings are initialized to default settings.	Drive address needs to be set so that correct parameters can be loaded by chiller controls.	—
301	Alarm	Configuration Error	Chiller controller is trying to send configuration to VFD, but VFD is not in "stop" condition.	Make sure VFD is in "stop" condition, recycle power. Contact Carrier service if this is not successful.	—

NOTE(S):

a. Warning or Alarm is determined by the setting of the reference Parameter.

LEGEND

IGBT — Insulated Gate Bipolar Transistor

PTC — Positive Temperature Coefficient

VFD — Variable Frequency Drive

Troubleshooting Software

The Carrier Controller software offers several tools to assist with troubleshooting unit issues.

BLACK BOX FUNCTION

The control system is equipped with a "black box" function that continuously stores operating parameters in the onboard memory every 5 seconds. See Table 63.

Table 63 — Black Box Function Recorded Parameters

POINT NAME	DESCRIPTION
SCT_A	Saturated Condensing Temperature A
SCT_B	Saturated Condensing Temperature B
SST_A	Saturated Suction Temperature A
SST_B	Saturated Suction Temperature B
EWT	Cooler Entering Temperature
LWT	Cooler Leaving Temperature
CEWT	Condenser Entering Temperature
CLWT	Condenser Leaving Temperature
OAT	Outdoor Air Temperature
Status	Status of the unit
CTRL_PNT	Control Point
CAPA_T	Capacity Running Circuit A
CAPB_T	Capacity Running Circuit B
HEATCOOL	Heat Cool Status
DEM_LIM	Demand limit
FANC_1	Fan contactor 1
FANC_2	Fan contactor 2
FANC_3	Fan contactor 3
VFAN	Varifan speed
CP_A1	Compressor A1 command
CP_A2	Compressor A2 command
CP_A3	Compressor A3 command
CP_B1	Compressor B1 command
CP_B2	Compressor B2 command
EXV_A	EXV Position A
EXV_B	EXV Position B
Mod_CPA1	Digital modulation CPA1
HGBP_V	Hot Gas ByPass Valve
HEAD_ACT	Head Pressure Actuator A
SUCT_A	Suction Temperature A
SUCT_B	Suction Temperature B
SH_A	Superheat Temperature A
SH_B	Superheat Temperature B
over_cap	Override Capacity
ov_exv_a	EXV Override A
ov_exv_b	EXV Override B
zm	Current Z Multiplier Val
smz	Load/Unload Factor
FLOW_SW	Flow switch
HP_SW_A	High Pressure Switch A
HP_SW_B	High Pressure Switch B
CNFS	Condenser Water Flow Switch
CWP1	Water Pump interlock 1
CWP2	Water Pump interlock 2
ALM	Alarm State
alarm_1c	Current Alarm 1
alarm_2c	Current Alarm 2
alarm_3c	Current Alarm 3
alarm_4c	Current Alarm 4
alarm_5c	Current Alarm 5
mstslv	Unit is Primary or secondary
PUMP_1	Pump #1 Command
PUMP_2	Pump #2 Command
CPUMP	Condenser Pump

LEGEND

A — Circuit A
B — Circuit B
EXV — Electronic Expansion Valve

For each alarm event that is triggered, the system collects up to 180 records (15 minutes) of data, with approximately 14 minutes of data recorded before the alarm is triggered and 1 minute of data after. The black box function is capable of storing 20 events of data on a rotating basis (first in, first out). This file can be accessed by using the Carrier Service Tools; contact your Carrier representative for assistance. See Tables 63 and 64.

Table 64 — Black Box Function Alarms Collected

ALARM CODE	POINT NAME	DESCRIPTION
12001	DP_A_F	Circuit A Discharge Pressure Transducer Failure
12002	DP_B_F	Circuit B Discharge Pressure Transducer Failure
12004	SP_A_F	Circuit A Suction Pressure Transducer Failure
12005	SP_B_F	Circuit B Suction Pressure Transducer Failure
10001	COOLER_FREEZE_F	Evaporator Freeze Protection
10005	LOW_SUCTION_A_F	Circuit A Low Suction Temperature
10006	LOW_SUCTION_B_F	Circuit B Low Suction Temperature
10008	HIGH_SH_A_F	Circuit A High Superheat
10009	HIGH_SH_B_F	Circuit B High Superheat
10011	LOW_SH_A_F	Circuit A Low Superheat
10012	LOW_SH_B_F	Circuit B Low Superheat
10014	COOLER_LOCK_F	Customer Interlock Failure
10016	CPA1_REVERSE_ROT_F	Compressor A1 Not Started
10017	CPA2_REVERSE_ROT_F	Compressor A2 Not Started
10020	CPB1_REVERSE_ROT_F	Compressor B1 Not Started
10021	CPB2_REVERSE_ROT_F	Compressor B2 Not Started
10032	COOL_PUMP1_F	Evaporator Pump 1 Fault
10033	COOL_PUMP2_F	Evaporator Pump 2 Fault
10037	REPEATED_HI_DGT_A_F	Circuit A Repeated High Discharge Gas Temperature
10038	REPEATED_HI_DGT_B_F	Circuit B Repeated High Discharge Gas Temperature
10040	REPEATED_LO_SST_A_F	Circuit A Repeated Low Saturated Suction Temperature
10041	REPEATED_LO_SST_B_F	Circuit B Repeated Low Saturated Suction Temperature
10097	SENSORS_SWAP_F	Evaporator Temperature Sensors Swapped
57nnn	FAN_VFD_DRIVE_A_F	Fan VFD Failure
57001	CIOB_A_LOW_VOLT_F	Circuit A CIOB Low Voltage
57002	CIOB_B_LOW_VOLT_F	Circuit B CIOB Low Voltage
10063	HP_SWITCH_A_F	Circuit A High Pressure Switch Trip
10064	HP_SWITCH_B_F	Circuit B High Pressure Switch Trip
10210	RUN_OUT_MAP_A_F	Circuit A Running out of Compressor Map
10211	RUN_OUT_MAP_B_F	Circuit B Running out of Compressor Map
57020	EXV_A_F	Circuit A EXV Stepper Motor Failure
57021	EXV_B_F	Circuit B EXV Stepper Motor Failure

LEGEND

EXV — Electronic Expansion Valve
VFD — Variable Frequency Drive

TROUBLESHOOTING GUIDE

Table 65 shows potential unit issues and possible solutions. This table is meant only as a guide and is not an exhaustive list of issues or solutions.

Table 65 — Troubleshooting

SYMPTOM	POSSIBLE CAUSE	POSSIBLE REMEDY
Unit Does Not Run	Check for power to unit	• Check overcurrent protection device • Check non-fused disconnect (if equipped) • Restore power to unit • Check Active Capacity Override, over_cap
	Wrong or incorrect unit configuration	Check unit configuration
	Active alarm	Check Alarm status. See the Alarms and Alerts section on page 96 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section on page 68 and follow troubleshooting instructions.
	High pressure switch (HPS) open	Recheck high pressure switch
Unit Operates Too Long or Continuously	Low refrigerant charge	Check for leak and add refrigerant
	Air in chilled water loop	Purge water loop
	Non-condensibles in refrigerant circuit	Remove refrigerant and recharge
	Inoperative EXV	• Check EXV and clean or replace • Check EXV cable and replace if necessary • Check EXV board for output signal
	Load too high	Unit may be undersized for application
	Compressor or control contacts welded	Replace contactor or relay
Circuit Does Not Run	Active alarm	Check Alarm status. See the Alarms and Alerts section on page 96 and follow troubleshooting instructions. Check Active Capacity Override, over_cap.
	Active operating mode	Check for Operating Modes. See the Operating Modes section on page 68 and follow troubleshooting instructions.Check Active Capacity Override, over_cap.
Circuit Does Not Load	Active alarm	Check Alarm status. See the Alarms and Alerts section on page 96 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section on page 68 and follow troubleshooting instructions.
	Low saturated suction temperature	See Capacity Control Overrides No. 23 and No. 24 on page 38
	High circuit suction superheat	The circuit capacity is not allowed to increase if circuit superheat is greater than 45°F (7.2°C). • Check for faulty suction transducer or wiring • Check for restriction in liquid line (filter drier, service valve, etc.) • Check EXV operation • Check for proper refrigerant charge
	Low suction superheat	The circuit capacity is not allowed to increase if circuit superheat is less than 3.6°F (–15.8°C). • Check for faulty suction transducer or wiring • Check for restriction in liquid line (filter drier, service valve, etc.) • Check EXV operation • Check for proper refrigerant charge
Compressor or Fans Do Not Run	Active alarm	Check Alarm status. See the Alarms and Alerts section on page 96 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section on page 68 and follow troubleshooting instructions.
	VFD fuses blown	Check fan VFD fuses and replace if necessary
	Inoperative compressor contactor	• Check control wiring • Check scroll protection module (available on some compressors) • Check contactor operation and replace if necessary
Chilled Water Pump Is ON but the Machine Is OFF	Evaporator freeze protection	Chilled water loop temperature too low. Check evaporator heater.

LEGEND

EXV — Electronic Expansion Valve
HPS — High Pressure Switch
VFD — Variable Frequency Drive

Electrical Schematics

Control and power schematics for 30RC units are shown in Fig. 80-84.

Quick Test (Service Test)

Main power and control circuit power must be on for Quick Test. The Carrier Controller Quick Test function is used to verify proper operation of various devices within the chiller, such as condenser fans, pumps, EXVs, and remote alarm relays. This is helpful during the start-up procedure to determine whether devices are installed correctly.

To use the Quick Test mode, the unit must be in the local OFF mode. The main control gives access to 2 Quick Test tables, allowing technicians to test all unit outputs. To reach the Quick Test menu, follow the path ***Main Menu → Quick Test #1*** or ***Quick Test #2***. Quick test #1 - Minimum Access Level is User. Quick Test #2 - Minimum Access Level is Service.

The unit must be in Local Off mode to adjust parameters in the table. The Quick Test function is not available remotely and can only be used from the Carrier Controller display. See the Start-Up Checklist at the end of this document for a list of the parameters in the Quick Test Tables.

EXAMPLE: TEST THE FUNCTION OF THE CIRCUIT A CONDENSER FANS

- Power must be applied to the unit. The Enable-Off-Remote Contact switch must be in the OFF position.
- Press the Start/Stop button and ensure the unit is in Local Off.
- Navigate to the Quick Test No. 1 table and set Quick Test Enable to Enable.
- Set VariFan Speed A to 100%, then select SET from the pop-up menu to accept the entry. Confirm all fans on circuit A are running.

Test component function by turning the item values from OFF to ON or adjusting the actuated percentage. These discrete outputs are then turned off if there is no keypad activity for 10 minutes. See Fig. 85 and 86 for component arrangement diagrams on pages 119 and 120 respectively. Pumps can be set to ON or FORCED in Quick Test. ON will energize the pump for a few seconds. FORCED will energize the pump continuously until the quick test is disabled.

NOTE: There may be up to a one-minute delay before the selected item is energized.

Legend For Fig. 80-86

ADDR	—	Address
AC/L	—	AC Line
ALM	—	Alarm
AC/N	—	AC Neutral
AUX	—	Auxiliary
ALT	—	Alert
BPHE	—	Brazed Plate Heat Exchanger
CB	—	Circuit Breaker
CL/HT	—	Cooler Heater
CLR	—	Evaporator
COMPR	—	Compressor
CSR	—	Current Sensing Relay
CWFS	—	Chilled Water Flow Switch
CWP	—	Condenser Water Pump
DGT	—	Discharge Gas Temperature
DPT	—	Discharge Pressure and Temperature
DX	—	Direct Expansion
ECTA	—	Economizer A Temp
ECTB	—	Economizer B Temp
EMM	—	Energy Management Module
EPT	—	Economizer Pressure Transducer
EVP	—	Evaporator
EXV	—	Electronic Expansion Valve
FIOP	—	Factory-Installed Option
FM	—	Fan Motor
FU	—	Fuse
FVFD	—	Fan Variable Frequency Drive
GFI-CO	—	Ground Fault Interrupter - Convenience Outlet
GND	—	Ground
HPS	—	High-Pressure Switch
HTR	—	Heater
LIQ	—	Liquid
MLV	—	Minimum Load Value
MP	—	Motor Protector
NEC	—	National Electrical Code
OPT	—	Oil Pressure Transducer
PL	—	Plug
PMP	—	Pump
PVFD	—	Pump Variable Frequency Drive
RRB	—	Reverse Rotation Board
SGT	—	Suction Gas Temperature
CIOB	—	Carrier Input/Output Board
SPT	—	Space Temperature
SW	—	Switch
TB	—	Terminal Block
TRAN	—	Transformer
VFD	—	Variable Frequency Drive
UPC	—	Universal Protocol Converter
UBS	—	Universal Serial Bus
XL	—	Across the Line

NOTES:
1. FACTORY WIRING IS IN ACCORDANCE WITH UL 60335-40-2 STANDARDS. FIELD MODIFICATIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. ALL UNITS OR MODULES HAVE SINGLE POINT PRIMARY POWER CONNECTION. MAIN POWER MUST BE SUPPLIED FROM A FIELD OR FACTORY SUPPLIED DISCONNECT.
3. WIRING FOR MAIN FIELD SUPPLY MUST BE RATED 75C. USE COPPER CONDUCTORS ONLY.

CONNECTION TYPE	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	MCA UP TO 175	14 AWG TO 2/0 AWG	1	J, T, RK1, RK5, G, CC
	MCA 175.1 TO 420	2 AWG TO 600kcmil	1	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	MCA UP TO 125	14 AWG - 3/0 AWG	1	-
	MCA 125.1 TO 225	4 AWG TO 4/0	1	-
	MCA 225.1 TO 400	2/0 AWG TO 500kcmil	1	-
		2/0 AWG TO 250kcmil	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. TB5-28 AND TB1 ARE FOR CONTROL OF CHILLED WATER PUMP1 (CWP1) STARTER. TB5-27 AND TB1 ARE FOR CONTROL OF CHILLED WATER PUMP2 (CWP2) STARTER. THE MAXIMUM LOAD ALLOWED FOR THE CHILLED WATER PUMP RELAY IS 5 VA SEALED, 10 VA INRUSH AT 24 V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. TERMINALS TB5-13 AND TB5-14 ARE FOR RUNNING AND ALARM RELAYS. THE MAXIMUM LOAD ALLOWED FOR THE ALARM RELAY IS 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
7. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 MA. INSTALLATION OF OPTIONAL ENERGY MANAGEMENT BOARD REQUIRED.
8. REMOVE FACTORY INSTALLED JUMPER BETWEEN TERMINALS TB5-10 AND 20 WHEN FIELD CWPI IS INSTALLED.
9. TB5-7 AND 8 OF TB5 ARE FOR FIELD EXTERNAL CONNECTIONS FOR REMOTE ON-OFF THE CONTACTS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP 50MA.

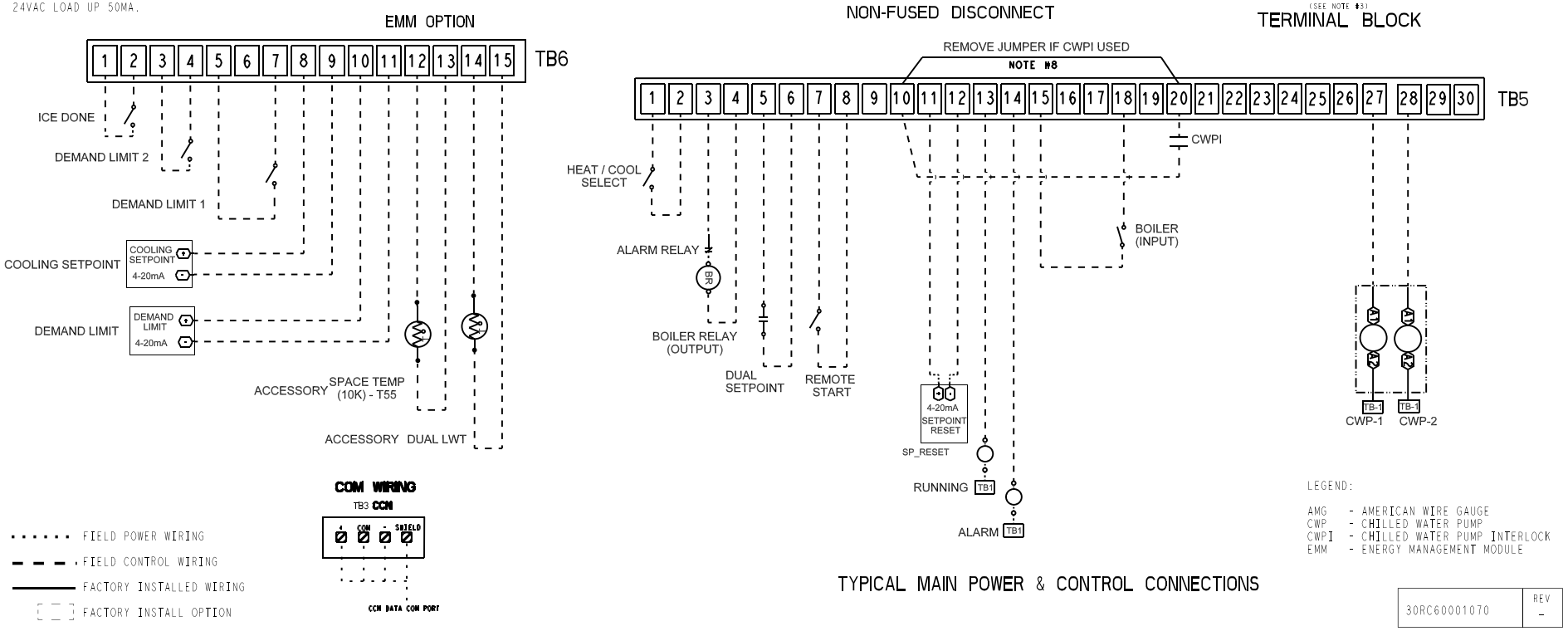
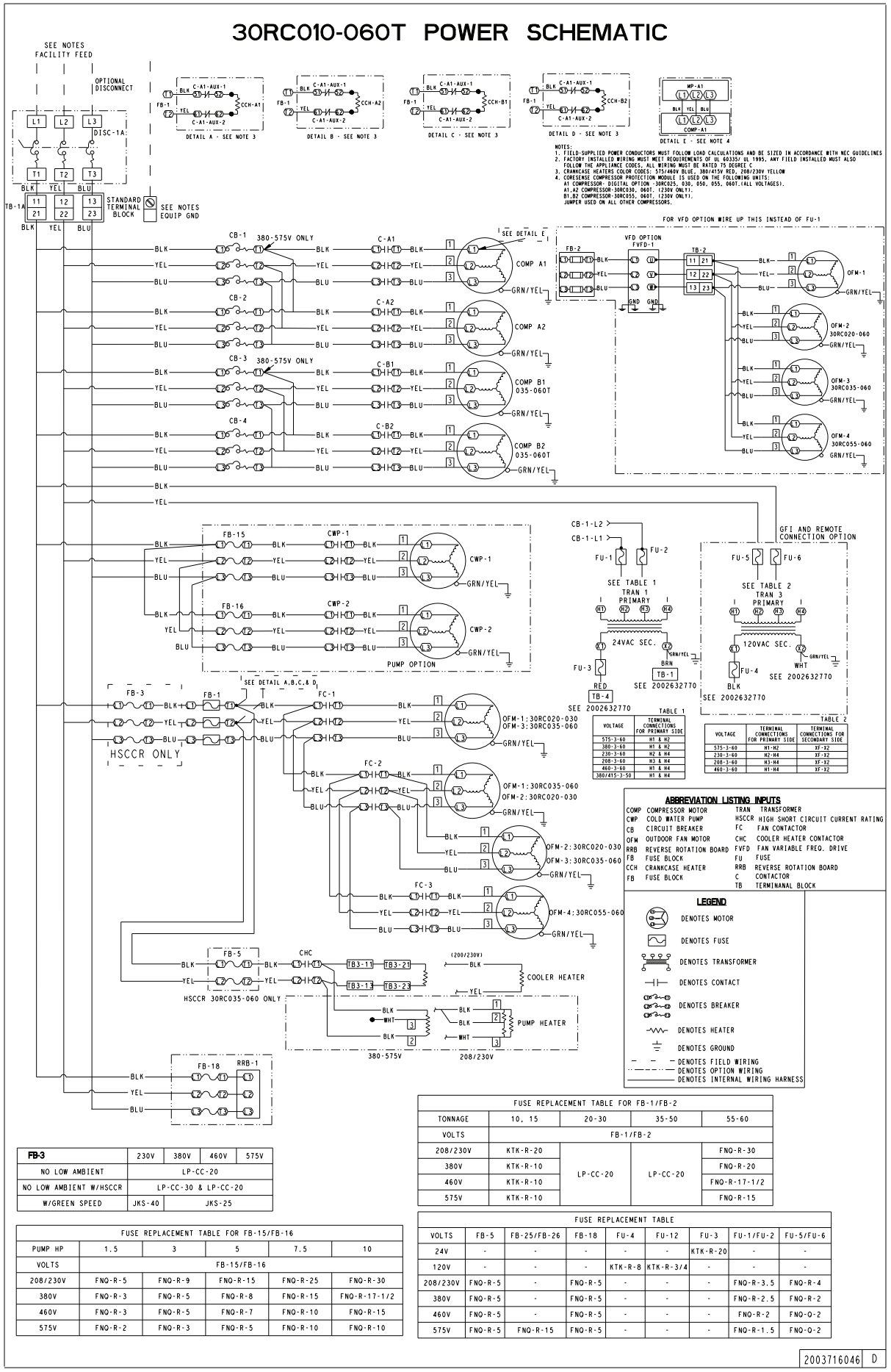


Fig. 80 — 30RC Typical Field Wiring Schematic



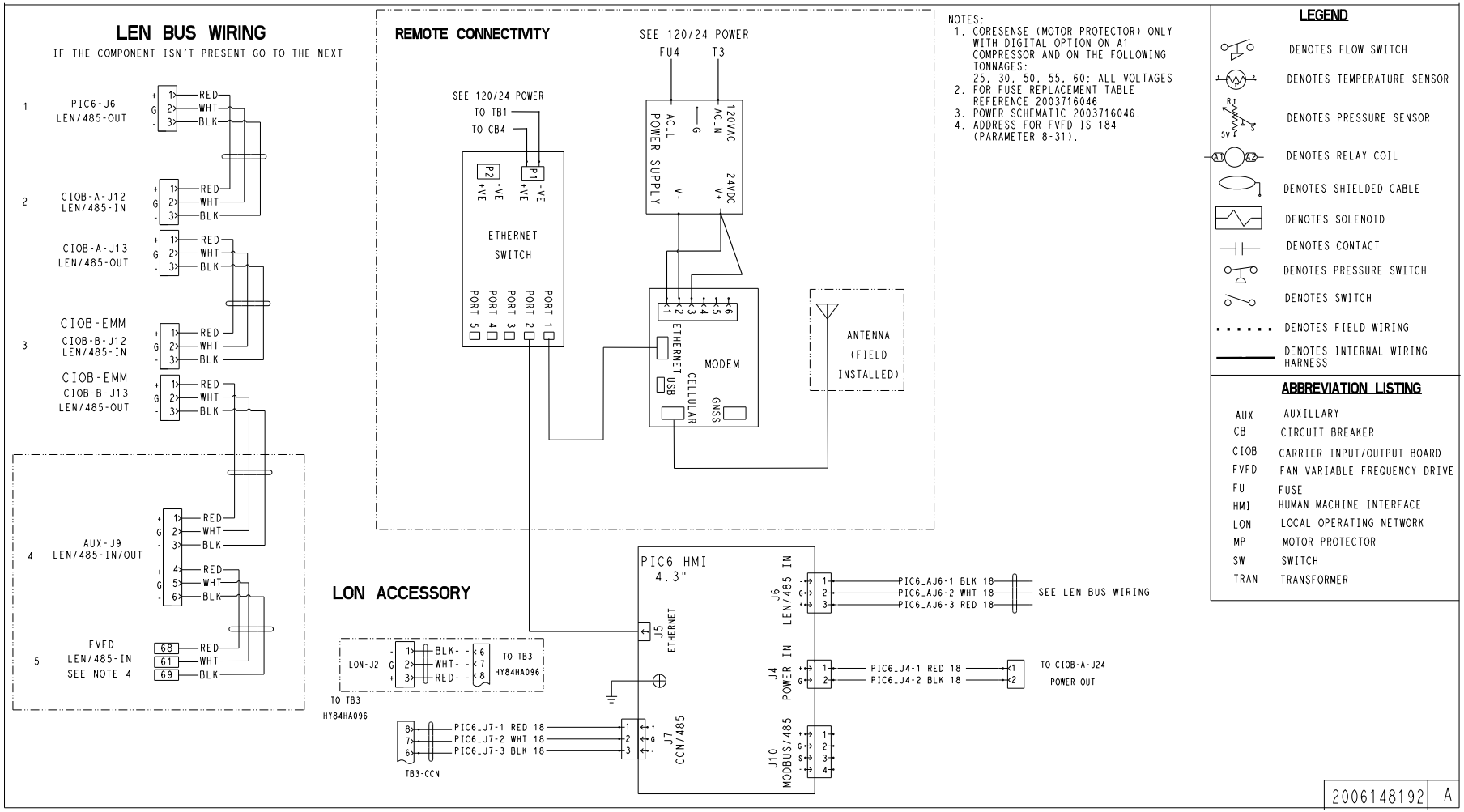
FB-3	230V	380V	460V	575V
NO LOW AMBIENT	LP-CC-20			
NO LOW AMBIENT W/HSCCR	LP-CC-30 & LP-CC-20			
W/GREEN SPEED	JKS-40	JKS-25		

FUSE REPLACEMENT TABLE FOR FB-15/FB-16					
PUMP HP	1.5	3	5	7.5	10
VOLTS	FB-15/FB-16				
208/230V	FNQ-R-5	FNQ-R-9	FNQ-R-15	FNQ-R-25	FNQ-R-30
380V	FNQ-R-3	FNQ-R-5	FNQ-R-8	FNQ-R-15	FNQ-R-17-1/2
460V	FNQ-R-3	FNQ-R-5	FNQ-R-7	FNQ-R-10	FNQ-R-15
575V	FNQ-R-2	FNQ-R-3	FNQ-R-5	FNQ-R-10	FNQ-R-10

FUSE REPLACEMENT TABLE FOR FB-1/FB-2				
TONNAGE	10, 15	20-30	35-50	55-60
VOLTS	FB-1/FB-2			
208/230V	KTK-R-20	LP-CC-20	LP-CC-20	FNQ-R-30
380V	KTK-R-10			FNQ-R-20
460V	KTK-R-10			FNQ-R-17-1/2
575V	KTK-R-10			FNQ-R-15

FUSE REPLACEMENT TABLE								
VOLTS	FB-5	FB-25/FB-26	FB-18	FU-4	FU-12	FU-3	FU-1/FU-2	FU-5/FU-6
24V	-	-	-	-	-	KTK-R-20	-	-
120V	-	-	-	KTK-R-8	KTK-R-3/4	-	-	-
208/230V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-3.5	FNQ-R-4
380V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-2.5	FNQ-R-2
460V	FNQ-R-5	-	FNQ-R-5	-	-	-	FNQ-R-2	FNQ-Q-2
575V	FNQ-R-5	FNQ-R-15	FNQ-R-5	-	-	-	FNQ-R-1.5	FNQ-Q-2

Fig. 81 — 30RC 010-060 Power Schematic



NOTE: See Legend on page 113.

Fig. 82 — 30RC Communication Wiring

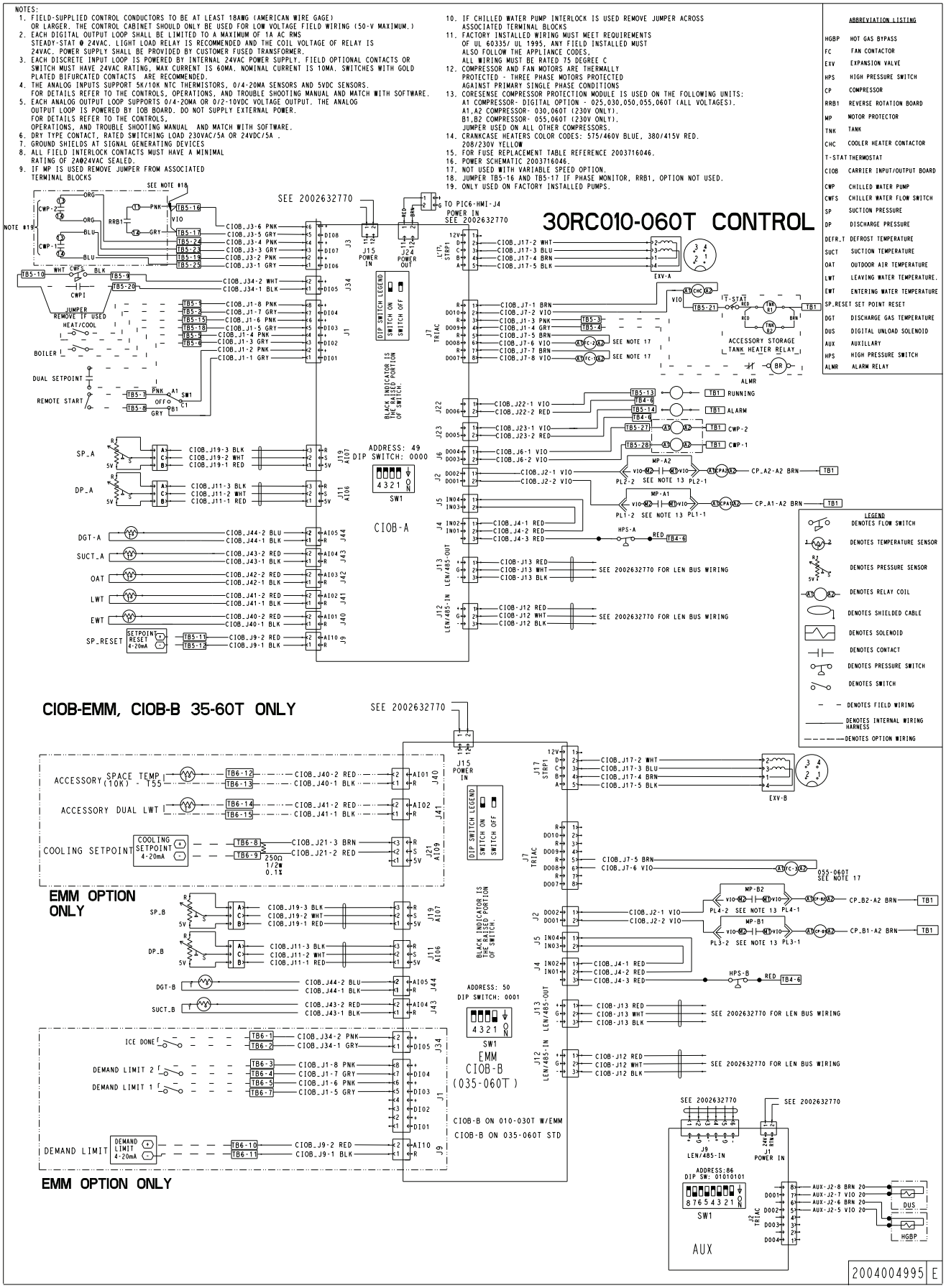


Fig. 83 — 30RC 010-060 Control Schematic

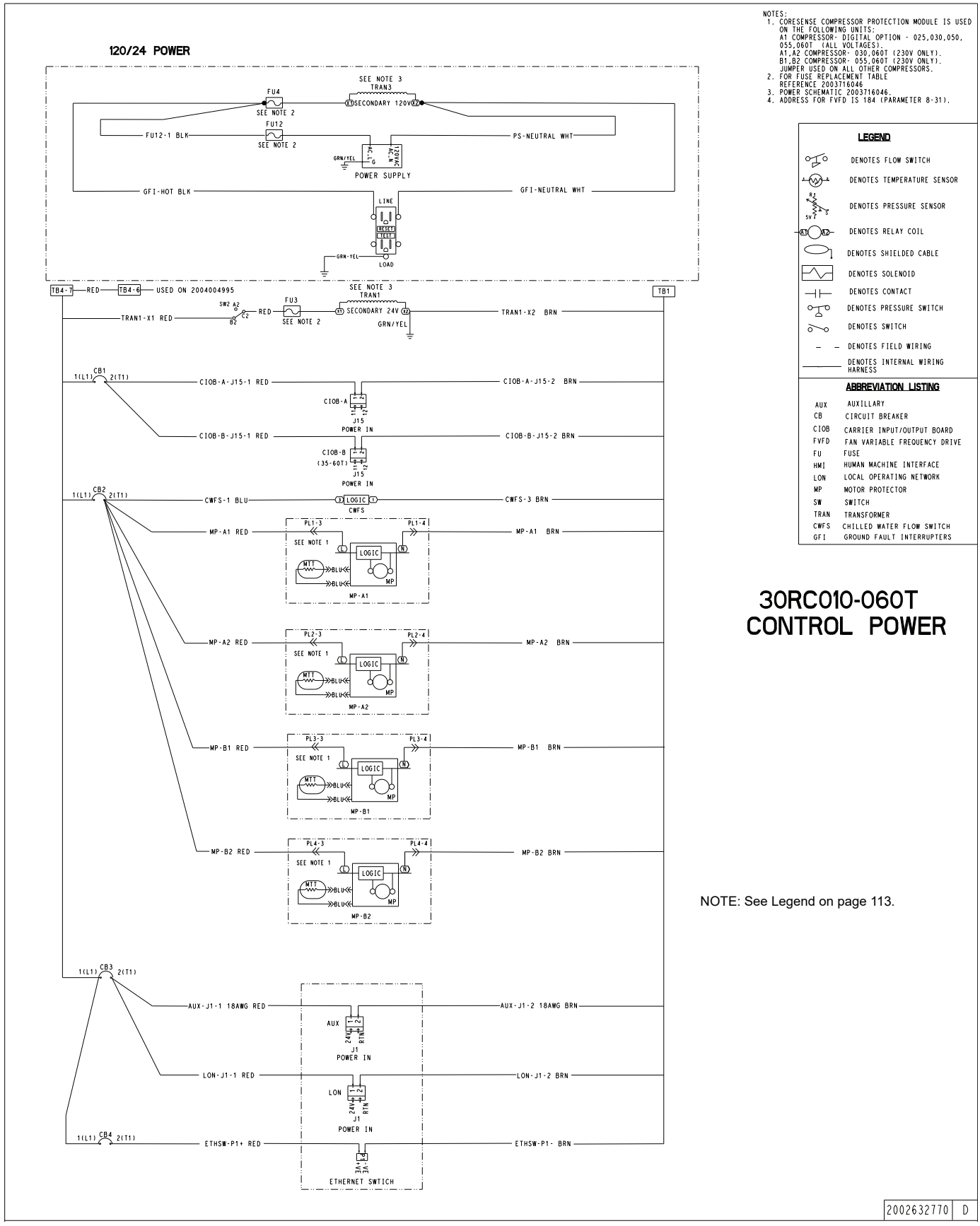
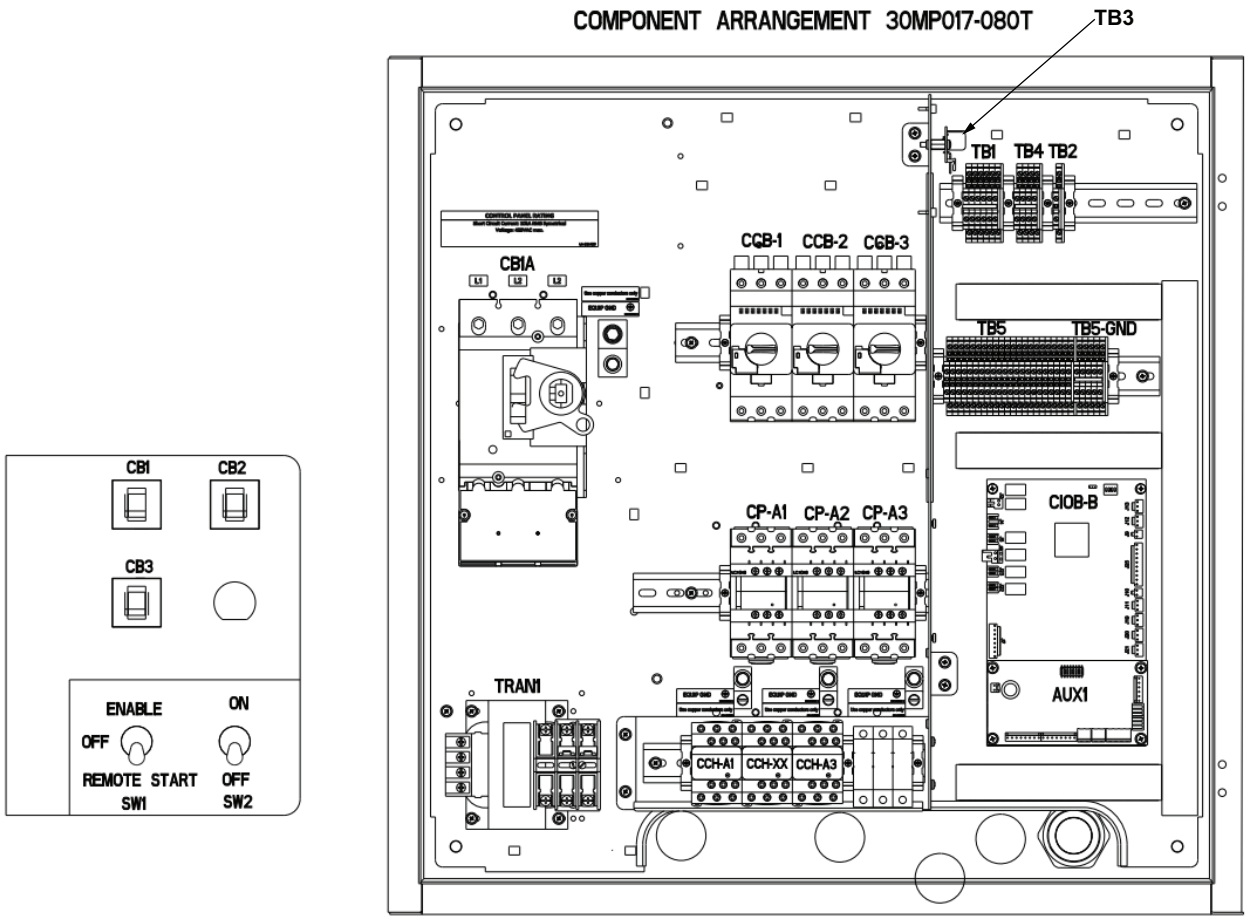
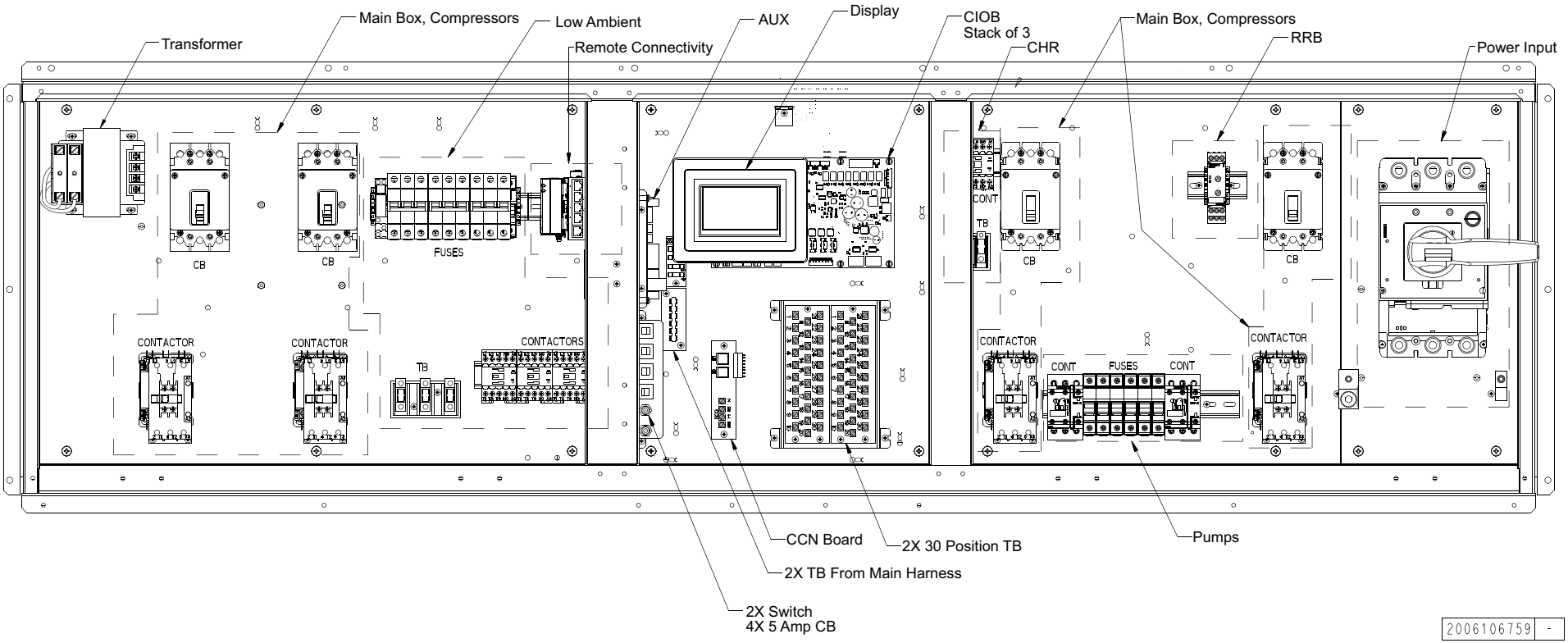


Fig. 84 — 30RC 010-060 Control Power Schematic



NOTE: See Legend on page 113.

Fig. 85 — Component Arrangement Diagram for 30RC 010-030 — Small Main



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NOTE: See Legend on page 113.

Fig. 86 — Component Arrangement Diagram for 30RC035-060 — Large Main

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES

Menu Descriptions

MAIN MENU

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	GENUNIT	ALL	General Parameter	
2	TEMP	ALL	Temperature	
3	PRESSURE	ALL	Pressure	
4	SETPOINT	USER	Setpoint	
5	INPUTS	ALL	Inputs	
6	OUTPUTS	ALL	Outputs	
7	PUMPSTAT	ALL	Pump Status	
8	RUNTIME	ALL	Runtime	
9	MSC_STAT	ALL	Miscellaneous Status	
10	MODES	ALL	Modes	
11	CONFIG	USER	Configuration	
12	QCK_TST1	USER	Quick Test 1	
13	QCK_TST2	SERVICE	Quick Test 2	
14	MAINTAIN	SERVICE	Maintenance	
15	TRENDING	ALL	Trendings	

ALARMS

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	ALARMRST	USER	Reset Alarms	
2	ALAM_CUR	ALL	Current Alarms	
3	ALARHIST	ALL	Alarm Historic	
4	ALARHIS2	ALL	Major Alarm Historic	

SYSTEM

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	CPULOAD	ALL	CPU Load	
2	NETWORK	ALL	Network	
3	DATETIME	ALL	Date/Time	
4	LANGUNIT	ALL	Language & Unit	
5	BRIGHTNS	ALL	Brightness	
6	SWINFO	ALL	Software Info	
7	HWINFO	ALL	Hardware Info	
8	USB_LOG	SERVICE	USB Log	
9	NETDIAG	SERVICE	Network Diagnostic	
10	CLOUDIAG	SERVICE	Cloud Diagnostics	

LOGIN

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	USER	ALL	User Login	
2	SERVICE	ALL	Service Login	
3	FACTORY	ALL	Factory Login	

CONFIG

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	GENCONF	USER	General Config	
2	PUMPCONF	USER	Pump Configuration	
3	HEADCONF	USER	Head Pressure Config	
4	HCCONFIG	USER	Heat/Cool Config	
5	RESETCFG	USER	Reset Config	
6	USERCONF	USER	User Configuration	
7	SCHEDULE	USER	Schedule	
8	HOLIDAY	USER	Holiday	
9	DATETIME	ALL	Date/Time	
10	NETWORK	USER	Network Menu	
11	CTRLID	USER	Control Identification	
12	FACTORY	FACTORY	Factory Parameters	
13	OPT_SEL	SERVICE	Option Selection	
14	SERVICE1	SERVICE	Service Parameters	
15	UPDTHOUR	SERVICE	Running Hour Config	
16	MST_SLV	SERVICE	Primary/Secondary	
17	CP_UNABL	SERVICE	Compressors Unable	
18	MSC_SERV	USER	Miscellaneous Service	

MAINTAIN

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	LOADFACT	SERVICE	Capacity EXV Ctrl	
2	DRV_CTRL	SERVICE	Drive Maintenance	
3	M_MSTSLV	SERVICE	Primary/Secondary Main	
4	LAST_POR	SERVICE	Last Power On Reset	
5	PR_LIMIT	SERVICE	Protection Limit	
6	SERMAINT	SERVICE	Service Maintenance	
7	HEADCTRL	SERVICE	Head Control	

NETWORK

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	MODBUSRS	USER	ModbusRTU Config.	
2	MODBUSIP	USER	ModbusTCP/IP Config.	
3	BACNET	USER	BACnet Parameters	
4	EMAILCFG	USER	EMail Configuration	

GENCONF

MAIN MENU → CONFIG → GENCONF

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	lead_cir	0 to 2	0	—	Cir Priority Sequence	0	2
2	blank				0=Auto 1=A Lead 2=B Lead		
3	seq_typ	NO_YES	0	—	Staged Loading Sequence	0	1
4	ramp_sel	NO_YES	0	—	Ramp Loading Select	0	1
5	lim_sel	0 to 2	0	—	Demand Limit Type Select	0	2
6				—	0 = None		
7				—	1 = Switch Control		
8				—	2 = 4-20mA Control		
9	off_on_d	1 to 15	1	min	Unit Off to On Delay	1	15
10	nh_limit	0 to 100	100	%	Night Capacity Limit	0	100
11	nh_start	0.00:0.00 to 0.00:0.00	0.00:0.00	—	Night Mode Start Hour	0.00:0.00	0.00:0.00
12	nh_end	0.00:0.00 to 0.00:0.00	0.00:0.00	—	Night Mode End Hour	0.00:0.00	0.00:0.00
13	ewt_opt	NO_YES	0	—	Entering Fluid Control	0	1
14	ice_cnfg	NO_YES	0	—	Ice Mode Enable	0	1
15	sp_tp_en	NO_YES	0	—	Space Temp Enable	0	1

PUMPCONF

MAIN MENU → CONFIG → PUMPCONF

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	pump_seq	0 to 4	0	—	Cooler Pumps Sequence	0	4
2					0 = No Pump		
3					1 = One Pump Only		
4					2 = Two Pumps Auto		
5					3 = Pump#1 Manual		
6					4 = Pump#2 Manual		
7	cpmp_seq	0 to 1	0	—	Cond Pump Sequence	0	1
8					0 = No Pump		
9					1 = One Pump Only		
10	pump_del	24 to 3000	48	hours	Pump Auto Rotation Delay	24	3000
11	pump_per	NO_YES	0	—	Pump Sticking Protection	0	1
12	pump_sby	NO_YES	0	—	Stop Pump During Standby	0	1
13	pump_loc	NO_YES	1	—	Flow Checked if Pump Off	0	1

HCCONFIG

MAIN MENU → CONFIG → HCCONFIG

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	auto_sel	NO_YES	0	—	Auto Changeover Select	0	1
2	cr_sel	0 to 4	0	—	Cooling Reset Select	0	4
3	hr_sel	0 to 4	0	—	Heating Reset Select	0	4
4					1=OAT, 0=None		
5					2=Delta T, 3=4-20mA		
6					4 = Space Temp		
7	blank						
8	heat_th	–4 to 32	5.0	°F	Heating OAT Threshold	–4	32
9	boil_th	5 to 59	14.2	°F	Boiler OAT Threshold	5	59

RESETCFG

MAIN MENU → CONFIG → RESETCFG

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	blank				COOLING RESET		
2	oat_crno	14 to 125	14	°F	OAT No Reset Value	14	125
3	oat_crfu	14 to 125	14	°F	OAT Full Reset Value	14	125
4	dt_cr_no	0 to 25	0	^F	Delta T No Reset Value	0	25
5	dt_cr_fu	0 to 25	0	^F	Delta T Full Reset Value	0	25
6	I_cr_no	0 to 20	0	mA	Current No Reset Value	0	20
7	I_cr_fu	0 to 20	0	mA	Current Full Reset Value	0	20
8	cr_deg	–30 to 30	0	^F	Cooling Reset Deg. Value	–30	30
9	spacr_no	14 to 125	14	°F	Space T No Reset Value	14	125
10	spacr_fu	14 to 125	14	°F	Space T Full Reset Value	14	125
11	blank				HEATING RESET		
12	oat_hrno	14 to 125	14	°F	OAT No Reset Value	14	125
13	oat_hrfu	14 to 125	14	°F	OAT Full Reset Value	14	125
14	dt_hr_no	0 to 25	0	^F	Delta T No Reset Value	0	25
15	dt_hr_fu	0 to 25	0	^F	Delta T Full Reset Value	0	25
16	I_hr_no	0 to 20	0	mA	Current No Reset Value	0	20
17	I_hr_fu	0 to 20	0	mA	Current Full Reset Value	0	20
18	hr_deg	–30 to 30	0	^F	Heating Reset Deg. Value	–30	30
19	spahr_no	14 to 125	14	°F	Space T No Reset Value	14	125
20	spahr_fu	14 to 125	14	°F	Space T Full Reset Value	14	125

USERCONF

MAIN MENU → CONFIG → USERCONF

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	alert_r	NO_YES	0	—	Alarm Relay for Alerts?	0	1
2	al_rever	NO_YES	0	—	Reversed Alarm Relay	0	1

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES (cont)

GENUNIT

MAIN MENU → GENUNIT

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	CTRL_TYP	0 to 2	0	—	Local=0 Net.=1 Remote=2	0	2	—	—
2	STATUS	TEXT	0	—	Running Status	—	—	—	—
3	ALM	TEXT	0	—	Alarm State	—	—	—	—
4	min_left	0 to 0	0	min	Minutes Left for Start	0	0	—	—
5	HEATCOOL	TEXT	0	—	Heat/Cool status	—	—	—	—
6	HC_SEL	0 to 2	0	—	Heat/Cool Select0=Cool 1=Heat 2=Auto	0	2	X	X
7	SP_SEL	0 to 2	0	—	Setpoint Select0=Auto. 1=Spt1. 2=Spt2	0	2	X	X
8	SP_OCC	NO_YES	0	—	Setpoint Occupied?	0	1	X	—
9	CHIL_S_S	DSABLE_ENABLE	0	—	Net.: Cmd Start/Stop	0	1	X	—
10	CHIL_OCC	NO_YES	0	—	Net.: Cmd Occupied	0	1	X	—
11	CAP_T	0 to 100	0	%	Percent Total Capacity	0	100	—	—
12	CAPA_T	0 to 100	0	%	Circuit A Total Capacity	0	100	—	—
13	CAPB_T	0 to 100	0	%	Circuit B Total Capacity	0	100	—	—
14	DEM_LIM	0 to 100	0	%	Active Demand Limit Val	0	100	X	—
15	SP	0 to 0	0	°F	Current Setpoint	0	0	—	—
16	CTRL_PNT	–4 to 153	0	°F	Control Point	–4	153	X	—
17	EMSTOP	DSABLE_ENABLE	0	—	Emergency Stop	0	1	X	—
18	LAG_LIM	0 to 100	0	%	Lag Capacity Limit Value	0	100	X	—

TEMP

MAIN MENU → TEMP

ITEM NUMBER	POINT NAME	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	EWT	°F	Entering Water Temp	—	—	—	—
2	LWT	°F	Leaving Water Temp	—	—	—	—
3	OAT	°F	Outdoor Air Temperature	–40	302	X	—
4	DLWT	°F	Dual Leaving Water Temp	–40	302	X	—
5	SCT_A	°F	Saturated Cond Tmp cir A	—	—	—	—
6	SST_A	°F	Saturated Suction Temp A	—	—	—	—
7	SUCT_A	°F	Suction Temp Circuit A	—	—	—	—
8	DGT_A	°F	Discharge Gas Temp A	—	—	—	—
9	SCT_B	°F	Saturated Cond Tmp cir B	—	—	—	—
10	SST_B	°F	Saturated Suction Temp B	—	—	—	—
11	SUCT_B	°F	Suction Temp Circuit B	—	—	—	—
12	DGT_B	°F	Discharge Gas Temp B	—	—	—	—
13	CEWT	°F	Cond Entering Water Temp	—	—	—	—
14	CLWT	°F	Cond Leaving Water Temp	—	—	—	—
15	SPACETMP	°F	Space Temperature	—	—	—	—

PRESSURE

MAIN MENU → PRESSURE

ITEM NUMBER	POINT NAME	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	DP_A	PSI	Discharge Pressure A	—	—	—	—
2	SP_A	PSI	Suction Pressure A	—	—	—	—
3	DP_B	PSI	Discharge Pressure B	—	—	—	—
4	SP_B	PSI	Suction Pressure B	—	—	—	—

INPUTS

MAIN MENU → INPUTS

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	ONOFF_SW	OPEN_CLOSE	—	Remote On/Off Switch	0	1	—	—
2	HC_SW	OPEN_CLOSE	—	Remote Heat/Cool Switch	0	1	—	—
3	on_ctrl	TEXT	—	Current Control	—	—	—	—
4	SETP_SW	OPEN_CLOSE	—	Second Setpoint Switch	0	1	—	—
5	LIM_SW1	OPEN_CLOSE	—	Limit Switch 1	0	1	—	—
6	LIM_SW2	OPEN_CLOSE	—	Limit Switch 2	0	1	—	—
7	SP_RESET	4 to 20	mA	Setpoint Reset Signal	4	20	—	—
8	FLOW_SW	OPEN_CLOSE	—	Flow Switch Interlock	0	1	—	—
9	CNFS	OPEN_CLOSE	—	Condenser Water Flow SW	0	1	—	—
10	leak_v1	0 to 0	V	Leakage Detection 1	0	0	—	—
11	leak_v2	0 to 0	V	Leakage Detection 2	0	0	—	—
12	DSHTR_SW	OPEN_CLOSE	—	Desuperheater Switch	0	1	—	—
13	HP_SW_A	OPEN_CLOSE	—	High Pressure Switch A	0	1	—	—
14	HP_SW_B	OPEN_CLOSE	—	High Pressure Switch B	0	1	—	—
15	BOILER	OFF_ON	—	Boiler Switch	0	1	—	—
16	CWP1	OPEN_CLOSE	—	Water Pump Interlock 1	0	1	—	—
17	CWP2	OPEN_CLOSE	—	Water Pump Interlock 2	0	1	—	—
18	REV_ROT	OPEN_CLOSE	—	Phase Reversal	0	1	—	—
19	LIM_4_20	4 to 20	mA	Capacity Limit Control	4	20	—	—
20	ICE_SW	OPEN_CLOSE	—	Ice Done Storage Switch	0	1	—	—
21	CSP_IN	4 to 20	mA	4_20mA Cooling Setpoint	4	20	—	—

OUTPUTS

MAIN MENU → OUTPUTS

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	CP_A1	OFF_ON	0	—	Compressor A1	0	0	—	—
2	CP_A2	OFF_ON	0	—	Compressor A2	0	0	—	—
3	CP_A3	OFF_ON	0	—	Compressor A3	0	0	—	—
4	DUS	OFF_ON	0	—	Digital Unload Solenoid	0	0	—	—
5	Mod_CPA1	0 to 100	0	%	Digital Modul. A1	0	100	—	—
6	HGBP_V	OFF_ON	0	—	Hot Gas Bypass Valve	0	0	—	—
7	FANC_1	OFF_ON	0	—	Fan Contactor 1	0	1	X	—
8	FANC_2	OFF_ON	0	—	Fan Contactor 2	0	1	X	—
9	FANC_3	OFF_ON	0	—	Fan Contactor 3	0	1	X	—
10	VFAN	0 to 0	0	%	VariaFan Speed	0	0	—	—
11	EXV_A	0 to 0	0	%	EXV Position Circuit A	0	0	—	—
12	EXVNPosA	0 to 0	0	%	EXV Next Pos Circuit A	0	0	—	—
13	CP_B1	OFF_ON	0	—	Compressor B1	0	0	—	—
14	CP_B2	OFF_ON	0	—	Compressor B2	0	0	—	—
15	EXV_B	0 to 0	0	%	EXV Position Circuit B	0	0	—	—
16	EXVNPosB	0 to 0	0	%	EXV Next Pos Circuit B	0	0	—	—
17	EXCH_HTR	OFF_ON	0	—	Exchanger Heater	0	0	—	—
18	ALARM	OFF_ON	0	—	Alarm Relay	0	0	—	—
19	RUN	OFF_ON	0	—	Running Relay	0	0	—	—
20	BOILER	OFF_ON	0	—	Boiler Output	0	1	—	—
21	LLSV_A	CLOSE_OPEN	0	—	Solenoid Valve A	0	1	—	—
22	LLSV_B	CLOSE_OPEN	0	—	Solenoid Valve B	0	1	—	—
23	HEAD_ACT	0 to 100	0	%	Head Pressure Actuator A	0	100	—	—
24	EISOR	CLOSE_OPEN	0	—	Evaporator Isolator Rly	0	1	—	—

PUMPSTAT

MAIN MENU → PUMPSTAT

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	PUMP_1	OFF_ON	0	—	Water Pump #1	0	1	X	—
2	PUMP_2	OFF_ON	0	—	Water Pump #2	0	1	X	—
3	ROT_PUMP	NO_YES	0	—	Rotate Pumps Now?	0	1	X	—
4	CPUMP	OFF_ON	0	—	Condenser Pump Relay	0	1	X	—

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES (cont)

RUNTIME

MAIN MENU → RUNTIME

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	hr_mach	"-" to "-"	hours	Machine Operating Hours	0	0	—	—
2	st_mach	"-" to "-"	—	Machine Starts Number	0	0	—	—
3	hr_cp_a1	"-" to "-"	hours	Compressor A1 Hours	0	0	—	—
4	st_cp_a1	"-" to "-"	—	Compressor A1 Starts	0	0	—	—
5	hr_cp_a2	"-" to "-"	hours	Compressor A2 Hours	0	0	—	—
6	st_cp_a2	"-" to "-"	—	Compressor A2 Starts	0	0	—	—
7	hr_cp_a3	"-" to "-"	hours	Compressor A3 Hours	0	0	—	—
8	st_cp_a3	"-" to "-"	—	Compressor A3 Starts	0	0	—	—
9	hr_cp_b1	"-" to "-"	hours	Compressor B1 Hours	0	0	—	—
10	st_cp_b1	"-" to "-"	—	Compressor B1 Starts	0	0	—	—
11	hr_cp_b2	"-" to "-"	hours	Compressor B2 Hours	0	0	—	—
12	st_cp_b2	"-" to "-"	—	Compressor B2 Starts	0	0	—	—
13	hr_pump1	"-" to "-"	hours	Water Pump #1 Hours	0	0	—	—
14	hr_pump2	"-" to "-"	hours	Water Pump #2 Hours	0	0	—	—
15	hr_cpump	"-" to "-"	hours	Condenser Pump Hours	0	0	—	—
16	hr_fanc1	"-" to "-"	hours	Fan Contactor #1 Hours	0	0	—	—
17	st_fanc1	"-" to "-"	—	Fan Contactor #1 Starts	0	0	—	—
18	hr_fanc2	"-" to "-"	hours	Fan Contactor #2 Hours	0	0	—	—
19	st_fanc2	"-" to "-"	—	Fan Contactor #2 Starts	0	0	—	—
20	hr_fanc3	"-" to "-"	hours	Fan Contactor #3 Hours	0	0	—	—
21	st_fanc3	"-" to "-"	—	Fan Contactor #3 Starts	0	0	—	—

MODES

MAIN MENU → MODES

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	m_delay	NO_YES	—	Delay Active	0	1	—	—
2	m_2ndspt	NO_YES	—	Second Setpoint Active	0	1	—	—
3	m_reset	NO_YES	—	Reset Active	0	1	—	—
4	m_limit	NO_YES	—	Demand Limit Active	0	1	—	—
5	m_ramp	NO_YES	—	Ramp Loading Active	0	1	—	—
6	m_cooler	NO_YES	—	Cooler Heater Active	0	1	—	—
7	m_pmprot	NO_YES	—	Pump Rot Active	0	1	—	—
8	m_pmpper	NO_YES	—	Pump Per Active	0	1	—	—
9	m_night	NO_YES	—	Night Low Noise Active	0	1	—	—
10	m_SM	NO_YES	—	System Manager Active	0	1	—	—
11	m_leadla	NO_YES	—	Primary Secondary Active	0	1	—	—
12	m_auto	NO_YES	—	Auto Changeover Active	0	1	—	—
13	m_heater	NO_YES	—	Electric Heat Active	0	1	—	—
14	m_boiler	NO_YES	—	Boiler Active	0	1	—	—
15	m_sst_a	NO_YES	—	Low Suction Circuit A	0	1	—	—
16	m_sst_b	NO_YES	—	Low Suction Circuit B	0	1	—	—
17	m_dgt_a	NO_YES	—	High DGT Circuit A	0	1	—	—
18	m_dgt_b	NO_YES	—	High DGT Circuit B	0	1	—	—
19	m_hp_a	NO_YES	—	High Pres Override Cir A	0	1	—	—
20	m_hp_b	NO_YES	—	High Pres Override Cir B	0	1	—	—
21	m_sh_a	NO_YES	—	Low SuperHeat Circuit A	0	1	—	—
22	m_sh_b	NO_YES	—	Low SuperHeat Circuit B	0	1	—	—
23	m_ice	NO_YES	—	Ice Mode In Effect	0	1	—	—

MSC_STAT

MAIN MENU → MSC_STAT

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	m_ecopmp	NO_YES	0	—	Eco Pump Mode Active	0	1	—	—

LOADFACT

MAIN MENU → MAINTMNU → LOADFACT

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	ctrl_avg	"-" to "-"	°F	Average Ctrl Water Temp	0	0	—	—
2	diff_wt*	"-" to "-"	°F	Differential Water Temp	0	0	—	—
3	delta_t†	"-" to "-"	^F	Water Delta T	0	0	—	—
4	CTRL_PNT	"-" to "-"	°F	Control Point	0	0	—	—
5	reset	"-" to "-"	^F	Reset Amount	0	0	—	—
6	tp_error	–100 to 100	^F	Controlled Temp Error	–100	100	—	—
7	cap_t	"-" to "-"	%	Actual Capacity	0	0	—	—
8	cap_lim	"-" to "-"	%	Actual Capacity Limit	0	0	—	—
9	zm	"-" to "-"	—	Current Z Multiplier Val	0	0	—	—
10	smz	"-" to "-"	%	Load/Unload Factor	0	0	—	—
11	cur_stag	"-" to "-"	—	Active Stage Number	0	0	—	—
12	over_cap	"-" to "-"	—	Active Capacity Override	0	0	—	—
13	SH_A	"-" to "-"	^F	Suction Superheat A	0	0	—	—
14	sh_sp_a	"-" to "-"	^F	SH Setpoint Circuit A	0	0	—	—
15	ov_exv_a	"-" to "-"	—	EXV Override Circuit A	0	0	—	—
16	exv_v_a	"-" to "-"	%	EXV Command Circuit A	0	0	—	—
17	SH_B	"-" to "-"	^F	Suction Superheat B	0	0	—	—
18	sh_sp_b	"-" to "-"	^F	SH Setpoint Circuit B	0	0	—	—
19	ov_exv_b	"-" to "-"	—	EXV Override Circuit B	0	0	—	—
20	exv_v_b	"-" to "-"	%	EXV Command Circuit B	0	0	—	—
21	sct_c_m	OFF_ON	—	Greenspeed Charging Mode	0	1	—	X

NOTE(S):

*. diff_wt = the sensor temp on which the unit will regulate (e.g., LWT)
†. delta_t = difference between diff_wt and the other water temp reference

DRV_CTRL

MAIN MENU → MAINTMNU → DRV_CTRL

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	blank			FAN DRIVE A				
2	cmd_rpm1	"-" to "-"	—	Fan Speed Cmd in RPM	0	0	—	—
3	drvpwr_1	"-" to "-"	kW	Fan Drive Power	0	0	—	—
4	drv_I_1	"-" to "-"	A	Fan Drive Current	0	0	—	—
5	drv_V_1	"-" to "-"	V	Fan Drive Voltage	0	0	—	—
6	drv_F_1	"-" to "-"	Hz	Fan Drive Frequency	0	0	—	—
7	drv_S_1	"-" to "-"	rpm	Fan Drive Speed RPM	0	0	—	—
8	drvVer_1	TEXT	—	Fan Drive Version	—	—	—	—
9	blank			SET DRIVE ADDRESS				
10	SET_DRV	NO_YES	—	Attach Varifan Drive	0	1	X	X

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES (cont)

M_MSTSLV

MAIN MENU → MAINTMNU → M_MSTSLV

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	mstslv	TEXT	—	Unit is Primary or Secnd	—	—	—	—
2	ms_ctrl	TEXT	—	Primary Control Type	—	—	—	—
3	ms_activ	FALSE_TRUE	—	Primary/Scd Ctrl Active	0	1	—	—
4	lead_sel	MASTER_SLAVE	—	Lead Unit is the:	0	1	—	—
5	slv_stat	0 to 0	—	Slave Chiller State	0	0	—	—
6	slv_capt	0 to 0	%	Slave Chiller Total Cap	0	0	—	—
7	l_strt_d	0 to 0	min	Lag Start Delay	0	0	—	—
8	ll_hr_d	0 to 0	hours	Lead/lag Hours Delta	0	0	—	—
9	ll_chang	NO_YES	—	Lead/lag Changeover?	0	1	—	—
10	ll_pull	NO_YES	—	Lead Pulldown?	0	1	—	—
11	ms_error	0 to 0	—	Primary/Scd Error	0	0	—	—
12	cap_max	NO_YES	—	Max Available Capacity?	0	1	—	—
13	lagstat	0 to 0	—	Slave lagstat	0	0	—	—
14	slav_hr	0 to 0	hours	Slave Operating Hours	0	0	—	—
15	slav_ewt	0 to 0	°F	Slave Entering Fluid	0	0	—	—
16	slav_lwt	0 to 0	°F	Slave Leaving Fluid	0	0	—	—

LAST_POR

MAIN MENU → MAINTMNU → LAST_POR

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	date_on1	"-" to "-"	—	PowerOn1: day-mon-year	0	0	—	—
2	time_on1	"-" to "-"	—	PowerOn1: hour-minute	0	0	—	—
3	date_of1	"-" to "-"	—	PowerDown1: day-mon-year	0	0	—	—
4	time_of1	"-" to "-"	—	PowerDown1: hour-minute	0	0	—	—
5	rebreas1	"-" to "-"	—	PowerDown1: reason*	0	0	—	—
6	date_on2	"-" to "-"	—	PowerOn2: day-mon-year	0	0	—	—
7	time_on2	"-" to "-"	—	PowerOn2: hour-minute	0	0	—	—
8	date_of2	"-" to "-"	—	PowerDown2: day-mon-year	0	0	—	—
9	time_of2	"-" to "-"	—	PowerDown2: hour-minute	0	0	—	—
10	rebreas2	"-" to "-"	—	PowerDown2: reason	0	0	—	—
11	date_on3	"-" to "-"	—	PowerOn3: day-mon-year	0	0	—	—
12	time_on3	"-" to "-"	—	PowerOn3: hour-minute	0	0	—	—
13	date_of3	"-" to "-"	—	PowerDown3: day-mon-year	0	0	—	—
14	time_of3	"-" to "-"	—	PowerDown3: hour-minute	0	0	—	—
15	rebreas3	"-" to "-"	—	PowerDown3: reason	0	0	—	—
16	date_on4	"-" to "-"	—	PowerOn4: day-mon-year	0	0	—	—
17	time_on4	"-" to "-"	—	PowerOn4: hour-minute	0	0	—	—
18	date_of4	"-" to "-"	—	PowerDown4: day-mon-year	0	0	—	—
19	time_of4	"-" to "-"	—	PowerDown4: hour-minute	0	0	—	—
20	rebreas4	"-" to "-"	—	PowerDown4: reason	0	0	—	—
21	date_on5	"-" to "-"	—	PowerOn5: day-mon-year	0	0	—	—
22	time_on5	"-" to "-"	—	PowerOn5:hour-minute	0	0	—	—
23	date_of5	"-" to "-"	—	PowerDown5: day-mon-year	0	0	—	—
24	time_of5	"-" to "-"	—	PowerDown5: hour-minute	0	0	—	—
25	rebreas5	"-" to "-"	—	PowerDown5: reason	0	0	—	—

NOTE(S):

*. Reasons for PowerDown:
1 = UTC_API (reboot required by software; for example when CCN table FACTORY is updated).
2 = application crash
3 = power loss
4 = watchdog

PR_LIMIT

MAIN MENU → MAINTMNU → PR_LIMIT

ITEM NUMBER	POINT NAME	RANGE	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	blank			CIRCUIT A				
2	sdtlim_a	"-" to "-"	°F	Discharge A Gas Limit (highest point reached)	0	0		——
3	sdt3m_a	"-" to "-"	°F	SDT A Average 3 minutes	0	0	—	—
4	sst3m_a	"-" to "-"	°F	SST A Average 3 minutes	0	0	—	—
5	sdt30s_a	"-" to "-"	°F	SDT A Average 30 seconds	0	0	—	—
6	sst30s_a	"-" to "-"	°F	SST A Average 30 seconds	0	0	—	—
7	blank			CIRCUIT B				
8	sdtlim_b	"-" to "-"	°F	Discharge B Gas Limit	0	0	—	—
9	sdt3m_b	"-" to "-"	°F	SDT B Average 3 minutes	0	0	—	—
10	sst3m_b	"-" to "-"	°F	SST B Average 3 minutes	0	0	—	—
11	sdt30s_b	"-" to "-"	°F	SDT B Average 30 seconds	0	0	—	—
12	sst30s_b	"-" to "-"	°F	SST B Average 30 seconds	0	0	—	—

SERMAINT

MAIN MENU → MAINTMNU → SERMAINT

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	S_RESET	0 to 5	0	—	Reset Maintenance Alert	0	5	X	—
2	blank				1 - reset all	—	—	—	—
3	blank					—	—	—	—
4	blank				OPERATION WARNINGS	—	—	—	—
5	charge_m	TEXT	0	—	2 - Refrigerant Charge	—	—	—	—
6	blank					—	—	—	—
7	blank				GENERAL SERVICING DELAYS	—	—	—	—
8	blank				4 - Next Service Mntn	—	—	—	—
9	s_date	TEXT	0	—	Date of Maintenance	—	—	—	—
10	s_hour	TEXT	0	—	Hour of Maintenance	—	—	—	—
11	s_days	TEXT	0	—	Operatin Days until Mntn	—	—	—	—
12	blank					—	—	—	—
13	blank					—	—	—	—
14	blank				REGULATORY SERVICING	—	—	—	—
15	blank				5 - F-Gas Check	—	—	—	—
16	f_date	TEXT	0	—	Fgas seal check remind	—	—	—	—
17	blank				6 - Leak detector check	—	—	—	—
18	l_date	TEXT	0	—	Leak detec. check remind	—	—	—	—

QCK_TST1

MAIN MENU → QCK_TST1

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	QCK_TEST	NO_YES	0	—	Quick test Enable	0	1	—	X
2	Q_FC1	0 to 1	0	—	Fan Contactor 1 Output	0	1	—	X
3	Q_FC2	0 to 1	0	—	Fan Contactor 2 Output	0	1	—	X
4	Q_FC3	0 to 1	0	—	Fan Contactor 3 Output	0	1	—	X
5	Q_VFAN	0 to 100	0	%	Variable Speed Fan	0	100	—	X
6	MOD_EXVA	MANUAL_AUTO	0	—	QuickTest Mode for EXV A	0	1	—	X
7	Q_EXVA	0 to 100	0	%	EXV position Circuit A	0	100	—	X
8	MOD_EXVB	MANUAL_AUTO	0	—	QuickTest Mode for EXV B	0	1	—	X
9	Q_EXVB	0 to 100	0	%	EXV position Circuit B	0	100	—	X
10	Q_PUMP_1	0 to 2	0	—	Pump 1. 1=ON 2=FORCED	0	2	—	X
11	Q_PUMP_2	0 to 2	0	—	Pump 2. 1=ON 2=FORCED	0	2	—	X
12	Q_CPUMP	0 to 2	0	—	Pump C. 1=ON 2=FORCED*	0	2	—	X
13	Q_ALARM	OFF_ON	0	—	Alarm relay Status	0	1	—	X
14	Q_RUN	OFF_ON	0	—	Running Status	0	1	—	X
15	Q_EX_HTR	OFF_ON	0	—	Cooler Heater	0	1	—	X
16	Q_BOILER	OFF_ON	0	—	Boiler Output	0	1	—	X
17	blank								
18	HP_TEST	–1 to 1	–1	—	High Pressure Test –1=Off / 0=CirA / 1=CirB	–1	1	—	X
19	Q_HGBP	OFF_ON	0	—	Hot Gas Bypass Valve A	0	1	—	X
20	Q_LLSV_A	OFF_ON	0	—	Solenoid Valve A	0	1	—	X
21	Q_LLSV_B	OFF_ON	0	—	Solenoid Valve B	0	1	—	X
22	Q_HEAD_P	0 to 100	0	%	Head Pressure Actuator A	0	100	—	X

NOTE(S):

*. Pump quick test set to ON will run pump for a few seconds. FORCED will run the pump until quick test is disabled.

ALARMRST

MAIN MENU → ALARMS → ALARMRST

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	RST_ALM	NO_YES	0	—	Alarm Reset	0	1	—	X
2	ALM	TEXT	0	—	Alarm State	—	—	—	—
3	alarm_1c	0 to 0	0	—	Current Alarm 1	0	0	—	—
4	alarm_2c	0 to 0	0	—	Current Alarm 2	0	0	—	—
5	alarm_3c	0 to 0	0	—	Current Alarm 3	0	0	—	—
6	alarm_4c	0 to 0	0	—	Current Alarm 4	0	0	—	—
7	alarm_5c	0 to 0	0	—	Current Alarm 5	0	0	—	—
8	alarm_1	0 to 0	0	—	Current Alarm 1 Index	0	0	—	—
9	alarm_2	0 to 0	0	—	Current Alarm 2 Index	0	0	—	—
10	alarm_3	0 to 0	0	—	Current Alarm 3 Index	0	0	—	—
11	alarm_4	0 to 0	0	—	Current Alarm 4 Index	0	0	—	—
12	alarm_5	0 to 0	0	—	Current Alarm 5 Index	0	0	—	—

HEADCRTL

MAIN MENU → MAINTMNU → HEADCRTL

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	blank				CIR A HEAD PRESSURE CTRL				
2	condsp	"-" to "-"	0	°F	Computed Cond Setpoint	0	0	—	—
3	fanseq	"-" to "-"	0	—	Fan Control Sequence	0	0	—	—
4	fan	"-" to "-"	0	—	Fan Speed	0	0	—	—
5	fan_ov	"-" to "-"	0	—	Fan Override	0	0	—	—

QCK_TST2

MAIN MENU → QCK_TST2

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	Q_CPA1	OFF_ON	0	—	Compressor A1 Output	0	1	—	X
2	Q_CPA2	OFF_ON	0	—	Compressor A2 Output	0	1	—	X
3	Q_CPA3	OFF_ON	0	—	Compressor A3 Output	0	1	—	X
4	Q_CPB1	OFF_ON	0	—	Compressor B1 Output	0	1	—	X
5	Q_CPB2	OFF_ON	0	—	Compressor B2 Output	0	1	—	X
6	Q_DUS	0 to 100	100	%	Digital Compressor	0	100	—	X

SYSVER

MAIN MENU → MAINTAIN → SYSVER

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	sr_cioba	TEXT	0	—	CIOB A CESR Number	—	—	—	—
2	sr_ciobb	TEXT	0	—	CIOB B CESR Number	—	—	—	—
3	sr_aux	TEXT	0	—	AUX CESR Number	—	—	—	—

FACTORY

MAIN MENU → CONFIG → FACTORY

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	unit_typ	1 to 3	1	—	UnitType 1 = 30RC 3 = 30MP	1	3	—	—
2	unitsize	0 to 0	0	—	Unit Capacity Model	0	0	—	—
3	boil_sel	NO_YES	0	—	Boiler Command Select	0	1	—	—
4	desuper	NO_YES	0	—	Desuperheater Select	0	1	—	—
5	vfan_sel	NO_YES	0	—	Variable Fan Speed	0	1	—	—
6	pump_sel	NO_YES	0	—	Factory Water Pump	0	1	—	—
7	dual_pmp	NO_YES	0	—	Factory Dual Water Pump	0	1	—	—
8	mst_slv	NO_YES	0	—	Primary Secondary Enable	0	1	—	—
9	flui_typ	1 to 3	1	—	Cooler Fluid Type 1 = Fresh Water 3 = Brine	1	3	—	—
10	voltage	0 to 0	0	—	Supply Voltage (208,230,380,460,or 575)	0	0	—	—
11	dus_sel	NO_YES	0	—	Digital Comp. Selection	0	1	—	—
12	opt_13a	NO_YES	0	—	EMM Option	0	1	—	—
13	hgbp_sel	NO_YES	0	—	Hot Gas Bypass Selection	0	1	—	—
14	llsv_en	NO_YES	0	—	Enable Liquid Line Valve (Not used on 30RC)	0	1	—	—
15	h_act_en	NO_YES	0	—	Enable Head Press Act A (Not Used on 30RC)	0	1	—	—
16	evap_en	NO_YES	0	—	Enable Evap Isolator Rel (Not used on 30RC)	0	1	—	—
17	leak_chk	NO_YES	0	—	Leakage Charge Detection (Not used on 30RC)	0	1	—	—
18	bac_opt	NO_YES	0	—	Enable BacNet Option	0	1	—	—

CP_UNABL

MAIN MENU → CONFIG → CP_UNABL

ITEM NO.	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	blank				FOR DISABLE COMPRESSORS		
2	un_cp_a1	NO_YES	0	—	Compressor A1 Disable	0	1
3	un_cp_a2	NO_YES	0	—	Compressor A2 Disable	0	1
4	un_cp_a3	NO_YES	0	—	Compressor A3 Disable	0	1
5	un_cp_b1	NO_YES	0	—	Compressor B1 Disable	0	1
6	un_cp_b2	NO_YES	0	—	Compressor B2 Disable	0	1

MST_SLV

MAIN MENU → CONFIG → MST_SLV

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	blank				Primary/Secondary Control		
2	ms_sel	0 to 2	0	—	Primary/Secondary Select 0 = Disable 1 = Primary 2 = Secondary	0	2
3	ms_ctrl	1 to 3	1	—	Primary Control Type 1 = Local Control 2 = Remote Control 3 = Network Control	1	3
4	slv_addr	1 to 236	2	—	Slave Address	1	236
5	lead_sel	0 to 2	0	—	Lead Lag Select 0=Always Lead 1=Lag Once Failed Only 2=Lead/Lag Runtime Sel	0	2
6	start_dt	3 to 18	4	^F	Start if Error Higher	3	18
7	lag_mini	0 to 150	0	min	Lag Minimum Running Time	0	150
8	lstr_tim	2 to 30	10	min	Lead/Lag Start Timer	2	30
9	ll_bal_d	40 to 400	168	hours	Lead/Lag Balance Delta	40	400
10	lag_pump	0 to 1	0	—	Lag Unit Pump Control 0 = Stop if Unit Stops 1 = Run if Unit Stops	0	1
11	lead_pul	0 to 60	0	min	Lead Pulldown Time	0	60
12	ll_serie	NO_YES	0	—	Chiller In Series	0	1
13	islegacy	NO_YES	0	—	Legacy Compatibility?	0	1

SERVICE1

MAIN MENU → CONFIG → SERVICE1

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	sh_sp_a	5 to 15	9	^F	EXV A Superheat Setpoint	5	15
2	sh_sp_b	5 to 15	9	^F	EXV B Superheat Setpoint	5	15
3	cond_en	NO_YES	0	—	Enable Cond. EWT/LWT	0	1
4	heatersp	1.8 to 6	3.42	^F	Cooler Heater Delta Spt	1.8	6
5	pump_cyc	NO_YES	1	—	Pump Cycling Freeze Prot	0	1
6	freezesp	–20 to 34	34	°F	Brine Freeze Setpoint	–20	34
7	min_lwt	–20 to 41	41.0	°F	Brine Minimum LWT	–20	41
8	auto_sm	DSABLE_ENABLE	0	—	Auto Start When SM Lost	0	1
9	zm_spt	4 to 12	6	—	Auto Z Multiplier Setpt	4	12
10	hc_zm	1 to 6	6	—	Maximum Z Multiplier	1	6
11	leak_thr	0 to 5	2.5	V	Leakage charge Threshold	0	5
12	leak_tmr	0 to 600	60	min	Leakage charge Timer	0	600
13	b_metric	0 to 1	1	—	Blackbox In Metric? 0 Imperial, 1 Metric	0	1
14	blank						
15	oat_en	NO_YES	0	—	Enable OAT for MP	0	1

EMAILCFG

MAIN MENU → CONFIG → EMAILCFG

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	senderP1	TEXT	0	—	Sender Email Part1	—	—
2	blank				@		
3	senderP2	TEXT	0	—	Sender Email Part2	—	—
4	recip1P1	TEXT	0	—	Recip1 Email Part1	—	—
5	blank				@		
6	recip1P2	TEXT	0	—	Recip1 Email Part2	—	—
7	recip2P1	TEXT	0	—	Recip2 Email Part1	—	—
8	blank				@		
9	recip2P2	TEXT	0	—	Recip2 Email Part2	—	—
10	smtpP1	0 to 255	0	—	SMTP IP Addr Part 1	0	255
11	smtpP2	0 to 255	0	—	SMTP IP Addr Part 2	0	255
12	smtpP3	0 to 255	0	—	SMTP IP Addr Part 3	0	255
13	smtpP4	0 to 255	0	—	SMTP IP Addr Part 4	0	255
14	accP1	TEXT	0	—	Account Email Part1	—	—
15	blank				@		
16	accP2	TEXT	0	—	Account Email Part2	—	—
17	accPass	TEXT	0	—	Account Password	—	—
18	portNbr	0 to 65535	25	—	Port Number	0	65535
19	srvTim	0 to 255	30	sec	Server Timeout	0	255
20	srvAut	0 to 1	0	—	Server Authentication	0	1

BACNET

MAIN MENU → CONFIG → BACNET

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	bacena	0 to 2	0	—	BACnet Enable Option 0 - Disabled 1 - BACnet IP 2 - BACnet MSTP	0	2
2	bacunit	NO_YES	1	—	Metric Units?	0	1
3	network	1 to 40000	1600	—	Network	1	40000
4	udpport	47808 to 47823	47808	—	UDP Port Number	47808	47823
5	bac_id	1 to 4194302	1600001	—	Device ID Manual	1	4194302
6	auid_opt	DSABLE_ENABLE	0	—	Device ID Auto Option	0	1
7	balmena	DSABLE_ENABLE	1	—	Alarm Reporting	0	1
8	mng_occ	NO_YES	0	—	BACnet Manage Occupancy	0	1
9	conifnam	0 to 1	0	—	IP Port Interface Name 0 = J5 / J15 1 = J16	0	1
10	mstpaddr	1 to 127	1	—	BACnet MS/TP MAC Address	1	127
11	mstpbaud	0 to 5	2	—	BACnet MS/TP Baud Rate 0 = 9600 1 = 19200 2 = 38400 3 = 57600 4 = 76800 5 = 115200	0	5
12	maxmastr	1 to 127	10	—	BACnet MS/TP Max Master	1	127
13	maxinfof	1 to 255	5	—	MS/TP Max Info Frames	1	255

MSC_SERV

MAIN MENU → CONFIG → MSC_SERV

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	blank				ECO PUMP CONFIG		
2	eco_pmp	NO_YES	1	—	Eco Pump Enable	0	1
3	ecop_off	2 to 60	5	min	Eco Pump Mode Off Delay	2	60
4	ecop_on	2 to 60	2	min	Eco Pump Mode On Delay	2	60

OPT_SEL

MAIN MENU → CONFIG → OPT_SEL

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	boil_en	NO_YES	0	—	Boiler Enable	0	1

FACTORY2

MAIN MENU → CONFIG → FACTORY2

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	cap_a1	0 to 99	0	—	Compressor A1 Capacity	0	99
2	cap_a2	0 to 99	0	—	Compressor A2 Capacity	0	99
3	cap_a3	0 to 99	0	—	Compressor A3 Capacity	0	99
4	cap_b1	0 to 99	0	—	Compressor B1 Capacity	0	99
5	cap_b2	0 to 99	0	—	Compressor B2 Capacity	0	99
6	nb_fan	0 to 8	0	—	Total Fans NB	0	8
7	exvTyp_a	0 to 0	0	—	EXV A Type	0	0
8	exvNam_a	TEXT	0	—	EXV A Name	—	—
9	exvmax_a	0 to 15000	0	—	EXV A Maximum Steps Nb	0	15000
10	exvTyp_b	0 to 0	0	—	EXV B Type	0	0
11	exvNam_b	TEXT	0	—	EXV B Name	—	—
12	exvmax_b	0 to 15000	0	—	EXV B Maximum Steps Nb	0	15000

SETPOINT

MAIN MENU → SETPOINT

ITEM NUMBER	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	csp1	–20 to 68	44.6	°F	Cooling Setpoint 1	–20	68
2	csp2	–20 to 68	44.6	°F	Cooling Setpoint 2	–20	68
3	ice_sp	–20 to 32	20	°F	Cooling Ice Setpoint	–20	32
4	hsp1	77 to 131	100.4	°F	Heating Setpoint 1	77	131
5	hsp2	77 to 131	100.4	°F	Heating Setpoint 2	77	131
6	ramp_sp	0.2 to 2	1	^F	Ramp Loading	0.2	2
7	cauto_sp	39 to 122	75	°F	Cool Changeover Setpt	39	122
8	hauto_sp	32 to 115	64	°F	Heat Changeover Setpt	32	115
9	lim_sp1	0 to 100	100	%	Switch Limit Setpoint 1	0	100
10	lim_sp2	0 to 100	100	%	Switch Limit Setpoint 2	0	100
11	lim_sp3	0 to 100	100	%	Switch Limit Setpoint 3	0	100
12	min_sct	80 to 122	104	°F	Desuperheater Min Sct	80	122
13	headSct	70 to 130	75	°F	Head Pressure SCT sp	70	130
14	cwl	50 to 130	65	°F	Entering Condenser stp	50	130

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES (cont)

The DCT 1 and DCT 2 tables contain items from different CCN tables. When Data collection with a PCDCT tool is requested, these 2 tables include the most useful parameters used for chiller debugging.

Note that information present in these tables is extracted from other CCN tables and can also be found in other tables as well.

LINE	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	CAPA_T	0 to 100	0	%	Circuit A Total Capacity	0	100		
2	HP_SW_A	OPEN_CLOSE	0	—	High Pressure Switch A	0	1		
3	CP_A1	OFF_ON	0	—	Compressor A1	0	0		
4	CP_A2	OFF_ON	0	—	Compressor A2	0	0		
5	CP_A3	OFF_ON	0	—	Compressor A3	0	0		
6	HGBP_V	OFF_ON	0	—	Hot Gas ByPass Valve	0	0		
7	DUS	OFF_ON	0	—	Digital Unload Solenoid	0	0		
8	Mod_CPA1	0 to 100	0	%	Digital Modul. A1	0	100		
9	FANC_1	0 to 1	0	—	Fan Contactor 1	0	1		
10	FANC_2	0 to 1	0	—	Fan Contactor 2	0	1		
11	FANC_3	0 to 1	0	—	Fan Contactor 3	0	1		
12	VFAN	0 to 0	0	%	VariaFan Speed	0	0		
13	fanseq	0 to 0	0	—	Fan Control Sequence	0	0		
14	fan_ov	0 to 0	0	—	Fan Override	0	0		
15	condsp	0 to 0	0	°F	Computed Cond Setpoint	0	0		
16	DP_A	0 to 0	0	PSI	Discharge Pressure A	0	0		
17	SP_A	0 to 0	0	PSI	Suction Pressure A	0	0		
18	SCT_A	0 to 0	0	°F	Saturated Cond Tmp cir A	0	0		
19	SST_A	0 to 0	0	°F	Saturated Suction Temp A	0	0		
20	SUCT_A	0 to 0	0	°F	Suction Temp Circuit A	0	0		
21	DGT_A	0 to 0	0	°F	Discharge Gas Temp A	0	0		
22	SH_A	0 to 0	0	^F	Suction Superheat A	0	0		
23	sh_sp_a	0 to 0	0	^F	SH Setpoint Circuit A	0	0		
24	EXV_A	0 to 0	0	%	EXV Position Circuit A	0	0		
25	exv_v_a	0 to 0	0	%	EXV Command Circuit A	0	0		
26	ov_exv_a	0 to 0	0	—	EXV Override Circuit A	0	0		
27	m_sst_a	NO_YES	0	—	Low Suction Circuit A	0	1		
28	m_dgt_a	NO_YES	0	—	High DGT Circuit A	0	1		
29	m_hp_a	NO_YES	0	—	High Pres Override Cir A	0	1		
30	m_sh_a	NO_YES	0	—	Low SuperHeat Circuit A	0	1		
31	CAPB_T	0 to 100	0	%	Circuit B Total Capacity	0	100		
32	HP_SW_B	OPEN_CLOSE	0	—	High Pressure Switch B	0	1		
33	CP_B1	OFF_ON	0	—	Compressor B1	0	0		
34	CP_B2	OFF_ON	0	—	Compressor B2	0	0		
35	DP_B	0 to 0	0	PSI	Discharge Pressure B	0	0		
36	SP_B	0 to 0	0	PSI	Suction Pressure B	0	0		
37	SCT_B	0 to 0	0	°F	Saturated Cond Tmp cir B	0	0		
38	SST_B	0 to 0	0	°F	Saturated Suction Temp B	0	0		
39	SUCT_B	0 to 0	0	°F	Suction Temp Circuit B	0	0		
40	DGT_B	0 to 0	0	°F	Discharge Gas Temp B	0	0		
41	SH_B	0 to 0	0	^F	Suction Superheat B	0	0		
42	sh_sp_b	0 to 0	0	^F	SH Setpoint Circuit B	0	0		
43	EXV_B	0 to 0	0	%	EXV Position Circuit B	0	0		
44	exv_v_b	0 to 0	0	%	EXV Command Circuit B	0	0		
45	ov_exv_b	0 to 0	0	—	EXV Override Circuit B	0	0		
46	m_sst_b	NO_YES	0	—	Low Suction Circuit B	0	1		
47	m_dgt_b	NO_YES	0	—	High DGT Circuit B	0	1		
48	m_hp_b	NO_YES	0	—	High Pres Override Cir B	0	1		
49	m_sh_b	NO_YES	0	—	Low SuperHeat Circuit B	0	1		

APPENDIX A — CARRIER CONTROLLER DISPLAY TABLES (cont)

LINE	POINT NAME	RANGE	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	blank				GENERIC				
2	CTRL_TYP	0 to 2	0	—	Local=0 Net.=1 Remote=2	0	2		
3	STATUS	TEXT	0	—	Running Status	—	—		
4	HEATCOOL	TEXT	0	—	Heat/Cool status	—	—		
5	DEM_LIM	0 to 100	0	%	Active Demand Limit Val	0	100		
6	min_left	0 to 0	0	min	Minutes Left for Start	0	0		
7	CAP_T	0 to 100	0	%	Percent Total Capacity	0	100		
8	SP	0 to 0	0	°F	Current Setpoint	0	0		
9	CTRL_PNT	–4 to 153	0	°F	Control Point	–4	153		
10	OAT	–40 to 302	0	°F	Outdoor Air Temperature	–40	302		
11	EWT	0 to 0	0	°F	Entering Water Temp	0	0		
12	LWT	0 to 0	0	°F	Leaving Water Temp	0	0		
13	CEWT	0 to 0	0	°F	Cond Entering Water Temp	0	0		
14	CLWT	0 to 0	0	°F	Cond Leaving Water Temp	0	0		
15	FLOW_SW	OPEN_CLOSE	0	—	Flow Switch Interlock	0	1		
16	CNFS	OPEN_CLOSE	0	—	Condenser Water Flow SW	0	1		
17	ALM	TEXT	0	—	Alarm State	—	—		
18	alarm_1c	0 to 0	0	—	Current Alarm 1	0	0		
19	alarm_2c	0 to 0	0	—	Current Alarm 2	0	0		
20	alarm_3c	0 to 0	0	—	Current Alarm 3	0	0		
21	alarm_4c	0 to 0	0	—	Current Alarm 4	0	0		
22	zm	0 to 0	0	—	Current Z Multiplier Val	0	0		
23	smz	0 to 0	0	%	Load/Unload Factor	0	0		
24	over_cap	0 to 0	0	—	Active Capacity Override	0	0		
25	EXCH_HTR	OFF_ON	0	—	Exchanger Heater	0	0		
26	sdtLim_a	0 to 0	0	°F	Discharge A Gas Limit	0	0		
27	sdtLim_b	0 to 0	0	°F	Discharge B Gas Limit	0	0		
28	LLSV_A	CLOSE_OPEN	0	—	Solenoid Valve A	0	0		
29	LLSV_B	CLOSE_OPEN	0	—	Solenoid Valve B	0	0		
30	EISOR	CLOSE_OPEN	0	—	Evaporator Isolator Rly	0	1		

APPENDIX B — CCN POINT TABLE

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
ALARM	T11_OUTPUTS	OUTPUTS_ALARM	
alarm_1	T12_ALARMRST	ALARMRST_alarm_1	
alarm_1c	T12_ALARMRST	ALARMRST_alarm_1c	
alarm_2	T12_ALARMRST	ALARMRST_alarm_2	
alarm_2c	T12_ALARMRST	ALARMRST_alarm_2c	
alarm_3	T12_ALARMRST	ALARMRST_alarm_3	
alarm_3c	T12_ALARMRST	ALARMRST_alarm_3c	
alarm_4	T12_ALARMRST	ALARMRST_alarm_4	
alarm_4c	T12_ALARMRST	ALARMRST_alarm_4c	
alarm_5	T12_ALARMRST	ALARMRST_alarm_5	
alarm_5c	T12_ALARMRST	ALARMRST_alarm_5c	
ALM		UNIT_ALM	
BOILER	T11_INPUTS	INPUTS_BOILER	
CAP_T	T11_GENUNIT	GENUNIT_CAP_T	
CAPA_T	T11_GENUNIT	GENUNIT_CAPA_T	
CAPB_T	T11_GENUNIT	GENUNIT_CAPB_T	
CEWT	T11_TEMP	TEMP_CEWT	
CHIL_OCC	T11_GENUNIT	GENUNIT_CHIL_OCC	X
CHIL_S_S	T11_GENUNIT	GENUNIT_CHIL_S_S	X
CLWT	T11_TEMP	TEMP_CLWT	
cmd_exvA	T12_LABOONLY	LABOONLY_cmd_exvA	X
cmd_exvB	T12_LABOONLY	LABOONLY_cmd_exvB	X
cmd_vf	T12_LABOONLY	LABOONLY_cmd_vf	X
CNFS	T11_INPUTS	INPUTS_CNFS	
CP_A1	T11_OUTPUTS	OUTPUTS_CP_A1	
CP_A2	T11_OUTPUTS	OUTPUTS_CP_A2	
CP_A3	T11_OUTPUTS	OUTPUTS_CP_A3	
CP_B1	T11_OUTPUTS	OUTPUTS_CP_B1	
CP_B2	T11_OUTPUTS	OUTPUTS_CP_B2	
cpmp_seq	T10_PUMPCONF	PUMPCONF_cpmp_seq	
CPUMP	T11_PUMPSTAT	PUMPSTAT_CPUMP	X
CSP_IN	T11_INPUTS	INPUTS_CSP_IN	
CTRL_PNT	T11_GENUNIT	GENUNIT_CTRL_PNT	X
CWP1	T11_INPUTS	INPUTS_CWP1	
CWP2	T11_INPUTS	INPUTS_CWP2	
DEM_LIM	T11_GENUNIT	GENUNIT_DEM_LIM	X
DLWT	T11_TEMP	TEMP_DLWT	X
DP_A	T11_PRESSURE	PRESSURE_DP_A	
DP_B	T11_PRESSURE	PRESSURE_DP_B	
DSHTR_SW	T11_INPUTS	INPUTS_DSHTR_SW	
DUS	T11_OUTPUTS	OUTPUTS_DUS	
EISOR	T11_OUTPUTS	OUTPUTS_EISOR	
EMSTOP	T11_GENUNIT	GENUNIT_EMSTOP	X
EWT	T11_TEMP	TEMP_EWT	
ewt_opt	T10_GENCONF	GENCONF_ewt_opt	
EX_PREA	T12_LABOONLY	LABOONLY_EX_PREA	X
EX_PREB	T12_LABOONLY	LABOONLY_EX_PREB	X
EXCH_HTR	T11_OUTPUTS	OUTPUTS_EXCH_HTR	
EXV_A	T11_OUTPUTS	OUTPUTS_EXV_A	
EXV_B	T11_OUTPUTS	OUTPUTS_EXV_B	
EXVNPosA	T11_OUTPUTS	OUTPUTS_EXVNPosA	
EXVNPosB	T11_OUTPUTS	OUTPUTS_EXVNPosB	
f_exv_A	T12_LABOONLY	LABOONLY_f_exv_A	X
f_exv_B	T12_LABOONLY	LABOONLY_f_exv_B	X
f_vfan	T12_LABOONLY	LABOONLY_f_vfan	X
FANC_1	T11_OUTPUTS	OUTPUTS_FANC_1	X
FANC_2	T11_OUTPUTS	OUTPUTS_FANC_2	X
FANC_3	T11_OUTPUTS	OUTPUTS_FANC_3	X
FLOW_SW	T11_INPUTS	INPUTS_FLOW_SW	
HC_SEL	T11_GENUNIT	GENUNIT_HC_SEL	X
HC_SW	T11_INPUTS	INPUTS_HC_SW	
hd_dg	T12_LABOONLY	LABOONLY_hd_dg	X
hd_ig	T12_LABOONLY	LABOONLY_hd_ig	X
hd_pg	T12_LABOONLY	LABOONLY_hd_pg	X
HEAD_ACT	T11_OUTPUTS	OUTPUTS_HEAD_ACT	
HEATCOOL	T11_GENUNIT	GENUNIT_HEATCOOL	
HGBP_V	T11_OUTPUTS	OUTPUTS_HGBP_V	
HP_SW_A	T11_INPUTS	INPUTS_HP_SW_A	
HP_SW_B	T11_INPUTS	INPUTS_HP_SW_B	
HP_TEST	T12_QCK_TST1	QCK_TEST_HP_TEST	
ICE_SW	T11_INPUTS	INPUTS_ICE_SW	
LAG_LIM	T11_GENUNIT	GENUNIT_LAG_LIM	X
LAG_LIM		PROTOCOL_LAG_LIM	X
LCW_STPT		PROTOCOL_LCW_STPT	X
leak_v1	T11_INPUTS	INPUTS_leak_v1	
leak_v2	T11_INPUTS	INPUTS_leak_v2	

APPENDIX B — CCN POINT TABLE (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
LENTST_S		PROTOCOL_LENTST_S	
LENTSTEN		PROTOCOL_LENTSTEN	
LIM_4_20	T11_INPUTS	INPUTS_LIM_4_20	
LIM_SW1	T11_INPUTS	INPUTS_LIM_SW1	
LIM_SW2	T11_INPUTS	INPUTS_LIM_SW2	
LLSV_A	T11_OUTPUTS	OUTPUTS_LLSV_A	
LLSV_B	T11_OUTPUTS	OUTPUTS_LLSV_B	
LWT	T11_TEMP	TEMP_LWT	
Mod_CPA1	T11_OUTPUTS	OUTPUTS_Mod_CPA1	
MOD_EXVA	T12_QCK_TST1	QCK_TEST_MOD_EXVA	
MOD_EXVB	T12_QCK_TST1	QCK_TEST_MOD_EXVB	
MODBUSEN		PROTOCOL_MODBUSEN	
modrt_en	T13_MODBUSRS	MODBUSRS_modrt_en	
ms_sel	T13_MST_SLV	MST_SLV_ms_sel	
OAT	T11_TEMP	TEMP_OAT	X
ONOFF_SW	T11_INPUTS	INPUTS_ONOFF_SW	
PUMP_1	T11_PUMPSTAT	PUMPSTAT_PUMP_1	X
PUMP_2	T11_PUMPSTAT	PUMPSTAT_PUMP_2	X
pump_seq	T10_PUMPCONF	PUMPCONF_pump_seq	
Q_ALARM	T12_QCK_TST1	QCK_TEST_Q_ALARM	
Q_BOILER	T12_QCK_TST1	QCK_TEST_Q_BOILER	
Q_CPA1	T12_QCK_TST2	QCK_TEST_Q_CPA1	
Q_CPA2	T12_QCK_TST2	QCK_TEST_Q_CPA2	
Q_CPA3	T12_QCK_TST2	QCK_TEST_Q_CPA3	
Q_CPB1	T12_QCK_TST2	QCK_TEST_Q_CPB1	
Q_CPB2	T12_QCK_TST2	QCK_TEST_Q_CPB2	
Q_CPUMP	T12_QCK_TST1	QCK_TEST_Q_CPUMP	
Q_DUS	T12_QCK_TST2	QCK_TEST_Q_DUS	
Q_EX_HTR	T12_QCK_TST1	QCK_TEST_Q_EX_HTR	
Q_EXVA	T12_QCK_TST1	QCK_TEST_Q_EXVA	
Q_EXVB	T12_QCK_TST1	QCK_TEST_Q_EXVB	
Q_FC1	T12_QCK_TST1	QCK_TEST_Q_FC1	
Q_FC2	T12_QCK_TST1	QCK_TEST_Q_FC2	
Q_FC3	T12_QCK_TST1	QCK_TEST_Q_FC3	
Q_HEAD_P	T12_QCK_TST1	QCK_TEST_Q_HEAD_ACT	
Q_HGBP	T12_QCK_TST1	QCK_TEST_Q_HGBPVA	
Q_LLSV_A	T12_QCK_TST1	QCK_TEST_Q_LLSV_A	
Q_LLSV_B	T12_QCK_TST1	QCK_TEST_Q_LLSV_B	
Q_PUMP_1	T12_QCK_TST1	QCK_TEST_Q_PUMP_1	
Q_PUMP_2	T12_QCK_TST1	QCK_TEST_Q_PUMP_2	
Q_RUN	T12_QCK_TST1	QCK_TEST_Q_RUN	
Q_TSTRQ		PROTOCOL_Q_TSTRQ	
Q_VFAN	T12_QCK_TST1	QCK_TEST_Q_VFAN	
QCK_TEST	T12_QCK_TST1	QCK_TEST_QCK_TEST	
REV_ROT	T11_INPUTS	INPUTS_REV_ROT	
ROT_PUMP	T11_PUMPSTAT	PUMPSTAT_ROT_PUMP	X
RST_ALM	T12_ALARMRST	ALARMRST_RST_ALM	
RT_HPSW		RT_HPSW	
RTSTIP1		RUNTEST_IP_ADDR1	X
RTSTIP2		RUNTEST_IP_ADDR2	X
RTSTIP3		RUNTEST_IP_ADDR3	X
RTSTIP4		RUNTEST_IP_ADDR4	X
RUN	T11_OUTPUTS	OUTPUTS_RUN	
RUN_TEST		PROTOCOL_RUN_TEST	
S_RESET	T12_SERMAINT	SERMAINT_S_RESET	X
SCT_A	T11_TEMP	TEMP_SCT_A	
SCT_B	T11_TEMP	TEMP_SCT_B	
SET_DRV	T12_DRV_CTRL	DRV_CTRL_SET_DRV	X
SETP_SW	T11_INPUTS	INPUTS_SETP_SW	
SP	T11_GENUNIT	GENUNIT_SP	
SP_A	T11_PRESSURE	PRESSURE_SP_A	
SP_B	T11_PRESSURE	PRESSURE_SP_B	
SP_OCC	T11_GENUNIT	GENUNIT_SP_OCC	X
SP_RESET	T11_INPUTS	INPUTS_SP_RESET	
SP_SEL	T11_GENUNIT	GENUNIT_SP_SEL	X
SPACETMP	T11_TEMP	TEMP_SPACETMP	
spt_vf	T12_LABOONLY	LABOONLY_spt_vf	X
SST_A	T11_TEMP	TEMP_SST_A	
SST_B	T11_TEMP	TEMP_SST_B	
STATUS	T11_GENUNIT	GENUNIT_STATUS	
SUCT_A	T11_TEMP	TEMP_SUCT_A	
SUCT_B	T11_TEMP	TEMP_SUCT_B	
TEST_HP		PROTOCOL_TEST_HP	X
VFAN	T11_OUTPUTS	OUTPUTS_VFAN	

APPENDIX C — LON POINT TABLE
Sample Configuration

LON POINT	SNVT TYPE	POINT	READ/WRITE	CCN POINT DESCRIPTION	CCN POINT NAME
CHLRMAP1					
nviChillerEnable	SNVT_switch	POINT01	W	Net.: Cmd Start/Stop	CHIL_S_S
nviCoolSetpt	SNVT_temp_p	POINT02	W	Control Point	CTRL_PNT
nvoOnOff	SNVT_switch	POINT03	R	Net.: Cmd Start/Stop	CHIL_S_S
nvoActiveSetpt	SNVT_temp_p	POINT04	R	Current Setpoint	SP
nviCapacityLim	SNVT_lev_percent	POINT05	W	Active Demand Limit Val	DEM_LIM
nviHeatSetpt	SNVT_temp_p	POINT06	W	Heating Setpoint 1	hsp1
nvoActualCapacity	SNVT_lev_percent	POINT07	R	Unit Total Capacity	CAP_T
nvoCapacityLim	SNVT_lev_percent	POINT08	R	Active Demand Limit Val	DEM_LIM
nvoLvgCHWTemp	SNVT_temp_p	POINT09	R	Leaving Fluid Temp	LWT
nvoEntCHWTemp	SNVT_temp_p	POINT10	R	Entering Fluid Temp	EWT
nvoEntCNDWTemp	SNVT_temp_p	POINT11	R	Outdoor Air Temp	OAT
nvoLvgCNDWTemp	SNVT_temp_p	POINT12	R	Cold Water System Temp	CHWSTEMP
nvoChillerStat.run_mode	SNVT_chlr_status	POINT13	R	—	—
nvoChillerStat.op_mode	SNVT_chlr_status	POINT14	R	—	—
nvoChillerStat.in_alarm	SNVT_chlr_status	POINT15	R	—	—
nvoChillerStat.run_enabl	SNVT_chlr_status	POINT16	R	—	—
nvoChillerStat.Local	SNVT_chlr_status	POINT17	R	—	—
nvoChillerStat.Limited	SNVT_chlr_status	POINT18	R	—	—
nvoChillerStat.chw_flow	SNVT_chlr_status	POINT19	R	—	—
nvoChillerStat.cndw_flow	SNVT_chlr_status	POINT20	R	—	—
nviOccSchedule	SNVT_tod_event	POINT21	W	—	—
CHLRMAP2					
nviTEMP1	SNVT_temp_p	POINT22	W	Cooling Setpoint 1	csp1
nvoTEMP1	SNVT_temp_p	POINT23	R	Cooling Setpoint 1	csp1
nvoTEMP2	SNVT_temp_p	POINT24	R	Heating Setpoint 1	hsp1
nvoTEMP3	SNVT_temp_p	POINT25	R	Saturated Cond Temp cir A	SCT_A
nvoTEMP4	SNVT_temp_p	POINT26	R	Saturated Suction Temp A	SST_A
nvoTEMP5	SNVT_temp_p	POINT27	R	Saturated Cond Tmp cir A	SCT_b
nvoTEMP6	SNVT_temp_p	POINT28	R	Saturated Suction Temp B	SST_B
nviPRESS1	SNVT_press_p	POINT29	W		
nvoPRESS1	SNVT_press_p	POINT30	R	Discharge Pressure A	DP_A
nvoPRESS2	SNVT_press_p	POINT31	R	Main Suction Pressure A	SP_A
nvoPRESS3	SNVT_press_p	POINT32	R	Discharge Pressure B	DP_B
nvoPRESS4	SNVT_press_p	POINT33	R	Main Suction Pressure B	SP_B
nvIPCT1	SNVT_lev_percent	POINT34	R		
nvIPCT2	SNVT_lev_percent	POINT35	R		
nvoTEMPDIFF1	SNVT_temp_diff_p	POINT36	R		
nvoTEMPDIFF2	SNVT_temp_diff_p	POINT37	R		
nviDISCRETE1	SNVT_switch	POINT38	W	Emergency Stop	EMSTOP
nviDISCRETE2	SNVT_switch	POINT39	W		
nvoDISCRETE1	SNVT_switch	POINT40	R	Emergency Stop	EMSTOP
nvoDISCRETE2	SNVT_switch	POINT41	R	Net.: Cmd Occupied	CHIL_OCC
nvoDISCRETE3	SNVT_switch	POINT42	R	Flow Switch Status	FLOW_SW
nvoDISCRETE4	SNVT_switch	POINT43	R		
nvoDISCRETE5	SNVT_switch	POINT44	R		
nvoDISCRETE6	SNVT_switch	POINT45	R		
nviCOUNT1	SNVT_count	POINT46	W		
nvoCOUNT1	SNVT_count	POINT47	R	Alarm State	ALM
nvoCOUNT2	SNVT_count	POINT48	R	Local = 0 Net. = 1 Remote = 2	CTRL_TYP
nvoCOUNTinc1	SNVT_count_inc	POINT49	R		
nvoCOUNTinc2	SNVT_count_inc	POINT50	R		

LEGEND

R — Read Only
W — Read Write
SNVT — Standard Network Variable Type
Spt — Setpoint

APPENDIX D — BACNET IP POINTS

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LIMIT		OPTION	COVINC	PV ACCESS	DESCRIPTION
				LOW	HIGH				
ALARMRST_alarm_1	ALARMRST_alarm_1	AV	985	0	0	Type 6	0	RO	Current Alarm 1 Index
ALARMRST_alarm_1c	ALARMRST_alarm_1c	AV	980	0	0	Type 6	0	RO	Current Alarm 1
ALARMRST_alarm_2	ALARMRST_alarm_2	AV	986	0	0	Type 6	0	RO	Current Alarm 2 Index
ALARMRST_alarm_2c	ALARMRST_alarm_2c	AV	981	0	0	Type 6	0	RO	Current Alarm 2
ALARMRST_alarm_3	ALARMRST_alarm_3	AV	987	0	0	Type 6	0	RO	Current Alarm 3 Index
ALARMRST_alarm_3c	ALARMRST_alarm_3c	AV	982	0	0	Type 6	0	RO	Current Alarm 3
ALARMRST_alarm_4	ALARMRST_alarm_4	AV	988	0	0	Type 6	0	RO	Current Alarm 4 Index
ALARMRST_alarm_4c	ALARMRST_alarm_4c	AV	983	0	0	Type 6	0	RO	Current Alarm 4
ALARMRST_alarm_5	ALARMRST_alarm_5	AV	989	0	0	Type 6	0	RO	Current Alarm 5 Index
ALARMRST_alarm_5c	ALARMRST_alarm_5c	AV	984	0	0	Type 6	0	RO	Current Alarm 5
ALARMRST_ALM	UNIT_ALM	AV	990	0	0	Type 5	1	RO	Alarm State
ALM_CIOB_A_LOW_VOLT_F	ALM_CIOB_A_LOW_VOLT_F	BV	157001	0	1	Type 5	0	RO	Circuit A CIOB Low Voltage Failure
ALM_CIOB_B_LOW_VOLT_F	ALM_CIOB_B_LOW_VOLT_F	BV	157002	0	1	Type 5	0	RO	Circuit B CIOB Low Voltage Failure
ALM_CIOB_CIR_A_COM_F	ALM_CIOB_CIR_A_COM_F	BV	104901	0	1	Type 5	0	RO	Loss of communication with CIOB Board Number A
ALM_CIOB_CIR_B_COM_F	ALM_CIOB_CIR_B_COM_F	BV	104902	0	1	Type 5	0	RO	Loss of communication with CIOB Board Number B
ALM_COND_EWT_F	ALM_COND_EWT_F	BV	115006	0	0	Type 5	0	RO	Condenser Entering Fluid Thermistor Failure
ALM_COND_LWT_F	ALM_COND_LWT_F	BV	115007	0	0	Type 5	0	RO	Condenser Leaving Fluid Thermistor Failure
ALM_COND_PUMP_F	ALM_COND_PUMP_F	AV	110073	0	1	Type 6	0	RO	Condenser Pump Default
ALM_COND_SENSORS_SWAP_F	ALM_COND_SENSORS_SWAP_F	BV	110098	0	1	Type 5	0	RO	Condenser Water Exchanger Temperature Sensors Swapped
ALM_CONDENSER_LOCK_F	ALM_CONDENSER_LOCK_F	BV	110015	0	1	Type 5	0	RO	Condenser Flow Switch Failure
ALM_COOL_EWT_F	ALM_COOL_EWT_F	BV	115001	0	1	Type 5	0	RO	Water Exchanger Entering Fluid Thermistor Failure
ALM_COOL_LWT_F	ALM_COOL_LWT_F	BV	115002	0	1	Type 5	0	RO	Water Exchanger Leaving Fluid Thermistor Failure
ALM_COOL_PUMP1_F	ALM_COOL_PUMP1_F	BV	110032	0	1	Type 5	0	RO	Cooler Pump 1 Default
ALM_COOL_PUMP2_F	ALM_COOL_PUMP2_F	BV	110033	0	1	Type 5	0	RO	Cooler Pump 2 Default
ALM_COOLER_FREEZE_F	ALM_COOLER_FREEZE_F	BV	110001	0	1	Type 5	0	RO	Water Exchanger Freeze Protection
ALM_COOLER_LOCK_F	ALM_COOLER_LOCK_F	BV	110014	0	1	Type 5	0	RO	Cooler Interlock Failure
ALM_CPA1_REVERSE_ROT_F	ALM_CPA1_REVERSE_ROT_F	BV	110016	0	1	Type 5	0	RO	Compressor A1 Not Started Or Pressure Increase not Established
ALM_CPA2_REVERSE_ROT_F	ALM_CPA2_REVERSE_ROT_F	BV	110017	0	1	Type 5	0	RO	Compressor A2 Not Started Or Pressure Increase not Established
ALM_CPA3_REVERSE_ROT_F	ALM_CPA3_REVERSE_ROT_F	BV	110018	0	1	Type 5	0	RO	Compressor A3 Not Started Or Pressure Increase not Established
ALM_CPB1_REVERSE_ROT_F	ALM_CPB1_REVERSE_ROT_F	BV	110020	0	1	Type 5	0	RO	Compressor B1 Not Started Or Pressure Increase not Established
ALM_CPB2_REVERSE_ROT_F	ALM_CPB2_REVERSE_ROT_F	BV	110021	0	1	Type 5	0	RO	Compressor B2 Not Started Or Pressure Increase not Established
ALM_DGT_A_F	ALM_DGT_A_F	BV	115015	0	1	Type 5	0	RO	Circuit A Discharge Gas Thermistor Failure
ALM_DLWT_F	ALM_DLWT_F	BV	115011	0	1	Type 5	0	RO	Primary/Secondary Common Fluid Thermistor Failure
ALM_DP_A_F	ALM_DP_A_F	BV	112001	0	1	Type 5	0	RO	Circuit A Discharge Pressure Transducer Failure
ALM_DP_B_F	ALM_DP_B_F	BV	112002	0	1	Type 5	0	RO	Circuit B Discharge Pressure Transducer Failure
ALM_EXV_A_F	ALM_EXV_A_F	BV	157020	0	1	Type 5	0	RO	Main EXV Stepper Motor Failure - Cir A
ALM_EXV_B_F	ALM_EXV_B_F	BV	157021	0	1	Type 5	0	RO	Main EXV Stepper Motor Failure - Cir B
ALM_FAN_DRIVE_COM_F	ALM_FAN_DRIVE_COM_F	BV	104701	0	1	Type 5	0	RO	Loss of communication with VFD Fan Drive
ALM_FAN_VFD_DRIVE_F	ALM_FAN_VFD_DRIVE_F	BV	117001	0	1	Type 5	0	RO	Circuit A VFD Fan Drive Failure
ALM_FGAS_NEEDED	ALM_FGAS_NEEDED	BV	113005	0	1	Type 5	0	RO	Fgas check needed, call your maintenance company
ALM_FLUIDE_FAIL	ALM_FLUIDE_FAIL	BV	110099	0	1	Type 5	0	RO	Possible Refrigerant Leakage Failure
ALM_HP_SWITCH_A_F	ALM_HP_SWITCH_A_F	BV	110063	0	1	Type 5	0	RO	Circuit A High Pressure Switch Failure

APPENDIX D — BACNET IP POINTS (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LIMIT		OPTION	COVINC	PV ACCESS	DESCRIPTION
				LOW	HIGH				
ALM_HP_SWITCH_B_F	ALM_HP_SWITCH_B_F	BV	110064	0	1	Type 5	0	RO	Circuit B High Pressure Switch Failure
ALM_ILL_FACT_CONF_F	ALM_ILL_FACT_CONF_F	BV	107001	0	1	Type 5	0	RO	Illegal configuration
ALM_INI_FACT_CONF_F	ALM_INI_FACT_CONF_F	BV	108000	0	1	Type 5	0	RO	Initial factory configuration required
ALM_LOSS_COM_MS_F	ALM_LOSS_COM_MS_F	BV	110030	0	1	Type 5	0	RO	Primary/Secondary communication Failure
ALM_LOSS_COM_SM_F	ALM_LOSS_COM_SM_F	BV	110029	0	1	Type 5	0	RO	Loss of communication with System Manager
ALM_LOW_SH_A_F	ALM_LOW_SH_A_F	BV	110011	0	1	Type 5	0	RO	Circuit A Low Superheat
ALM_LOW_SH_B_F	ALM_LOW_SH_B_F	BV	110012	0	1	Type 5	0	RO	Circuit B Low Superheat
ALM_LOW_SUCTION_A_F	ALM_LOW_SUCTION_A_F	BV	110005	0	1	Type 5	0	RO	Circuit A Low Saturated Suction Temperature
ALM_LOW_SUCTION_B_F	ALM_LOW_SUCTION_B_F	BV	110006	0	1	Type 5	0	RO	Circuit B Low Saturated Suction Temperature
ALM_M_S_CONFIG_F	ALM_M_S_CONFIG_F	BV	109001	0	1	Type 5	0	RO	Primary chiller configuration error
ALM_NETWORK_EMSTOP_F	ALM_NETWORK_EMSTOP_F	BV	110031	0	1	Type 5	0	RO	Unit is in Network emergency stop
ALM_OAT_F	ALM_OAT_F	BV	115010	0	1	Type 5	0	RO	OAT Thermistor Failure
ALM_REPEATED_HI_DGT_A_F	ALM_REPEATED_HI_DGT_A_F	BV	110037	0	1	Type 5	0	RO	Circuit A Repeated High Discharge Gas Overrides
ALM_REPEATED_HI_DGT_B_F	ALM_REPEATED_HI_DGT_B_F	BV	110038	0	1	Type 5	0	RO	Circuit B Repeated High Discharge Gas Overrides
ALM_REPEATED_LO_SST_A_F	ALM_REPEATED_LO_SST_A_F	BV	110040	0	1	Type 5	0	RO	Circuit A Repeated Low Suction Temp Overrides
ALM_REPEATED_LO_SST_B_F	ALM_REPEATED_LO_SST_B_F	BV	110041	0	1	Type 5	0	RO	Circuit B Repeated Low Suction Temp Overrides
ALM_RUN_OUT_MAP_A_F	ALM_RUN_OUT_MAP_A_F	BV	110210	0	1	Type 5	0	RO	Compressor Running Outside MAP - cir A
ALM_RUN_OUT_MAP_B_F	ALM_RUN_OUT_MAP_B_F	BV	110211	0	1	Type 5	0	RO	Compressor Running Outside MAP - cir B
ALM_SENSORS_SWAP_F	ALM_SENSORS_SWAP_F	BV	110097	0	1	Type 5	0	RO	Water Exchanger Temperature Sensors Swapped
ALM_SERVICE_MAINT_ALERT	ALM_SERVICE_MAINT_ALERT	BV	113001	0	1	Type 5	0	RO	Service Maintenance Alert
ALM_SP_A_F	ALM_SP_A_F	BV	112004	0	1	Type 5	0	RO	Circuit A Suction Pressure Transducer Failure
ALM_SP_B_F	ALM_SP_B_F	BV	112005	0	1	Type 5	0	RO	Circuit B Suction Pressure Transducer Failure
ALM_SPACETMP	ALM_SPACETMP	BV	115021	0	1	Type 5	0	RO	Space Temperature Failure
ALM_SUCTION_T_A_F	ALM_SUCTION_T_A_F	BV	115012	0	1	Type 5	0	RO	Circuit A Suction Gas Thermistor Failure
ALM_SUCTION_T_B_F	ALM_SUCTION_T_B_F	BV	115013	0	1	Type 5	0	RO	Circuit B Suction Gas Thermistor Failure
BACnet_bacena	BACnet_bacena	BV	60	0	2	Type 4	0	RO	BACnet Enable Option
BACnet_bacunit	BACnet_bacunit	BV	61	0	1	Type 4	0	RO	Metric Units?
BACnet_BMS_OCC	BACnet_BMS_OCC	AV	66	0	2	Type 6	0	RW	BMS's request for occupancy: 0=UNOCC, 1=OCC, 2, None.
BACnet_COLOR	BACnet_COLOR	MV	64	0	14	Type 5	0	RO	ALC color value
BACnet_ident	BACnet_ident	AV	63	1	4194302	Type 6	0	RO	Device Id Actually Used
BACnet_network	BACnet_network	AV	62	1	40000	Type 6	0	RO	Network
BACnet_PRIME_V	BACnet_PRIME_V	AV	65	0	0	Type 6	0	RO	ALC prime value
FACTORY_flui_typ	FACTORY_flui_typ	AV	5443	1	3	Type 6	0	RO	Cooler Fluid Type
FACTORY_hgbp_sel	FACTORY_hgbp_sel	BV	5770	0	1	Type 4	0	RO	Hot Gas Bypass Selection
FACTORY_unit_typ	FACTORY_unit_typ	AV	5013	1	3	Type 6	0	RO	UnitType (WaterCooled=3)
FACTORY_unitsize	FACTORY_unitsize	AV	5014	0	0	Type 6	0	RO	Unit Capacity Model
FACTORY2_cap_a1	FACTORY2_cap_a1	AV	5766	0	99	Type 6	0	RO	Compressor A1 Capacity
FACTORY2_cap_a2	FACTORY2_cap_a2	AV	5767	0	99	Type 6	0	RO	Compressor A2 Capacity
FACTORY2_cap_a3	FACTORY2_cap_a3	AV	5768	0	99	Type 6	0	RO	Compressor A3 Capacity
FACTORY2_cap_b1	FACTORY2_cap_b1	AV	5769	0	99	Type 6	0	RO	Compressor B1 Capacity
GENCONF_ewt_opt	GENCONF_ewt_opt	BV	5078	0	1	Type 4	0	RO	Entering Fluid Control
GENCONF_lim_sel	GENCONF_lim_sel	AV	5003	0	2	Type 6	0	RO	Demand Limit Type Select
GENUNIT_CAP_T	GENUNIT_CAP_T	AV	9	0	100	Type 5	10	RO	Percent Total Capacity
GENUNIT_CAPA_T	GENUNIT_CAPA_T	AV	1017	0	100	Type 5	10	RO	Circuit A Total Capacity
GENUNIT_CAPB_T	GENUNIT_CAPB_T	AV	2017	0	100	Type 5	10	RO	Circuit B Total Capacity
GENUNIT_CHIL_OCC_rd	GENUNIT_CHIL_OCC	BV	58	0	1	Type 4	0	RO	Net.: Cmd Occupied
GENUNIT_CHIL_OCC_wr	PROTOCOL_CHIL_OCC	BV	10058	0	1	Type 1	0	RW	Net.: Cmd Occupied
GENUNIT_CHIL_S_S_rd	GENUNIT_CHIL_S_S	BV	12	0	1	Type 4	0	RO	Net.: Cmd Start/Stop
GENUNIT_CHIL_S_S_wr	PROTOCOL_CHIL_S_S	BV	10012	0	1	Type 1	0	RW	Net.: Cmd Start/Stop
GENUNIT_CTRL_PNT_rd	GENUNIT_CTRL_PNT	AV	6	–4	153	Type 5	1	RO	Control Point
GENUNIT_CTRL_PNT_wr	PROTOCOL_CTRL_PNT	AV	10006	–4	153	Type 2	0	RW	Control Point
GENUNIT_CTRL_TYP	GENUNIT_CTRL_TYP	AV	21	0	2	Type 6	0	RO	Local=0 Net.=1 Remote=2
GENUNIT_DEM_LIM_rd	GENUNIT_DEM_LIM	AV	8	0	100	Type 6	0	RO	Active Demand Limit Val
GENUNIT_DEM_LIM_wr	PROTOCOL_DEM_LIM	AV	10008	0	100	Type 2	0	RW	Active Demand Limit Val
GENUNIT_EMSTOP_rd	GENUNIT_EMSTOP	BV	13	0	1	Type 4	0	RO	Emergency Stop

APPENDIX D — BACNET IP POINTS (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LIMIT		OPTION	COVINC	PV ACCESS	DESCRIPTION
				LOW	HIGH				
GENUNIT_EMSTOP_wr	PROTOCOL_EMSTOP	BV	10013	0	1	Type 1	0	RW	Emergency Stop
GENUNIT_HC_SEL_rd	GENUNIT_HC_SEL	AV	23	0	2	Type 6	0	RO	Heat/Cool Select
GENUNIT_HC_SEL_wr	PROTOCOL_HC_SEL	AV	10023	0	3	Type 2	0	RW	Heat/Cool Select
GENUNIT_HEATCOOL	UNIT_HEATCOOL	AV	77	0	0	Type 6	0	RO	Heat/Cool status
GENUNIT_min_left	GENUNIT_min_left	AV	11	0	0	Type 6	0	RO	Minutes Left for Start
GENUNIT_SP	GENUNIT_SP	AV	7	0	0	Type 6	0	RO	Current Setpoint
GENUNIT_SP_OCC_rd	GENUNIT_SP_OCC	BV	59	0	1	Type 4	0	RO	Setpoint Occupied?
GENUNIT_SP_OCC_wr	PROTOCOL_SP_OCC	BV	10059	0	1	Type 1	0	RW	Setpoint Occupied?
GENUNIT_SP_SEL_rd	GENUNIT_SP_SEL	AV	24	0	2	Type 6	0	RO	Setpoint Select
GENUNIT_SP_SEL_wr	PROTOCOL_SP_SEL	AV	10024	0	2	Type 2	0	RW	Setpoint Select
GENUNIT_STATUS	UNIT_STATUS	AV	22	0	0	Type 6	0	RO	Running Status
HCCONFIG_cr_sel	HCCONFIG_cr_sel	AV	5019	0	4	Type 6	0	RO	Cooling Reset Select
HCCONFIG_hr_sel	HCCONFIG_hr_sel	AV	5020	0	4	Type 6	0	RO	Heating Reset Select
HEADCTRL_condsp	HEADCTRL_condsp	AV	5772	0	0	Type 6	0	RO	Computed Cond Setpoint
HEADCTRL_fan	HEADCTRL_fan	AV	5773	0	0	Type 6	0	RO	Fan Speed
HR_PARTIAL_DOWNTIME	HR_PARTIAL_DOWNTIME	AV	966	0	0	Type 6	0	RO	Cumul Time Partial Alm
HR_TOTAL_DOWNTIME	HR_TOTAL_DOWNTIME	AV	967	0	0	Type 6	0	RO	Cumul Time Tripout Alm
INPUTS_CNFS	INPUTS_CNFS	BV	55	0	1	Type 4	0	RO	Condenser Water Flow SW
INPUTS_CSP_IN	INPUTS_CSP_IN	AV	5106	4	20	Type 6	0	RO	4_20mA Cooling Setpoint
INPUTS_CWP1	INPUTS_CWP1	AV	5759	0	1	Type 6	0	RO	Water Pump Interlock 1
INPUTS_CWP2	INPUTS_CWP2	AV	5760	0	1	Type 6	0	RO	Water Pump Interlock 2
INPUTS_DSHTR_SW	INPUTS_DSHTR_SW	AV	5008	0	1	Type 6	0	RO	Desuperheater Switch
INPUTS_FLOW_SW	INPUTS_FLOW_SW	BV	52	0	1	Type 4	0	RO	Flow Switch Interlock
INPUTS_HC_SW	INPUTS_HC_SW	AV	45	0	1	Type 6	0	RO	Remote Heat/Cool Switch
INPUTS_HP_SW_A	INPUTS_HP_SW_A	BV	5009	0	1	Type 4	0	RO	High Pressure Switch A
INPUTS_HP_SW_B	INPUTS_HP_SW_B	BV	5011	0	1	Type 4	0	RO	High Pressure Switch B
INPUTS_ICE_SW	INPUTS_ICE_SW	AV	20	0	1	Type 6	0	RO	Ice Done Storage Switch
INPUTS_leak_v1	INPUTS_leak_v1	AV	5006	0	5	Type 6	0	RO	Leakage Detection 1
INPUTS_leak_v2	INPUTS_leak_v2	AV	5007	0	5	Type 6	0	RO	Leakage Detection 2
INPUTS_LIM_4_20	INPUTS_LIM_4_20	AV	5764	4	20	Type 6	0	RO	Capacity Limit Control
INPUTS_LIM_SW1	INPUTS_LIM_SW1	BV	18	0	1	Type 4	0	RO	Limit Switch 1
INPUTS_LIM_SW2	INPUTS_LIM_SW2	BV	19	0	1	Type 4	0	RO	Limit Switch 2
INPUTS_ONOFF_SW	INPUTS_ONOFF_SW	BV	16	0	1	Type 4	0	RO	Remote On/Off Switch
INPUTS_REV_ROT	INPUTS_REV_ROT	AV	5761	0	1	Type 6	0	RO	Phase Reversal
INPUTS_SETP_SW	INPUTS_SETP_SW	BV	48	0	1	Type 4	0	RO	Second Setpoint Switch
INPUTS_SP_RESET	INPUTS_SP_RESET	AV	5005	4	20	Type 6	0	RO	Setpoint Reset Signal
LOADFACT_SH_A	LOADFACT_SH_A	AV	1011	0	0	Type 5	18	RO	Suction Superheat A
LOADFACT_SH_B	LOADFACT_SH_B	AV	2011	0	0	Type 5	18	RO	Suction Superheat B
MODES_m_ice	MODES_m_ice	BV	5301	0	1	Type 4	0	RO	Ice Mode In Effect
OPT_SEL_boil_en	OPT_SEL_boil_en	BV	5061	0	1	Type 4	0	RW	Boiler Enable
OUTPUTS_ALARM	OUTPUTS_ALARM	BV	5012	0	0	Type 4	0	RO	Alarm Relay
OUTPUTS_BOILER	OUTPUTS_BOILER	AV	5711	0	1	Type 6	0	RO	Boiler Output
OUTPUTS_CP_A1	OUTPUTS_CP_A1	BV	1032	0	0	Type 4	0	RO	Compressor A1
OUTPUTS_CP_A2	OUTPUTS_CP_A2	BV	1033	0	0	Type 4	0	RO	Compressor A2
OUTPUTS_CP_A3	OUTPUTS_CP_A3	BV	1034	0	0	Type 4	0	RO	Compressor A3
OUTPUTS_CP_B1	OUTPUTS_CP_B1	BV	2032	0	0	Type 4	0	RO	Compressor B1
OUTPUTS_CP_B2	OUTPUTS_CP_B2	BV	2033	0	0	Type 4	0	RO	Compressor B2
OUTPUTS_DUS	OUTPUTS_DUS	AV	5754	0	0	Type 6	0	RO	Digital Unload Solenoid
OUTPUTS_EISOR	OUTPUTS_EISOR	AV	5765	0	1	Type 6	0	RO	Evaporator Isolator Rly
OUTPUTS_EXCH_HTR	OUTPUTS_EXCH_HTR	BV	57	0	0	Type 4	0	RO	Exchanger Heater
OUTPUTS_EXV_A	OUTPUTS_EXV_A	AV	5023	0	0	Type 6	0	RO	EXV Position Circuit A
OUTPUTS_EXV_B	OUTPUTS_EXV_B	AV	5024	0	0	Type 6	0	RO	EXV Position Circuit B
OUTPUTS_FANC_1	OUTPUTS_FANC_1	AV	5762	0	1	Type 6	0	RO	Fan Contactor 1
OUTPUTS_FANC_2	OUTPUTS_FANC_2	AV	5763	0	1	Type 6	0	RO	Fan Contactor 2
OUTPUTS_HEAD_ACT	OUTPUTS_HEAD_ACT	AV	5752	0	100	Type 6	0	RO	Head Pressure Actuator A
OUTPUTS_HGBP_V	OUTPUTS_HGBP_V	AV	5753	0	0	Type 6	0	RO	Hot Gas ByPass Valve
OUTPUTS_LLSV_A	OUTPUTS_LLSV_A	AV	5758	0	1	Type 6	0	RO	Solenoid Valve A
OUTPUTS_LLSV_B	OUTPUTS_LLSV_B	AV	5757	0	1	Type 6	0	RO	Solenoid Valve B
OUTPUTS_Mod_CPA1	OUTPUTS_Mod_CPA1	AV	5771	0	100	Type 6	0	RO	Digital Modul. A1
OUTPUTS_RUN	OUTPUTS_RUN	BV	15	0	0	Type 4	0	RO	Running Relay
OUTPUTS_VFAN	OUTPUTS_VFAN	AV	1015	0	0	Type 6	0	RO	VariaFan Speed
PRESSURE_DP_A	PRESSURE_DP_A	AV	1000	0	0	Type 6	0	RO	Discharge Pressure A
PRESSURE_DP_B	PRESSURE_DP_B	AV	2000	0	0	Type 6	0	RO	Discharge Pressure B
PRESSURE_SP_A	PRESSURE_SP_A	AV	1001	0	0	Type 6	0	RO	Suction Pressure A
PRESSURE_SP_B	PRESSURE_SP_B	AV	2001	0	0	Type 6	0	RO	Suction Pressure B
PROTOCOL_PUMP_C	PROTOCOL_PUMP_C	BV	10053	0	1	Type 1	0	RW	Condenser Pump
PUMPCONF_pump_del	PUMPCONF_pump_del	AV	5001	24	3000	Type 6	0	RO	Pump Auto Rotation Delay
PUMPCONF_pump_loc	PUMPCONF_pump_loc	BV	5004	0	1	Type 4	0	RO	Flow Checked if Pump Off
PUMPCONF_pump_per	PUMPCONF_pump_per	BV	5002	0	1	Type 4	0	RO	Pump Sticking Protection
PUMPCONF_pump_sby	PUMPCONF_pump_sby	BV	5003	0	1	Type 4	0	RO	Stop Pump During Standby
PUMPCONF_pump_seq	PUMPCONF_pump_seq	AV	73	0	4	Type 6	0	RO	Cooler Pumps Sequence
PUMPSTAT_CPUMP	PUMPSTAT_CPUMP	BV	5756	0	1	Type 4	0	RO	Condenser Pump Relay

APPENDIX D — BACNET IP POINTS (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LIMIT		OPTION	COVINC	PV ACCESS	DESCRIPTION
				LOW	HIGH				
PUMPSTAT_PUMP_1_rd	PUMPSTAT_PUMP_1	BV	50	0	1	Type 4	0	RO	Water Pump #1
PUMPSTAT_PUMP_1_wr	PROTOCOL_PUMP_1	BV	10050	0	1	Type 1	0	RW	Evaporator pump 1
PUMPSTAT_PUMP_2_rd	PUMPSTAT_PUMP_2	BV	51	0	1	Type 4	0	RO	Water Pump #2
PUMPSTAT_PUMP_2_wr	PROTOCOL_PUMP_2	BV	10051	0	1	Type 1	0	RW	Evaporator pump 2
RESETCFG_cr_deg	RESETCFG_cr_deg	AV	5035	–30	30	Type 6	0	RO	Cooling Reset Deg. Value
RESETCFG_dt_cr_fu	RESETCFG_dt_cr_fu	AV	5030	0	25	Type 6	0	RO	Delta T Full Reset Value
RESETCFG_dt_cr_no	RESETCFG_dt_cr_no	AV	5029	0	25	Type 6	0	RO	Delta T No Reset Value
RESETCFG_dt_hr_fu	RESETCFG_dt_hr_fu	AV	5039	0	25	Type 6	0	RO	Delta T Full Reset Value
RESETCFG_dt_hr_no	RESETCFG_dt_hr_no	AV	5038	0	25	Type 6	0	RO	Delta T No Reset Value
RESETCFG_hr_deg	RESETCFG_hr_deg	AV	5044	–30	30	Type 6	0	RO	Heating Reset Deg. Value
RESETCFG_I_cr_fu	RESETCFG_I_cr_fu	AV	5032	0	20	Type 6	0	RO	Current Full Reset Value
RESETCFG_I_cr_no	RESETCFG_I_cr_no	AV	5031	0	20	Type 6	0	RO	Current No Reset Value
RESETCFG_I_hr_fu	RESETCFG_I_hr_fu	AV	5041	0	20	Type 6	0	RO	Current Full Reset Value
RESETCFG_I_hr_no	RESETCFG_I_hr_no	AV	5040	0	20	Type 6	0	RO	Current No Reset Value
RESETCFG_oat_crfu	RESETCFG_oat_crfu	AV	5028	14	125	Type 6	0	RO	OAT Full Reset Value
RESETCFG_oat_crno	RESETCFG_oat_crno	AV	5027	14	125	Type 6	0	RO	OAT No Reset Value
RESETCFG_oat_hrfu	RESETCFG_oat_hrfu	AV	5037	14	125	Type 6	0	RO	OAT Full Reset Value
RESETCFG_oat_hrno	RESETCFG_oat_hrno	AV	5036	14	125	Type 6	0	RO	OAT No Reset Value
RESETCFG_spacr_fu	RESETCFG_spacr_fu	AV	5034	14	125	Type 6	0	RO	Space T Full Reset Value
RESETCFG_spacr_no	RESETCFG_spacr_no	AV	5033	14	125	Type 6	0	RO	Space T No Reset Value
RESETCFG_spahr_fu	RESETCFG_spahr_fu	AV	5043	14	125	Type 6	0	RO	Space T Full Reset Value
RESETCFG_spahr_no	RESETCFG_spahr_no	AV	5042	14	125	Type 6	0	RO	Space T No Reset Value
RUNTIME_hr_cp_a1	RUNTIME_hr_cp_a1	AV	1960	0	0	Type 6	0	RO	Compressor A1 Hours
RUNTIME_hr_cp_a2	RUNTIME_hr_cp_a2	AV	1961	0	0	Type 5	0	RO	Compressor A2 Hours
RUNTIME_hr_cp_a3	RUNTIME_hr_cp_a3	AV	1962	0	0	Type 5	0	RO	Compressor A3 Hours
RUNTIME_hr_cp_b1	RUNTIME_hr_cp_b1	AV	2960	0	0	Type 6	0	RO	Compressor B1 Hours
RUNTIME_hr_cp_b2	RUNTIME_hr_cp_b2	AV	2961	0	0	Type 5	0	RO	Compressor B2 Hours
RUNTIME_hr_mach	RUNTIME_hr_mach	AV	960	0	0	Type 6	0	RO	Machine Operating Hours
RUNTIME_hr_pump1	RUNTIME_hr_pump1	AV	962	0	0	Type 6	0	RO	Water Pump #1 Hours
RUNTIME_hr_pump2	RUNTIME_hr_pump2	AV	963	0	0	Type 6	0	RO	Water Pump #2 Hours
RUNTIME_st_cp_a1	RUNTIME_st_cp_a1	AV	1964	0	0	Type 5	1	RO	Compressor A1 Starts
RUNTIME_st_cp_a2	RUNTIME_st_cp_a2	AV	1965	0	0	Type 5	0	RO	Compressor A2 Starts
RUNTIME_st_cp_a3	RUNTIME_st_cp_a3	AV	1966	0	0	Type 5	0	RO	Compressor A3 Starts
RUNTIME_st_cp_b1	RUNTIME_st_cp_b1	AV	2964	0	0	Type 5	1	RO	Compressor B1 Starts
RUNTIME_st_cp_b2	RUNTIME_st_cp_b2	AV	2965	0	0	Type 5	0	RO	Compressor B2 Starts
RUNTIME_st_mach	RUNTIME_st_mach	AV	961	0	0	Type 5	1	RO	Machine Starts Number
SERVICE1_freezesp	SERVICE1_freezesp	AV	5447	–20	34	Type 6	0	RO	Brine Freeze Setpoint
SETPOINT_cauto_sp	SETPOINT_cauto_sp	AV	5016	39	122	Type 6	0	RW	Cool Changeover Setpt
SETPOINT_csp1	SETPOINT_csp1	AV	900	–20	68	Type 6	0	RW	Cooling Setpoint 1
SETPOINT_csp2	SETPOINT_csp2	AV	901	–20	68	Type 6	0	RW	Cooling Setpoint 2
SETPOINT_hauto_sp	SETPOINT_hauto_sp	AV	5017	32	115	Type 6	0	RW	Heat Changeover Setpt
SETPOINT_hsp1	SETPOINT_hsp1	AV	903	77	131	Type 6	0	RW	Heating Setpoint 1
SETPOINT_hsp2	SETPOINT_hsp2	AV	904	77	131	Type 6	0	RW	Heating Setpoint 2
SETPOINT_lim_sp1	SETPOINT_lim_sp1	AV	905	0	100	Type 6	0	RW	Switch Limit Setpoint 1
SETPOINT_lim_sp2	SETPOINT_lim_sp2	AV	906	0	100	Type 6	0	RW	Switch Limit Setpoint 2
SETPOINT_lim_sp3	SETPOINT_lim_sp3	AV	907	0	100	Type 6	0	RW	Switch Limit Setpoint 3
SETPOINT_min_sct	SETPOINT_min_sct	AV	5064	80	122	Type 6	0	RW	Desuperheater Min Sct
SETPOINT_ramp_sp	SETPOINT_ramp_sp	AV	5015	0.2	2	Type 6	0	RW	Ramp Loading
TEMP_CEWT	TEMP_CEWT	AV	25	0	0	Type 5	2	RO	Cond Entering Water Temp
TEMP_CLWT	TEMP_CLWT	AV	26	0	0	Type 5	2	RO	Cond Leaving Water Temp
TEMP_DGT_A	TEMP_DGT_A	AV	1009	0	0	Type 5	18	RO	Discharge Gas Temp A
TEMP_DGT_B	TEMP_DGT_B	AV	2009	0	0	Type 5	18	RO	Discharge Gas Temp B
TEMP_DLWT	TEMP_DLWT	AV	5	–40	302	Type 5	18	RO	Dual Leaving Water Temp
TEMP_EWT	TEMP_EWT	AV	1	0	0	Type 5	18	RO	Entering Water Temp
TEMP_LWT	TEMP_LWT	AV	2	0	0	Type 5	18	RO	Leaving Water Temp
TEMP_OAT	TEMP_OAT	AV	3	–40	302	Type 5	18	RO	Outdoor Air Temperature
TEMP_SCT_A	TEMP_SCT_A	AV	1005	0	0	Type 5	18	RO	Saturated Cond Tmp cir A
TEMP_SCT_B	TEMP_SCT_B	AV	2005	0	0	Type 5	18	RO	Saturated Cond Tmp cir B
TEMP_SPACETMP	TEMP_SPACETMP	AV	5082	0	0	Type 5	2	RO	Space Temperature
TEMP_SST_A	TEMP_SST_A	AV	1006	0	0	Type 5	18	RO	Saturated Suction Temp A
TEMP_SST_B	TEMP_SST_B	AV	2006	0	0	Type 5	18	RO	Saturated Suction Temp B
TEMP_SUCT_A	TEMP_SUCT_A	AV	1007	0	0	Type 6	0	RO	Suction Temp Circuit A
TEMP_SUCT_B	TEMP_SUCT_B	AV	2007	0	0	Type 6	0	RO	Suction Temp Circuit B

APPENDIX E — MODBUS IP POINTS

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX.	DECIMAL							MIN.	MAX.	DEFAULT
0x0001	1	1	ALM_COOLER_FREEZE_F	Water Exchanger Freeze Protection	1bit BOOL	DI		0	1	0
0x0005	5	1	ALM_LOW_SUCTION_A_F	Circuit A Low Saturated Suction Temperature	1bit BOOL	DI		0	1	0
0x0006	6	1	ALM_LOW_SUCTION_B_F	Circuit B Low Saturated Suction Temperature	1bit BOOL	DI		0	1	0
0x000B	11	1	ALM_LOW_SH_A_F	Circuit A Low Superheat	1bit BOOL	DI		0	1	0
0x000C	12	1	ALM_LOW_SH_B_F	Circuit B Low Superheat	1bit BOOL	DI		0	1	0
0x000E	14	1	ALM_COOLER_LOCK_F	Cooler Interlock Failure	1bit BOOL	DI		0	1	0
0x000F	15	1	ALM_CONDENSER_LOCK_F	CondenserFlowSwitchFailure	1bit BOOL	DI		0	1	0
0x0010	16	1	ALM_CPA1_REVERSE_ROT_F	Compressor A1 Not Started Or Pressure Increase not Established	1bit BOOL	DI		0	1	0
0x0011	17	1	ALM_CPA2_REVERSE_ROT_F	Compressor A2 Not Started Or Pressure Increase not Established	1bit BOOL	DI		0	1	0
0x0012	18	1	ALM_CPA3_REVERSE_ROT_F	Compressor A3 Not Started Or Pressure Increase not Established	1bit BOOL	DI		0	1	0
0x0014	20	1	ALM_CPB1_REVERSE_ROT_F	Compressor B1 Not Started Or Pressure Increase not Established	1bit BOOL	DI		0	1	0
0x0015	21	1	ALM_CPB2_REVERSE_ROT_F	Compressor B2 Not Started Or Pressure Increase not Established	1bit BOOL	DI		0	1	0
0x001D	29	1	ALM_LOSS_COM_SM_F	Loss of communication with System Manager	1bit BOOL	DI		0	1	0
0x001E	30	1	ALM_LOSS_COM_MS_F	Primary/Secondary communication Failure	1bit BOOL	DI		0	1	0
0x001F	31	1	ALM_NETWORK_EMSTOP_F	UnitisinNetworkemergencystop	1bit BOOL	DI		0	1	0
0x0020	32	1	ALM_COOL_PUMP1_F	Cooler Pump 1 Default	1bit BOOL	DI		0	1	0
0x0021	33	1	ALM_COOL_PUMP2_F	Cooler Pump 2 Default	1bit BOOL	DI		0	1	0
0x0049	73	1	ALM_COND_PUMP_F	Condenser Pump Default	1bit BOOL	DI		0	1	0
0x0025	37	1	ALM_REPEATED_HI_DGT_A_F	Circuit A Repeated High Discharge Gas Overrides	1bit BOOL	DI		0	1	0
0x0026	38	1	ALM_REPEATED_HI_DGT_B_F	Circuit B Repeated High Discharge Gas Overrides	1bit BOOL	DI		0	1	0
0x0028	40	1	ALM_REPEATED_LO_SST_A_F	Circuit A Repeated Low Suction Temp Overrides	1bit BOOL	DI		0	1	0
0x0029	41	1	ALM_REPEATED_LO_SST_B_F	Circuit B Repeated Low Suction Temp Overrides	1bit BOOL	DI		0	1	0
0x003F	63	1	ALM_HP_SWITCH_A_F	Circuit A High pressure switch Failure	1bit BOOL	DI		0	1	0
0x0040	64	1	ALM_HP_SWITCH_B_F	Circuit B High pressure switch Failure	1bit BOOL	DI		0	1	0
0x0061	97	1	ALM_SENSORS_SWAP_F	Water Exchanger Temperature Sensors Swapped	1bit BOOL	DI		0	1	0
0x0062	98	1	ALM_COND_SENSORS_SWAP_F	Condenser Water Exchanger TemperatureSensorsSwapped	1bit BOOL	DI		0	1	0
0x0063	99	1	ALM_FLUIDE_FAIL	Possible Refrigerant Leakage Failure	1bit BOOL	DI		0	1	0
0x00D2	210	1	ALM_RUN_OUT_MAP_A_F	Compressor Running Outside MAP - cir A	1bit BOOL	DI		0	1	0
0x00D3	211	1	ALM_RUN_OUT_MAP_B_F	Compressor Running Outside MAP - cir B	1bit BOOL	DI		0	1	0
0x07D1	2001	1	ALM_DP_A_F	Circuit A Discharge Pressure Transducer Failure	1bit BOOL	DI		0	1	0
0x07D2	2002	1	ALM_DP_B_F	Circuit B Discharge Pressure Transducer Failure	1bit BOOL	DI		0	1	0
0x07D4	2004	1	ALM_SP_A_F	Circuit A Suction Pressure Transducer Failure	1bit BOOL	DI		0	1	0
0x07D5	2005	1	ALM_SP_B_F	Circuit B Suction Pressure Transducer Failure	1bit BOOL	DI		0	1	0
0x0BB8	3000	1	ALM_INI_FACT_CONF_F	Initial factory configuration required	1bit BOOL	DI		0	1	0
0x0BB9	3001	1	ALM_ILL_FACT_CONF_F	Illegal configuration	1bit BOOL	DI		0	1	0
0x0C1D	3101	1	ALM_SERVICE_MAINT_ALERT	Service maintenance alert	1bit BOOL	DI		0	1	0
0x0C21	3105	1	ALM_FGAS_NEEDED	Fgas check needed, call your maintenance company	1bit BOOL	DI		0	1	0
0x0CE5	3301	1	ALM_M_S_CONFIG_F	Primary chiller configuration error	1bit BOOL	DI		0	1	0
0x0FA1	4001	1	ALM_CIOB_A_LOW_VOLT_F	Circuit A CIOB Low Voltage Failure	1bit BOOL	DI		0	1	0
0x0FA2	4002	1	ALM_CIOB_B_LOW_VOLT_F	Circuit B CIOB Low Voltage Failure	1bit BOOL	DI		0	1	0

APPENDIX E — MODBUS IP POINTS (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX.	DECIMAL							MIN.	MAX.	DEFAULT
0x125D	4701	1	ALM_FAN_DRIVE_COM_F	Loss of communication with VFD Fan Drive	1bit BOOL	DI		0	1	0
0x1325	4901	1	ALM_CIOB_CIR_A_COM_F	Loss of communication with CIOB Board Number A	1bit BOOL	DI		0	1	0
0x1326	4902	1	ALM_CIOB_CIR_B_COM_F	Loss of communication with CIOB Board Number B	1bit BOOL	DI		0	1	0
0x1389	5001	1	ALM_COOL_EWT_F	Water Exchanger Entering Fluid Thermistor Failure	1bit BOOL	DI		0	1	0
0x138A	5002	1	ALM_COOL_LWT_F	Water Exchanger Leaving Fluid Thermistor Failure	1bit BOOL	DI		0	1	0
0x138E	5006	1	ALM_COND_EWT_F	Condenser Entering Fluid Thermistor Failure	1bit BOOL	DI				0
0x138F	5007	1	ALM_COND_LWT_F	Condenser Leaving Fluid Thermistor Failure	1bit BOOL	DI				0
0x1392	5010	1	ALM_OAT_F	OAT Thermistor Failure	1bit BOOL	DI		0	1	0
0x1393	5011	1	ALM_DLWT_F	Primary/Secondary Common Fluid Thermistor Failure	1bit BOOL	DI		0	1	0
0x1394	5012	1	ALM_SUCTION_T_A_F	Circuit A Suction Gas Thermistor Failure	1bit BOOL	DI		0	1	0
0x1395	5013	1	ALM_SUCTION_T_B_F	Circuit B Suction Gas Thermistor Failure	1bit BOOL	DI		0	1	0
0x1397	5015	1	ALM_DGT_A_F	Circuit A Discharge Gas Thermistor Failure	1bit BOOL	DI		0	1	0
0x139D	5021	1	ALM_SPACETMP	Space Temperature Failure	1bit BOOL	DI		0	1	0
0x1771	6001	1	ALM_FAN_VFD_DRIVE_F	Circuit A VFD Fan Drive Failure	1bit BOOL	DI		0	1	0
0x0FB4	4020	1	ALM_EXV_A_F	Main EXV Stepper Motor Failure - Cir A	1bit BOOL	DI		0	1	0
0x0FB5	4021	1	ALM_EXV_B_F	Main EXV Stepper Motor Failure - Cir B	1bit BOOL	DI		0	1	0
0x0384	900	2	SETPOINT_csp1	Cooling Setpoint 1	32bits FLOAT	HR	°F	–20	68	44.6
							°C	–28.88889	20.0000028	7.00000176
0x0386	902	2	SETPOINT_csp2	Cooling Setpoint 2	32bits FLOAT	HR	°F	–20	68	44.6
							°C	–28.88889	20.0000028	7.00000176
0x038A	906	2	SETPOINT_hsp1	Heating Setpoint 1	32bits FLOAT	HR	°F	77	131	100.4
							°C	25.0000032	55.0000056	38.00000424
0x038C	908	2	SETPOINT_hsp2	Heating Setpoint 2	32bits FLOAT	HR	°F	77	131	100.4
							°C	25.0000032	55.0000056	38.00000424
0x038E	910	2	SETPOINT_lim_sp1	Switch Limit Setpoint 1	32bits UINT	HR	PERCENT	0	100	100
0x0390	912	2	SETPOINT_lim_sp2	Switch Limit Setpoint 2	32bits UINT	HR	PERCENT	0	100	100
0x0392	914	2	SETPOINT_lim_sp3	Switch Limit Setpoint 3	32bits UINT	HR	PERCENT	0	100	100
0x0BC2	3010	2	PROTOCOL_CTRL_PNT	Control Point	32bits FLOAT	HR	°F	–4	153	44.6
							°C	–20.0000004	67.2222288	7.00000176
0x0BC6	3014	2	PROTOCOL_DEM_LIM	Active Demand Limit Val	32bits UINT	HR	PERCENT	0	100	0
0x0BCE	3022	2	PROTOCOL_CHIL_S_S	Net.: Cmd Start/Stop	32bits UINT	HR		0	1	0
0x0BD0	3024	2	PROTOCOL_EMSTOP	Emergency Stop	32bits UINT	HR		0	1	0
0x0BE4	3044	2	PROTOCOL_HC_SEL	Heat/Cool Select	32bits UINT	HR		0	3	0
0x0BE6	3046	2	PROTOCOL_SP_SEL	Setpoint Select	32bits UINT	HR		0	2	0
0x0C1A	3098	2	PROTOCOL_PUMP_1	Evaporator pump 1	32bits UINT	HR		0	1	0
0x0C1C	3100	2	PROTOCOL_PUMP_2	Evaporator pump 2	32bits UINT	HR		0	1	0
0x0C20	3104	2	PROTOCOL_PUMP_C	Condenser pump	32bits UINT	HR		0	1	0
0x0C2A	3114	2	PROTOCOL_CHIL_OCC	Net.: Cmd Occupied	32bits UINT	HR		0	1	0
0x0C2C	3116	2	PROTOCOL_SP_OCC	Setpoint Occupied?	32bits UINT	HR		0	1	0
0x0C4E	3150	2	PROTOCOL_ROT_PUMP	Rotate Cooler Pumps ?	32bits UINT	HR		0	1	0
0x0FA0	4000	2	MODBUSRS_metric	Metric Unit	32bits UINT	HR		0	1	1
0x0FA2	4002	2	MODBUSRS_real_typ	Real type management	32bits UINT	HR		0	1	1
0x0FA4	4004	2	MODBUSRS_swap_b	Swap Bytes	32bits UINT	HR		0	1	0
0x0FA6	4006	2	MODBUSIP_metric	Metric Unit	32bits UINT	HR		0	1	1
0x0FA8	4008	2	MODBUSIP_real_typ	Real type management	32bits UINT	HR		0	1	1
0x0FAA	4010	2	MODBUSIP_swap_b	Swap Bytes	32bits UINT	HR		0	1	0
0x1068	4200	2	RESETCFG_cr_deg	Cooling Reset Deg. Value	32bits FLOAT	HR	^F	–30	30	0
							^C	–16.666668	16.666668	0
0x106A	4202	2	HCCONFIG_cr_sel	Cooling Reset Select	32bits UINT	HR		0	4	0
0x106C	4204	2	RESETCFG_dt_cr_fu	Delta T Full Reset Value	32bits FLOAT	HR	^F	0	25	0
							^C	0	13.88889	0
0x106E	4206	2	RESETCFG_dt_cr_no	Delta T No Reset Value	32bits FLOAT	HR	^F	0	25	0
							^C	0	13.88889	0
0x1080	4224	2	RESETCFG_spacr_fu	Space T Full Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x1082	4226	2	RESETCFG_spacr_no	Space T No Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996

APPENDIX E — MODBUS IP POINTS (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX.	DECIMAL							MIN.	MAX.	DEFAULT
0x1070	4208	2	RESETCFG_dt_hr_fu	Delta T Full Reset Value	32bits FLOAT	HR	^F	0	25	0
							^C	0	13.88889	0
0x1072	4210	2	RESETCFG_dt_hr_no	Delta T No Reset Value	32bits FLOAT	HR	^F	0	25	0
							^C	0	13.88889	0
0x1074	4212	2	RESETCFG_hr_deg	Heating Reset Deg. Value	32bits FLOAT	HR	^F	–30	30	0
							^C	–16.666668	16.666668	0
0x1084	4228	2	RESETCFG_spahr_fu	Space T Full Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x1086	4230	2	RESETCFG_spahr_no	Space T No Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x1076	4214	2	HCCONFIG_hr_sel	Heating Reset Select	32bits UINT	HR		0	4	0
0x1078	4216	2	RESETCFG_oat_crfu	OAT Full Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x107A	4218	2	RESETCFG_oat_crno	OAT No Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x107C	4220	2	RESETCFG_oat_hrfu	OAT Full Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x107E	4222	2	RESETCFG_oat_hrno	OAT No Reset Value	32bits FLOAT	HR	°F	14	125	14
							°C	–9.9999996	51.666672	–9.9999996
0x1088	4232	2	RESETCFG_I_cr_fu	Current Full Reset Value	32bits FLOAT	HR	MILLIAMPS	0	20	0
0x108A	4234	2	RESETCFG_I_cr_no	Current No Reset Value	32bits FLOAT	HR	MILLIAMPS	0	20	0
0x108C	4236	2	RESETCFG_I_hr_fu	Current Full Reset Value	32bits FLOAT	HR	MILLIAMPS	0	20	0
0x108E	4238	2	RESETCFG_I_hr_no	Current No Reset Value	32bits FLOAT	HR	MILLIAMPS	0	20	0
0x10CC	4300	2	PUMPCONF_pump_seq	Cooler Pumps Sequence	32bits UINT	HR		0	4	0
0x10CE	4302	2	PUMPCONF_pump_del	Pump Auto Rotation Delay	32bits INT	HR	HOURS	24	3000	48
0x10D0	4304	2	PUMPCONF_pump_loc	Flow Checked if Pump Off	32bits UINT	HR		0	1	1
0x10D2	4306	2	PUMPCONF_pump_per	Pump Sticking Protection	32bits UINT	HR		0	1	0
0x10D4	4308	2	PUMPCONF_pump_sby	Stop Pump During Standby	32bits UINT	HR		0	1	0
0x1004	4100	2	GENCONF_ewt_opt	Entering Fluid Control	32bits UINT	HR		0	1	0
0x1006	4102	2	GENCONF_lim_sel	Demand Limit Type Select	32bits UINT	HR		0	2	0
0x232C	9004	2	SETPOINT_ramp_sp	Ramp Loading	32bits FLOAT	HR	^F	0.2	2	1
							^C	0.11111112	1.1111112	0.5555556
0x232E	9006	2	SETPOINT_cauto_sp	Cool Changeover Setpt	32bits FLOAT	HR	°F	39	122	75
							°C	3.8888904	50.0000052	23.888892
0x2330	9008	2	SETPOINT_hauto_sp	Heat Changeover Setpt	32bits FLOAT	HR	°F	32	115	64
							°C	0.0000012	46.111116	17.7777804
0x2332	9010	2	SETPOINT_min_sct	Desuperheater Min Sct	32bits FLOAT	HR	°F	80	122	104
							°C	26.66667	50.0000052	40.0000044
0x238C	9100	2	OPT_SEL_boil_en	Boiler Enable	32bits UINT	HR		0	1	0
0x0000	0	2	TEMP_EWT	Entering Water Temp	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x0002	2	2	TEMP_LWT	Leaving Water Temp	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x0004	4	2	TEMP_OAT	Outdoor Air Temperature	32bits FLOAT	IR	°F	–40	302	0
							°C	–40.000002	150.0000132	–17.777778
0x0008	8	2	TEMP_DLWT	Dual Leaving Water Temp	32bits FLOAT	IR	°F	–40	302	0
							°C	–40.000002	150.0000132	–17.777778
0x000A	10	2	GENUNIT_CTRL_PNT	Control Point	32bits FLOAT	IR	°F	–4	153	0
							°C	–20.000000	67.2222288	–17.777778
0x000C	12	2	GENUNIT_SP	Current Setpoint	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x000E	14	2	GENUNIT_DEM_LIM	Active Demand Limit Val	32bits UINT	IR	PERCENT	0	100	0
0x0010	16	2	GENUNIT_CAP_T	Percent Total Capacity	32bits UINT	IR	PERCENT	0	100	0
0x0014	20	2	GENUNIT_min_left	Minutes Left for Start	32bits FLOAT	IR	MINUTES			0
0x0016	22	2	GENUNIT_CHIL_S_S	Net.: Cmd Start/Stop	32bits UINT	IR		0	1	0
0x0018	24	2	GENUNIT_EMSTOP	Emergency Stop	32bits UINT	IR		0	1	0
0x001C	28	2	OUTPUTS_RUN	Running Relay	32bits UINT	IR				0
0x001E	30	2	INPUTS_ONOFF_SW	Remote On/Off Switch	32bits UINT	IR		0	1	0
0x0022	34	2	INPUTS_LIM_SW1	Limit Switch 1	32bits UINT	IR		0	1	0
0x0024	36	2	INPUTS_LIM_SW2	Limit Switch 2	32bits UINT	IR		0	1	0
0x0026	38	2	INPUTS_ICE_SW	Ice Done Storage Switch	32bits UINT	IR		0	1	0
0x0028	40	2	GENUNIT_CTRL_TYP	Local=0 Net.=1 Remote=2	32bits UINT	IR		0	2	0
0x002A	42	2	UNIT_STATUS	Running Status	32bits UINT	IR				0
0x002C	44	2	GENUNIT_HC_SEL	Heat/Cool Select	32bits UINT	IR		0	2	0
0x002E	46	2	GENUNIT_SP_SEL	Setpoint Select	32bits UINT	IR		0	2	0
0x0030	48	2	TEMP_CEWT	Cond Entering Water Temp	32bits FLOAT	IR	°F			0
							°C			–17.777778

APPENDIX E — MODBUS IP POINTS (cont)

ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX.	DECIMAL							MIN.	MAX.	DEFAULT
0x0032	50	2	TEMP_CLWT	Cond Leaving Water Temp	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x005E	94	2	INPUTS_SETP_SW	Second Setpoint Switch	32bits UINT	IR		0	1	0
0x23F0	9200	2	INPUTS_CSP_IN	4_20mA Cooling Setpoint	32bits FLOAT	IR	MILLIAMPS	4	20	4
0x0062	98	2	PUMPSTAT_PUMP_1	Water Pump #1	32bits UINT	IR		0	1	0
0x0064	100	2	PUMPSTAT_PUMP_2	Water Pump #2	32bits UINT	IR		0	1	0
0x0066	102	2	INPUTS_FLOW_SW	Flow Switch Interlock	32bits UINT	IR		0	1	0
0x006C	108	2	INPUTS_CNFS	Condenser Water Flow SW	32bits UINT	IR		0	1	0
0x0070	112	2	OUTPUTS_EXCH_HTR	Exchanger Heater	32bits UINT	IR				0
0x0072	114	2	GENUNIT_CHIL_OCC	Net.: Cmd Occupied	32bits UINT	IR		0	1	0
0x0074	116	2	GENUNIT_SP_OCC	Setpoint Occupied?	32bits UINT	IR		0	1	0
0x0084	132	2	TEMP_SPACETMP	Space Temperature	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x0090	144	2	PUMPCONF_pump_seq	Cooler Pumps Sequence	32bits UINT	IR		0	4	0
0x0096	150	2	PUMPSTAT_ROT_PUMP	Rotate Pumps Now?	32bits UINT	IR		0	1	0
0x03E8	1000	2	RUNTIME_hr_mach	Machine Operating Hours	32bits FLOAT	IR	HOURS			0
0x03EA	1002	2	RUNTIME_st_mach	Machine Starts Number	32bits FLOAT	IR				0
0x03EC	1004	2	RUNTIME_hr_pump1	Water Pump #1 Hours	32bits FLOAT	IR	HOURS			0
0x03EE	1006	2	RUNTIME_hr_pump2	Water Pump #2 Hours	32bits FLOAT	IR	HOURS			0
0x03F4	1012	2	HR_PARTIAL_DOWNTIME	Cumul Time Partial Alm	32bits FLOAT	IR	HOURS			0
0x03F6	1014	2	HR_TOTAL_DOWNTIME	Cumul Time Tripout Alm	32bits FLOAT	IR	HOURS			0
0x044C	1100	2	ALARMRST_alarm_1c	Current Alarm 1	32bits UINT	IR				0
0x044E	1102	2	ALARMRST_alarm_2c	Current Alarm 2	32bits UINT	IR				0
0x0450	1104	2	ALARMRST_alarm_3c	Current Alarm 3	32bits UINT	IR				0
0x0452	1106	2	ALARMRST_alarm_4c	Current Alarm 4	32bits UINT	IR				0
0x0454	1108	2	ALARMRST_alarm_5c	Current Alarm 5	32bits UINT	IR				0
0x0456	1110	2	ALARMRST_alarm_1	Current Alarm 1 index	32bits UINT	IR				0
0x0458	1112	2	ALARMRST_alarm_2	Current Alarm 2 index	32bits UINT	IR				0
0x045A	1114	2	ALARMRST_alarm_3	Current Alarm 3 index	32bits UINT	IR				0
0x045C	1116	2	ALARMRST_alarm_4	Current Alarm 4 index	32bits UINT	IR				0
0x045E	1118	2	ALARMRST_alarm_5	Current Alarm 5 index	32bits UINT	IR				0
0x0460	1120	2	UNIT_ALM	Alarm State	32bits UINT	IR				0
0x04B0	1200	2	PRESSURE_DP_A	Discharge Pressure A	32bits FLOAT	IR	PSI			0
							kPa			0
0x04B2	1202	2	PRESSURE_SP_A	Suction Pressure A	32bits FLOAT	IR	PSI			0
							kPa			0
0x04BA	1210	2	TEMP_SCT_A	Saturated Cond Tmp cir A	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x04BC	1212	2	TEMP_SST_A	Saturated Suction Temp A	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x04BE	1214	2	TEMP_SUCT_A	Suction Temp Circuit A	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x04C2	1218	2	TEMP_DGT_A	Discharge Gas Temp A	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x04CE	1230	2	OUTPUTS_VFAN	VariaFan Speed	32bits FLOAT	IR	PERCENT			0
0x04D2	1234	2	GENUNIT_CAPA_T	Circuit A Total Capacity	32bits UINT	IR	PERCENT	0	100	0
0x04F0	1264	2	OUTPUTS_CP_A1	Compressor A1	32bits UINT	IR				0
0x04F2	1266	2	OUTPUTS_CP_A2	Compressor A2	32bits UINT	IR				0
0x04F4	1268	2	OUTPUTS_CP_A3	Compressor A3	32bits UINT	IR				0
0x241E	9246	2	OUTPUTS_Mod_CPA1	Digital Modul. A1	32bits UINT	IR	PERCENT	0	100	0
0x0578	1400	2	PRESSURE_DP_B	Discharge Pressure B	32bits FLOAT	IR	PSI			0
							kPa			0
0x057A	1402	2	PRESSURE_SP_B	Suction Pressure B	32bits FLOAT	IR	PSI			0
							kPa			0
0x0582	1410	2	TEMP_SCT_B	Saturated Cond Tmp cir B	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x0584	1412	2	TEMP_SST_B	Saturated Suction Temp B	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x0586	1414	2	TEMP_SUCT_B	Suction Temp Circuit B	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x058A	1418	2	TEMP_DGT_B	Discharge Gas Temp B	32bits FLOAT	IR	°F			0
							°C			–17.777778
0x059A	1434	2	GENUNIT_CAPB_T	Circuit B Total Capacity	32bits UINT	IR	PERCENT	0	100	0
0x05B8	1464	2	OUTPUTS_CP_B1	Compressor B1	32bits UINT	IR				0
0x05BA	1466	2	OUTPUTS_CP_B2	Compressor B2	32bits UINT	IR				0
0x0708	1800	2	RUNTIME_hr_cp_a1	Compressor A1 Hours	32bits FLOAT	IR	HOURS			0
0x070A	1802	2	RUNTIME_hr_cp_a2	Compressor A2 Hours	32bits FLOAT	IR	HOURS			0
0x070C	1804	2	RUNTIME_hr_cp_a3	Compressor A3 Hours	32bits FLOAT	IR	HOURS			0

APPENDIX E — MODBUS IP POINTS (cont)

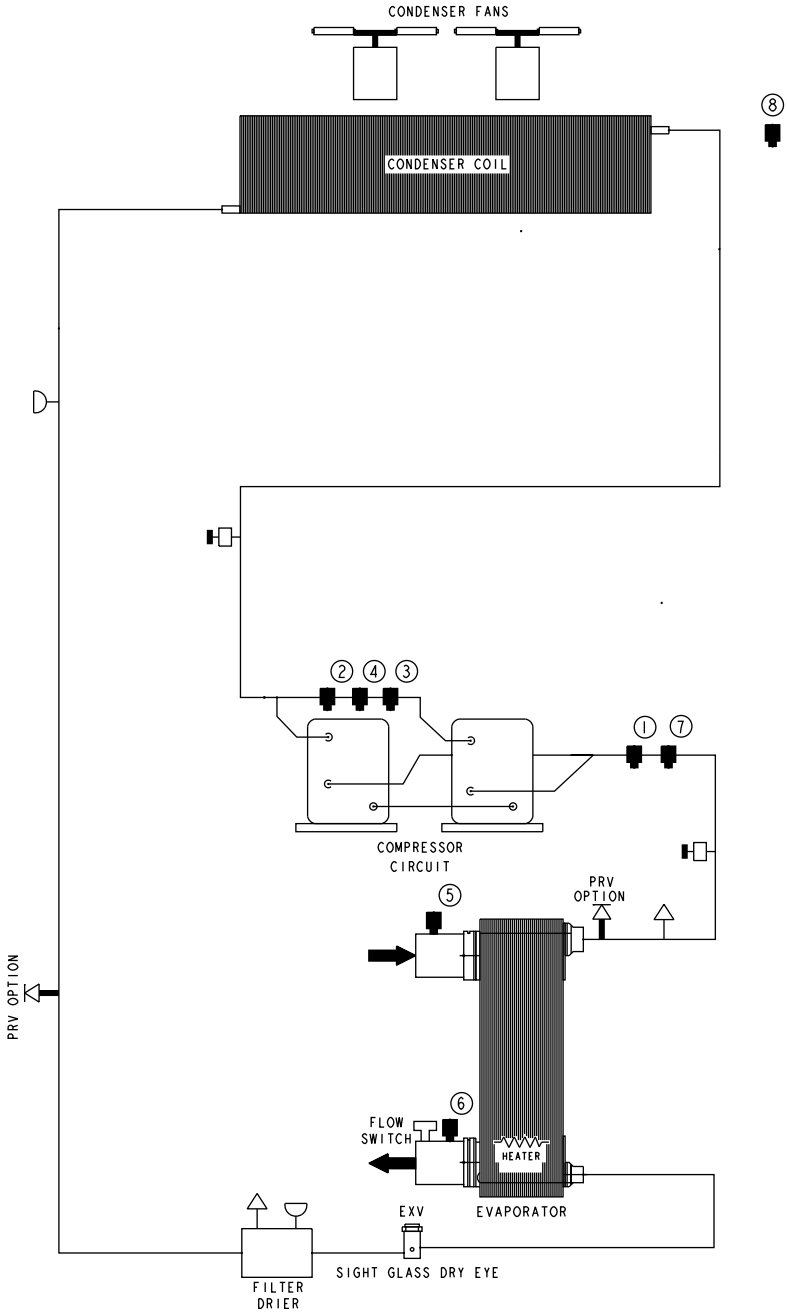
ADDRESS		REG. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
HEX.	DECIMAL							MIN.	MAX.	DEFAULT
0x0710	1808	2	RUNTIME_st_cp_a1	Compressor A1 Starts	32bits FLOAT	IR				0
0x0712	1810	2	RUNTIME_st_cp_a2	Compressor A2 Starts	32bits FLOAT	IR				0
0x0714	1812	2	RUNTIME_st_cp_a3	Compressor A3 Starts	32bits FLOAT	IR				0
0x07D0	2000	2	RUNTIME_hr_cp_b1	Compressor B1 Hours	32bits FLOAT	IR	HOURS			0
0x07D2	2002	2	RUNTIME_hr_cp_b2	Compressor B2 Hours	32bits FLOAT	IR	HOURS			0
0x07D8	2008	2	RUNTIME_st_cp_b1	Compressor B1 Starts	32bits FLOAT	IR				0
0x07DA	2010	2	RUNTIME_st_cp_b2	Compressor B2 Starts	32bits FLOAT	IR				0
0x2328	9000	2	FACTORY_unit_typ	UnitType (WaterCooled=3)	32bits UINT	IR		1	3	1
0x232A	9002	2	FACTORY_unitsize	Unit Capacity Model	32bits UINT	IR				0
0x241C	9244	2	FACTORY_hgbp_sel	Hot Gas Bypass Selection	32bits UINT	IR		0	1	0
0x2414	9236	2	FACTORY2_cap_a1	Compressor A1 Capacity	32bits FLOAT	IR		0	99	0
0x2416	9238	2	FACTORY2_cap_a2	Compressor A2 Capacity	32bits FLOAT	IR		0	99	0
0x2418	9240	2	FACTORY2_cap_a3	Compressor A3 Capacity	32bits FLOAT	IR		0	99	0
0x241A	9242	2	FACTORY2_cap_b1	Compressor B1 Capacity	32bits FLOAT	IR		0	99	0
0x2340	9024	2	OUTPUTS_EXV_A	EXV Position Circuit A	32bits FLOAT	IR	PERCENT			0
0x2342	9026	2	OUTPUTS_EXV_B	EXV Position Circuit B	32bits FLOAT	IR	PERCENT			0
0x23F2	9202	2	PUMPSTAT_CPUMP	Condenser Pump Relay	32bits UINT	IR		0	1	0
0x23F4	9204	2	OUTPUTS_LLSV_A	Soleniod Valve A	32bits UINT	IR		0	1	0
0x23F6	9206	2	OUTPUTS_LLSV_B	Soleniod Valve B	32bits UINT	IR		0	1	0
0x23F8	9208	2	OUTPUTS_HEAD_ACT	Head Pressure Actuator A	32bits UINT	IR	PERCENT	0	100	0
0x23FA	9210	2	OUTPUTS_HGBP_V	Hot Gas ByPass Valve	32bits UINT	IR				0
0x23FC	9212	2	OUTPUTS_DUS	Digital Unload Solenoid	32bits UINT	IR				0
0x23FE	9214	2	OUTPUTS_BOILER	Boiler Output	32bits UINT	IR		0	1	0
0x2400	9216	2	INPUTS_HC_SW	Remote Heat/Cool Switch	32bits UINT	IR		0	1	0
0x2402	9218	2	INPUTS_CWP1	Water Pump Interlock 1	32bits UINT	IR		0	1	0
0x2404	9220	2	INPUTS_CWP2	Water Pump Interlock 2	32bits UINT	IR		0	1	0
0x2406	9222	2	INPUTS_REV_ROT	Phase Reversal	32bits UINT	IR		0	1	0
0x2408	9224	2	INPUTS_HP_SW_A	High Pressure Switch A	32bits UINT	IR		0	1	0
0x0462	1122	2	OUTPUTS_ALARM	Alarm Relay	32bits UINT	IR				0
0x240A	9226	2	OUTPUTS_FANC_1	Fan Contactor 1	32bits UINT	IR		0	1	0
0x240C	9228	2	OUTPUTS_FANC_2	Fan Contactor 2	32bits UINT	IR		0	1	0
0x240E	9230	2	INPUTS_HP_SW_B	High Pressure Switch B	32bits UINT	IR		0	1	0
0x2410	9232	2	INPUTS_LIM_4_20	Capacity Limit Control	32bits FLOAT	IR	MILLIAMPS	4	20	4
0x2412	9234	2	OUTPUTS_EISOR	Evaporator Isolator Rly	32bits UINT	IR		0	1	0
0x04C6	1222	2	LOADFACT_SH_A	Suction Superheat A	32bits FLOAT	IR	^F			0
							^C			0
0x058E	1422	2	LOADFACT_SH_B	Suction Superheat B	32bits FLOAT	IR	^F			0
							^C			0
0x2424	9252	2	HEADCTRL_fan	Fan Speed	32bits FLOAT	IR				0

LEGEND

CO — COILS_MEDIA
DI — DISCR_INPUT_MEDIA
HEX. — Hexadecimal
HR — HOLDING_REG_MEDIA
IR — INPUT_REG_MEDIA

APPENDIX F — PIPING AND INSTRUMENTATION

30RC 010-030 Units



LEGEND

SSV	SUCTION SERVICE VALVE
HR	HEAT RECOVERY
HGBP	HOT GAS BYPASS
1	SUCTION PRESSURE
2	DISCHARGE PRESSURE
3	HIGH PRESSURE SWITCH
4	DISCHARGE GAS THERMISTOR (R-32 ONLY)
5	ENTERING WATER THERMISTOR
6	LEAVING WATER THERMISTOR
7	RETURN GAS THERMISTOR
8	OUTSIDE AIR THERMISTOR

REFRIGERANT ACCESS FITTING

PRESSURE RELIEF VALVE

FUSIBLE PLUG

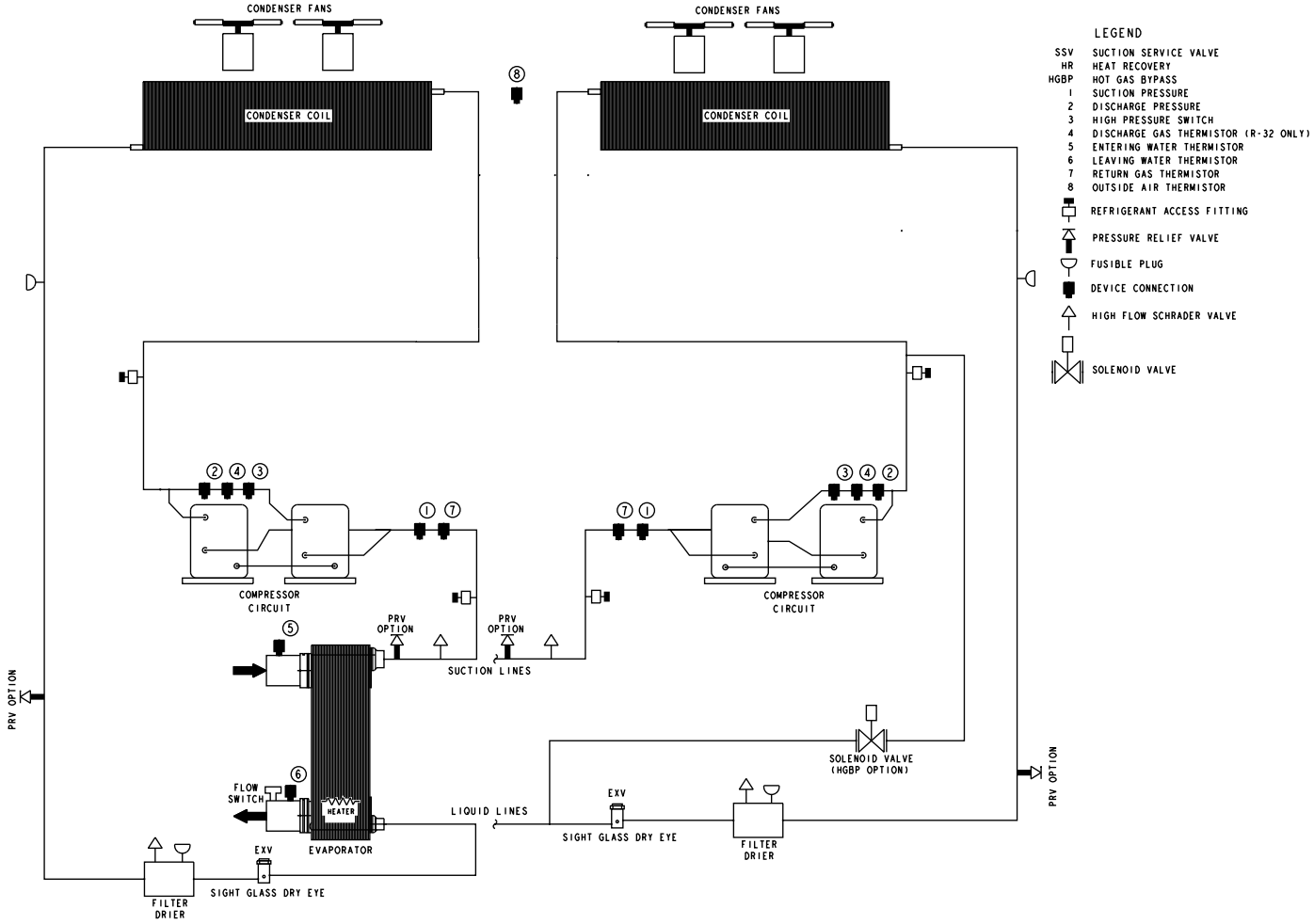
DEVICE CONNECTION

HIGH FLOW SCHRADER VALVE

SOLENOID VALVE

APPENDIX F — PIPING AND INSTRUMENTATION (cont)

30RC 035-060 Units



APPENDIX G — MAINTENANCE SUMMARY AND LOG SHEETS

WEEKLY	
Compressor	Check oil level.
Condenser	Check condenser coils for debris and clean as necessary.
	Periodic clean water rinse, especially in coastal and industrial applications.
Controls	Review Alarm/Alert history.
MONTHLY	
Evaporator	Inspect water pumps.
Controls	Check accuracy of thermistors and replace if greater than ±2°F (1.2°C) variance from calibrated thermometer.
	Check accuracy of transducers and replace if greater than ±5 psi (34.47 kPa) variance.
Refrigerant System	Check refrigerant charge level.
	Check moisture-indicating sight glass for possible refrigerant loss and presence of moisture.
	Perform leak test.
QUARTERLY	
Compressor	Check crankcase heater operation.
Controls	Check chilled water flow switch operation.
Condenser	Check all condenser fans for proper operation.
Refrigerant System	Check all refrigerant joints and valves for refrigerant leaks and repair as necessary.
Hydronic System	Inspect pump seal if equipped with a hydronic pump package.
	Lubricate pump motor as required.
Starter	Inspect all contactors.
ANNUALLY	
Evaporator	Check to be sure that the proper concentration of antifreeze is present in the chilled water loop, if applicable.
	Verify that the chilled water loop is properly treated.
	Check chilled water strainers and clean as necessary.
	Check cooler heater operation if equipped.
Condenser	Check condition of condenser fan blades and that they are securely fastened to the motor shaft.
Controls	Perform Service Test to confirm operation of all components.
	Check all electrical connections and tighten as necessary.
	Inspect all contactors and relays and replace as necessary.
Refrigerant System	Check refrigerant filter driers for excessive pressure drop and replace as necessary.
Hydronic System	Check pump heater operation if equipped.

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

APPENDIX G — MAINTENANCE SUMMARY AND LOG SHEETS (cont)

30RC Weekly Maintenance Log

Plant: _____ Unit ID:_____

Machine Model No. _____

DATE	OIL LEVEL	CHECK CONDENSER COIL	CHECK ALARMS / FAULTS	OPERATOR INITIALS	REMARKS

NOTE: Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

APPENDIX G — MAINTENANCE SUMMARY AND LOG SHEETS (cont)

Month			1	2	3	4	5	6	7	8	9	10	11	12
Date			/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /	/ /
Operator														

UNIT SECTION	ACTION	UNIT	ENTRY											
Compressor	Check Oil Level	Yes/No												
	Check Crankcase Heater Operation	Yes/No												
	Send Oil Sample Out for Analysis	Yes/No												
Evaporator	Check Cooler Heater Operation	Yes/No												
	Check Chiller Water Loop	Yes/No												
	Check Chilled Water Strainers	Yes/No												
	Record Water Pressure Differential (PSI)	PSI												
	Inspect Water Pumps	Yes/No												
	Isolate and Drain Cooler	Yes/No												
Condenser	Inspect and Clean All Coils	Yes/No												
	Check All Condenser Fans for Proper Operation	Yes/No												
	Check Condition of Condenser Fan Blades	Yes/No												
Controls	General Cleaning and Tightening Connections	Yes/No												
	Check Chilled Water Flow Switch Operation	Yes/No												
	Perform Service Test	Yes/No												
	Confirm Accuracy of Pressure Transducers	Yes/No												
	Confirm Accuracy of Thermistors	Yes/No												
	Do Not Disconnect Control Power Unless Cooler is Completely Drained	Yes/No												
Starter	General Tightening and Cleaning Connections	Yes/No												
	Inspect All Contactors	Yes/No												
System	Check Refrigerant Charge Level	Yes/No												
	Verify Operation of EXVs and Record Position	0-100%												
	Record System Superheat	°F												
	Check Moisture Sight Glass	Yes/No												
	Perform Leak Test	Yes/No												
	Check All Refrigerant Joints and Valves for Refrigerant Leaks	Yes/No												
	Check Filter Driers	Yes/No												

LEGEND

EXV — Expansion Valve

— Annually

NOTES:
1. Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.
2. Refer to Installation Instructions for proper winterization procedure.

APPENDIX H — CARRIER CONTROLLER WEB AND NETWORK INTERFACE PARAMETERS

Web Interface

The Carrier Controller provides the functionality to access and control unit parameters from the web interface. Three users can be connected simultaneously with no priority between them. The last modification is taken into account.

NOTE: Machine Start/Stop is not authorized through a web connection for security reasons.

IMPORTANT: Use firewalls and VPN for a secure connection.

MINIMUM WEB BROWSER CONFIGURATION

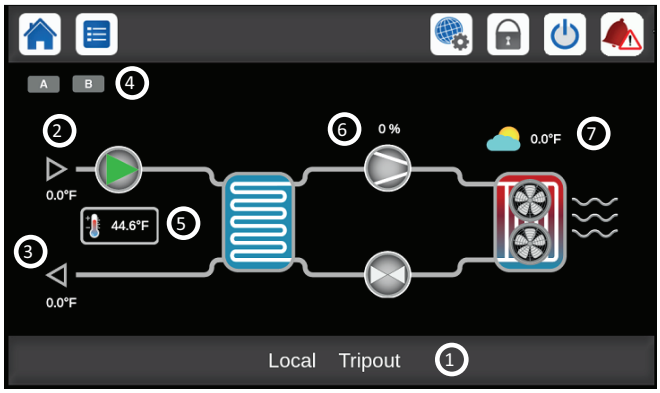
Use Google Chrome (Version 65.0 or Higher), Mozilla Firefox (Version 65.0 or Higher), or Internet Explorer (Version 11.0 or Higher). Google Chrome is the recommended browser.

Web Browser Access

To connect the controller to the web interface, it is necessary to know the IP address of the unit.

To verify the unit IP address:

1. Begin by navigating to the System Menu on the upper right corner of the display. The System Menu can be accessed from any screen except for the individual login screens: User, Service, and Factory. See Fig. A.



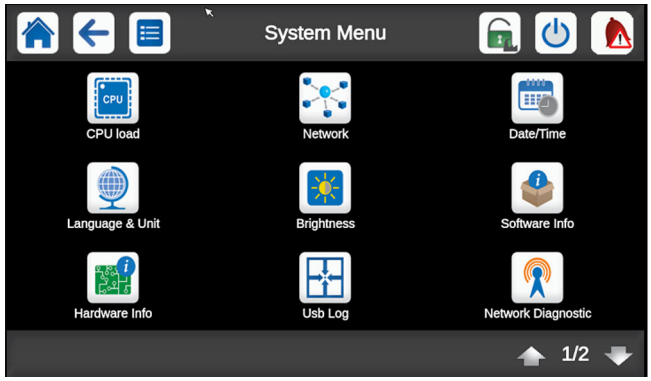
LEGEND

1 — Unit Status Message
2 — Evaporator Entering Fluid Temperature
3 — Evaporator Leaving Fluid Temperature
4 — Circuit Running Indicator
5 — Active Setpoint and Link to Setpoint Table
6 — Chiller Capacity
7 — Outside Air Temperature

Fig. A — Display Home Screens

2. Select the Network button from the System Menu screen. See Fig. B.

   This screen shows the settings, see Fig. B. To change the settings select the icon at the bottom right of the screen. This screen is shown in Fig. C. Select the entry to change and a text box will come up. Enter the new value and select the check mark. Select the save icon in the lower left corner to save.



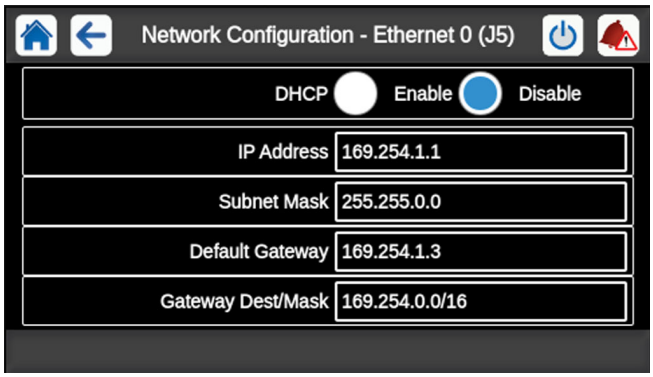


Fig. B — System Menu Screen

3. Verify address under Ethernet 0 (J5). See Fig. C for an example.

   – Unit default address: 169.254.1.1

   – The unit IP address can be changed. See Network Settings below.

   To access the Carrier Controller web interface:
   1. Open the web browser.
   2. Enter the IP address of the unit in the address bar of the web browser.
   3. Start with “https://” followed by the unit IP address. Example: https://169.254.1.1
   4. Press Enter.
   5. The web interface will be loaded.

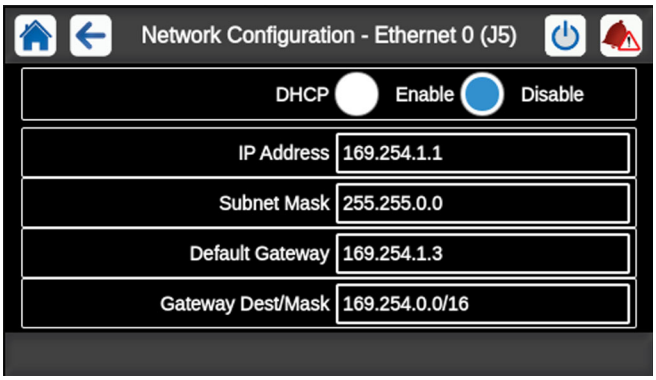


Fig. C — Network Screen

Network Settings

Request an IP address, subnet mask, and default gateway from the system administrator before connecting the unit to the local Ethernet network. The Network Screen (see Fig. C) allows the user to define network parameters, including TCP/IP address. Each parameter is editable and can be changed by selecting the outlined box and entering the desired address once the alpha-numeric keyboard displays. Click the save button after entering address.

Once this is complete, the setup of the Carrier Controller is complete. The computer or network that the Carrier Controller is being connected to may need to have some settings changed in order to communicate between them. See the next section.

ETHERNET/IP CONNECTION

If the unit is point-to-point to a PC and the unit is energized, it may be necessary to check the Ethernet connection and/or configure the PC network board. Refer to the following instructions to verify PC settings and connection to the Carrier Controller.

To verify the unit's IP address, perform the following steps:

1. From the computer connected to the controller, go to Local Area Connection Properties and select Internet Protocol (TCP/IP). See Fig. D.

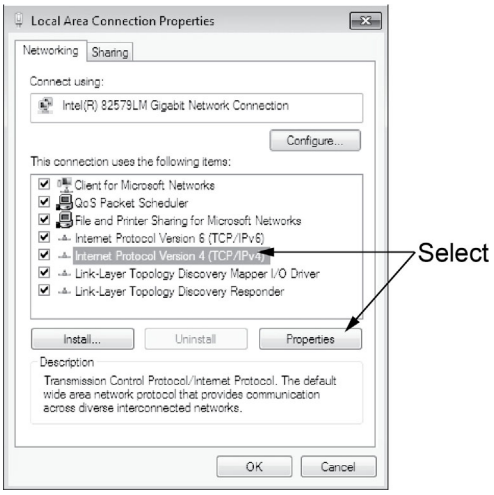


Fig. D — Local Area Connection Properties Screen

2. Once the Properties button is selected the Internet Protocol Properties Window opens. See Fig. E.
3. The IP address of the Carrier Controller must have matching system and subsystem fields in order for the 2 to communicate. In addition the last part of the IP address must be unique for both on the network.
   For example, Carrier Controller IP address: 172.30.101.11 and the PC address: 172.30.101.182.
   In this example 172.30 corresponds to the network and 101 corresponds to the subsystem and they must match. The last part of the IP address, 11 and 182, must be unique on the network.
4. Confirm that Carrier Controller IP address and PC IP address meet the above criteria and select OK on the PC.

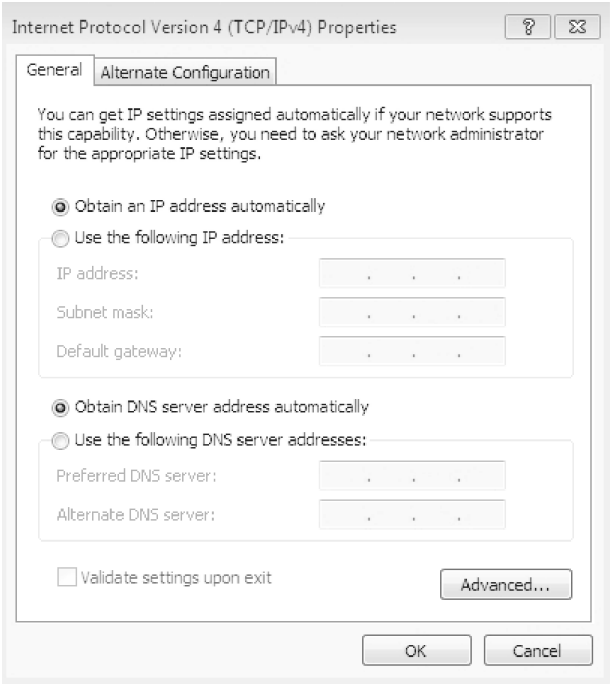


Fig. E — Internet Protocol Properties Screen

5. Communication between the Carrier Controller and the PC should be active. Using a standard Web Browser, with minimum versions shown above and with Java installed, type in the IP address of the Carrier Controller. The display on the PC should look very similar to what is on the Carrier Controller display.

If issues still exist with accessing the Carrier Controller using the web browser, try to ping the Carrier Controller by using the following steps:

1. Open a command prompt using one of the following methods:
   a. Window logo key + R to access the run command. Then type CMD and press enter.
   OR
   b. Click start button and then click run. Then type CMD and press enter.
2. At the command prompt, type the ping command followed by the unit IP address.
3. As shown in Fig. F, the device attached to IP address 161.145.71.145 communicated successfully. The IP address for the Carrier Controller should return a similar confirmation if the system is configured properly. If it does not additional IT assistance may be necessary.

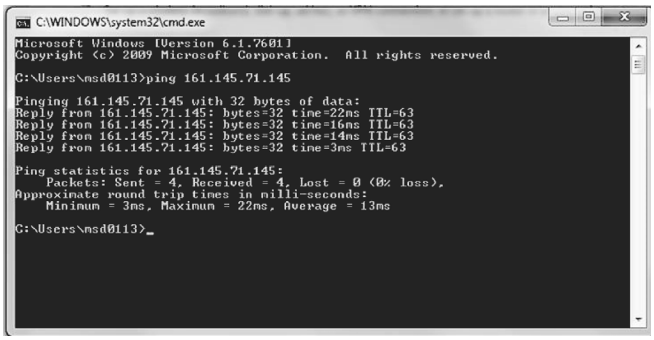


Fig. F — Ping Response Screen

APPENDIX I — FACTORY-SUPPLIED PUMPS

Pump Maintenance

GENERAL CARE

The vertical inline pumps provided with the 30RC products are built to operate without periodic maintenance. An inspection made at regular intervals will ensure years of trouble-free operation. Give special attention to the following:

1. Keep unit clean.
2. Keep refuse, dust, and other loose items away from pump and ventilating openings of the motor.

LUBRICATION

Lubrication is not required. There are no bearings in the pump that need external lubrication service.

MECHANICAL SEAL

Mechanical seals require no special attention. The seal is fitted with a flush line. The seal is flushed from the suction side of the pump.

⚠ CAUTION

Do not run the pump unless properly filled with water, as the seals require a film of liquid between the faces.

Mechanical seals may weep slightly at start-up. Allow the pump to continue operating for several hours and the mechanical seal to seat properly prior to calling for service.

⚠ CAUTION

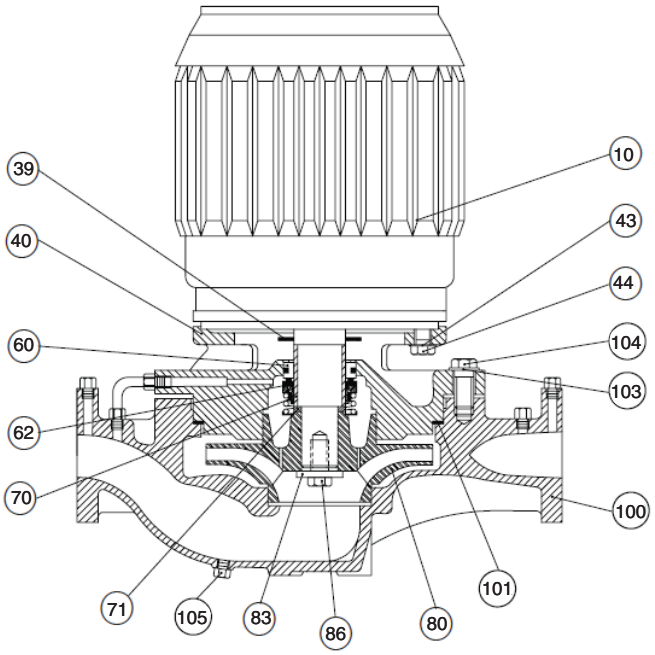
Do not use oil, Vaseline, or other petroleum or silicon-based products for seal elastomer lubrication. This may cause swelling and failure of the seal.

Seal Replacement

See Fig. G for pump seal replacement diagram.

⚠ CAUTION

Exercise extreme care when handling power wiring. Ensure that fuses are removed or breaker disconnected in the power supply to the motor. Power disconnect should be within line of sight to the pump and be tagged with reason for disconnection.



10 — Motor
39 — Water Slinger
40 — Adapter
43 — Washer
44 — Motor Capscrews
60 — Mechanical Seal Seat
62 — Mechanical Seal Rotating Element
70 — Shaft Sleeve
71 — Shaft Key Spacer
80 — Impeller
83 — Impeller Washer
86 — Impeller Fastener
100 — Casing
101 — Casing Gasket
103 — Casing Capscrews
104 — Casing Washers
105 — Drain Plug

Fig. G — Pump Seal Replacement

ELECTRICAL WIRING

If the pump and/or motor assembly is to be serviced on a bench, then the motor wiring must be disconnected.

ISOLATION VALVES

If the system is not drained, ensure that the suction and discharge piping isolation valves are closed. Remove drain plug (105) from the bottom of the casing and drain the pump.

PREPARE ASSEMBLY FOR REMOVAL

Secure the motor (10), by lifting straps, to an overhead chainfall or similar lifting device. The device must be designed to lift the weight of the unit safely. Raise the lifter to bring the lifting straps taut. Disconnect the flush/vent tubing assembly and place carefully to one side. Remove the casing capscrews (103) and washers (104). Pry bars may then be inserted between the casing (100) and adapter (40). Care should be taken not to apply pressure to the outside diameter of the adapter to prevent possible breakage. Outside pressure should be on the casing only.

REMOVE ROTATING ASSEMBLY

The rotating assembly (motor [10], adapter [40], and impeller [80]) may now be lifted out of the casing.

ROTATING ASSEMBLY NOTES

The impeller (80) is fastened directly to the motor shaft and must be removed in order to replace the mechanical seal assembly (60 and 62). This may be accomplished on a safe surface near the installation or, more conveniently, on a workbench.

INDEX

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Catalog No. 04-53300285-01 Printed in U.S.A. Form 30RC-101T Pg 164 10-25 Replaces: 30RC-100T

START-UP CHECKLIST FOR 30RC AIR-COOLED CHILLERS

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices, and adhere to the safety considerations/information as outlined in preceding sections of this Controls, Start-Up, Operation, Service, and Troubleshooting document.

A. PROJECT INFORMATION

Job Name _____
Address _____
City _____ State _____ Zip _____
Installing Contractor _____
Sales Office _____
Start-Up Performed By _____

UNIT
Model _____
Serial _____

B. PRELIMINARY EQUIPMENT CHECK (This section to be completed by installing contractor)

1. Is there any physical damage?	☐ Yes	☐ No
a. If yes, was it noted on the freight bill and has a claim been filed with the shipper?	☐ Yes	☐ No
b. Will this prevent start-up?	☐ Yes	☐ No
Description _____		
_____		
2. Unit is installed level as per the Installation Instructions.	☐ Yes	☐ No
3. Power supply agrees with the unit nameplate.	☐ Yes	☐ No
4. Correct control voltage _____vac. Check transformer primary on 208/230 v.	☐ Yes	☐ No
5. Electrical power wiring is installed properly.	☐ Yes	☐ No
6. Unit is properly grounded.	☐ Yes	☐ No
7. Electrical circuit protection has been sized and installed properly.	☐ Yes	☐ No
8. Crankcase heaters energized for 24 hours before start-up.	☐ Yes	☐ No
9. Will this machine be controlled by a third party using BACnet/Lon/Modbus?	☐ Yes	☐ No
If yes, will the controls contractor be present at start-up?	☐ Yes	☐ No

Chilled Water System Check (This section to be completed by installing contractor)

1. All chilled water valves are open.	☐ Yes	☐ No
2. All piping is connected properly.	☐ Yes	☐ No
3. All air has been purged from the system.	☐ Yes	☐ No
4. Chilled water pump is operating with the correct rotation.	☐ Yes	☐ No
5. Chilled water pump starter controlled by chiller.	☐ Yes	☐ No
6. Water loop volume greater than 3 gal/ton for air conditioning or 6 gal/ton for process cooling and low ambient operation.	☐ Yes	☐ No
7. Has the water system been cleaned and flushed per the Installation Instructions?	☐ Yes	☐ No
8. For units with R-32 refrigerant, have automatic air separators with vents been installed as required by code?	☐ Yes	☐ No

9. Proper loop freeze protection provided to ____ °F (°C). ☐ Yes ☐ No

   Antifreeze type_____ Concentration _____%.

   (If antifreeze solution is not utilized on 30RC machines, and the minimum outdoor ambient is below 32°F (0°C), then items 10, 11, and 12 have to be completed to provide evaporator freeze protection to –20°F. Refer to Installation Instructions for proper evaporator winterization procedure.)

IMPORTANT: Adding antifreeze solution is the only certain means of protecting the unit from freeze-up if the heater fails or electrical power is interrupted or lost while temperatures are below 32°F (0°C).

10. Outdoor piping wrapped with electric heater tape. ☐ Yes ☐ No
11. Evaporator heaters installed and operational. ☐ Yes ☐ No
12. Is the unit equipped with low ambient head pressure control? ☐ Yes ☐ No

    If yes, are wind baffles installed? (Required if chiller will run below 32°F and be exposed to the wind.) ☐ Yes ☐ No
13. Are there any VFDs (variable frequency drives) on the chilled water pumps? ☐ Yes ☐ No
    a. Primary loop ☐ Yes ☐ No
    b. Secondary loop ☐ Yes ☐ No
14. Chiller controls the pump(s)? ☐ Yes ☐ No
    a. If yes, have the pump interlocks been wired? ☐ Yes ☐ No

Preliminary start-up complete.

Installing/Mechanical Contractor _____ Date _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

C. UNIT START-UP (Qualified individuals only. Factory start-up recommended!)

Evaporator

Model _____

Serial _____

Compressors

A1)

Model _____

Serial _____

A2)

Model _____

Serial _____

B1)

Model _____

Serial _____

B2)

Model _____

Serial _____

Hydronic Package

P1)

Model _____

Serial _____

P2)

Model _____

Serial _____

1. All liquid line service valves located near EXVs are open. ☐ Yes ☐ No
2. All discharge service valves are open. ☐ Yes ☐ No
4. Leak check unit. Locate, repair, and report any refrigerant leaks. ☐ Yes ☐ No
5. All terminals are tight. ☐ Yes ☐ No
6. All plug assemblies are tight. ☐ Yes ☐ No
7. All cables, thermistors, and transducers have been inspected for cross wires. ☐ Yes ☐ No
8. All thermistors are fully inserted into wells. ☐ Yes ☐ No
9. All armatures move freely on contactors. ☐ Yes ☐ No
10. Voltage at terminal block is within unit nameplate range. ☐ Yes ☐ No
11. Check voltage imbalance: A-B_____ A-C_____B-C_____

    Average voltage = _____ (A-B + A-C + B-C)/3
    Maximum deviation from average voltage = _____
    Voltage imbalance = _____% (max. deviation / average voltage) X 100

    Is voltage imbalance less than 2%? ☐ Yes ☐ No

    (DO NOT start chiller if voltage imbalance is greater than 2%. Contact local utility for assistance.)
12. Verify evaporator flow rate ☐ Yes ☐ No

    Pressure entering evaporator _____ psig (kpa)
    Pressure leaving evaporator _____ psig (kpa)
    Evaporator pressure drop _____ psig (kpa)
    Psig x 2.31 ft/psi = _____ ft of water
    kPa x 0.334 m/psi = _____ m of water
    Evaporator flow rate _____ gpm (l/s)

    (See Evaporator Pressure Drop Curve provided in the 30RC Installation Instructions.)
13. Verify that isolation valves on factory-installed pump packages are properly positioned and locked prior to start-up (slot in-line with piping on both sides of pump). ☐ Yes ☐ No
14. Chilled water flow switch operational. ☐ Yes ☐ No

Start and operate machine. Complete the following:

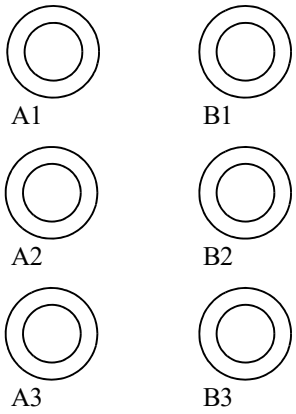
1. Complete component test utilizing Quick Test mode (make sure EXVs are checked after liquid line service valves are opened).
2. For fixed speed units, operate all condenser fans and verify operation and rotation.
3. Check refrigerant and oil charge. Record charge information below.
4. Record compressor and condenser fan motor current.
5. Record operating data.
6. Provide operating instructions to owner's personnel. Instruction time _____ hours

	Circuit A	Circuit B
Refrigerant Charge	_____	_____
Additional charge required	_____	_____

Oil Charge

Indicate level in sight glass of compressors A1 and B1.
Level should be 3/4 to 7/8 of a full sight glass when off.

Additional oil charge required.
Circuit A _____
Circuit B _____



Carrier Controller Software Versions

Controller: ECG-SR-20V4G _____ _____ _____
To obtain software version, navigate to ***System Menu → Software Info*** and find "Software Version" displayed in the table.

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

Record Configuration Information

PATH	CARRIER CONTROLLER DESCRIPTION	DEFAULT	ENTRY
System Menu → Language & Unit	Language	English	
	Units	US Imp	
Main Menu → General Parameters	Heat/Cool Select	0 (Cool)	
	Setpoint Select	0 (Auto)	
Main Menu → Configuration Menu → General Configuration	Cir Priority Sequence	0 (Auto)	
	Staged Loading Sequence	No	
	Ramp Loading Select	0 (No)	
	Unit Off to On Delay	1 min	
	Heating OAT Threshold	1.4°F (–17°C)	
	Demand Limit Type Select	0 (None)	
	Night Mode Start Hour	0	
	Night Mode End Hour	0	
	Night Capacity Limit	100%	
	Ice Mode Enable	0 (No)	
	Both Command Sel (HSM)*	No	
	Auto Changeover Select	No	
	Entering Fluid Control	No	
Main Menu → Configuration Menu → Pump Configuration	Pumps Sequence	0 (No Pump)	
	Pump Auto Rotation Delay	48 hours	
	Pump Sticking Protection	0 (No)	
	Stop Pump During Standby	No	
	Flow Checked If Pump Off	1 (Yes)	
	Flow Control Method*	1 (Constant Speed)	
	Flow Delta T Setpoint*	9.0°F (–12.8°C)	
	Flow Delta P Setpoint*	29.00 psi	
	Pressure Zero Value*	–14.50 psi	
	Pump Minimum Speed*	60%	
	Pump Min Speed Cap = 0%*	60%	
	Pump Maximum Speed*	100%	
	Min Water Press Thres*	15 psig	
	Water Pump Max Delta P*	73 psig	
Main Menu → Configuration Menu → User Configuration	Alarm Relay for Alerts	No	
	Reversed Alarm Relay	0	
	Phase Controller Action*	0	
	PC Minimum Fault Time*	120	
Main Menu → Configuration Menu → Reset Configuration	Cooling Reset Select	0 (None)	
	Heating Reset Select	0 (None)	
	OAT No Reset Value	14°F (–10°C)	
	OAT Full Reset Value	14°F (–10°C)	
	Delta T No Reset Value	0°F (0°C)	
	Delta T Full Reset Value	0°F (0°C)	
	Current No Reset Value	0 mA	
	Current Full Reset Value	0 mA	
	Space T No Reset Value	14°F (–10°C)	
	Space T Full Reset Value	14°F (–10°C)	
	Cooling Reset Deg. Value	0°F (0°C)	
	Cooling OAT No Reset Value	14°F (–10°C)0 mA	
	Cooling OAT Full Reset Value	14°F (–10°C)	
	Cooling Delta T No Reset Value	0°F (0°C)	
	Cooling Delta T Full Reset Value	0°F (0°C)	
	Cooling Current No Reset Value	0 mA	
	Cooling Current Full Reset Value	0 mA	
	Cooling Space T No Reset Value	14°F (–10°C)	
	Cooling Space T Full Reset Value	14°F (–10°C)	
	Cooling Reset Deg. Value	0°F (0°C)	
	Heating OAT No Reset Value	14°F (–10°C)	
	Heating OAT Full Reset Value	14°F (–10°C)	
	Heating Delta T No Reset Value	0°F (0°C)	
	Heating Delta T Full Reset Value	0°F (0°C)	
	Heating Current No Reset Value	0 mA	
	Heating Current Full Reset Value	0 mA	
	Heating Space T No Reset Value	14°F (–10°C)	
	Heating Space T Full Reset Value	14°F (–10°C)	
	Heating Reset Deg. Value	0°F (0°C)	

* Not applicable to North America units. Leave as Default value.

LEGEND

HSM — Hydronic System Manager
OAT — Outside Air Temperature

Record Configuration Information (cont)

PATH	CARRIER CONTROLLER DESCRIPTION	DEFAULT	ENTRY
Main Menu → Configuration Menu → Factory Configuration	Unit Type (Heat Pump = 2)	1	
	Unit Capacity	Unit Dependent	
	Fan Type	0 (Fixed Speed)	
	Exchanger Heater Select	No	
	Energy Management Module	No	
	Pump Type	1 (No Internal Pump)	
	Factory Dual Water Pump	No	
	Pump Control Method*	1	
	Exchanger Fluid Type	1 (Water)	
	Exchanger Coil Type	0 (MCHX)	
	Supply_Voltage	Unit Dependent	
	Hot Gas Bypass Selection	No	
Main Menu → Configuration Menu → Service Configuration	High Pressure Threshold	656.0 psi	
	Exch. Heater Delta Spt	3.4°F (1.9°C)	
	Brine Freeze Setpoint	34.0°F (1.1°C)	
	Minimum LWT Setpoint	38.0°F (3.3°C)	
	Auto Start when SM Lost	Disable	
	Auto Z Multiplier Stp	6	
	Maximum Z Multiplier	6.0	
	Flow Setpoint*	0	
	Pump Cycl. Freeze Prot.	No	
	Blackbox in Metric?	Yes	
	Unit Altitude (in meters)	0	
	Leakage Charge Threshold*	2.5V	
	Leakage Charge Timer*	60 min	
	Free Defr Allowed Period	2 hours	
	OAT Min for Free Defrost	34.7°F (1.5°C)	
	Fast Capacity Recovery	No	
Main Menu → Configuration Menu → Primary/Secondary	Primary/Secondary Select	0 (disable)	
	Primary Control Type	1 (Local)	
	Secondary Address	2	
	Lead Lag Select	0 (Always Lead)	
	Lead/Lag Balance Delta	168 hours	
	Lead/Lag Start Timer	10 min	
	Lead Pulldown Time	0 min	
	Start If Error Higher	4°F (2.2°C)	
	Lag Minimum Running Time	0 min	
	Lag Unit Pump Control	0 (Stop if Unit Stops)	
	Chiller In Series	0 (No)	
	Legacy Compatibility?	No	
Main Menu → Configuration Menu → Msc Config	Eco Pump Enable	No	
	Pump Off Time	2 min	
	Pump On Time	5 min	
Main Menu → Setpoint Configuration	Cooling Setpoint 1	44°F (6.7°C)	
	Cooling Setpoint 2	44°F (6.7°C)	
	Cooling Ice Setpoint	44°F (6.7°C)	
	Cooling Ramp Loading	1°F (0.6°C)	
	Heating Setpoint 1	100°F (37.8°C)	
	Heating Setpoint 2	100°F (37.8°C)	
	Heating Ramp Loading	1.0°C (–17.2°C)	
	Cool Changeover Setpt	75.0°F (23.9°C)	
	Heat Changeover Setpt	64.0°F (17.8°C)	
	Switch Limit Setpoint 1	100%	
	Switch Limit Setpoint 2	100%	
	Switch Limit Setpoint 3	100%	

* Not applicable to North America units. Leave as Default value.

LEGEND

LWT — Leaving Water Temperature
OAT — Outdoor Air Temperature
SM — System Manager
Spt — Setpoint

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

Component Test — Complete the following tests to make sure all peripheral components are operational before the compressors are started.

PATH	CARRIER CONTROLLER DESCRIPTION	CHECK WHEN COMPLETE
Main Menu → Quick Test #1	Quick Test Enable	
	Pump #1 Output	
	Pump #2 Output	
	Exchanger Heater Output	
	Alarm Relay Status	
	Running Relay Status	
	Fan A1 Output	
	Variable Fan Speed A	
	EXV Position Circuit A	
	Reverse Vlv Output Cir B	
	EXV Position Circuit B	
Main Menu → Quick Test #2	Total Capacity Output	
	Compressor A1 Output	
	Compressor A2 Output	
	Compressor B1 Output	
	Compressor B2 Output	
	Alert Relay Switch	
	Shutdown Relay Status	

* Not applicable to North America units. Leave as Default value.

LEGEND

EXV — Electronic Expansion Valve
Vlv — Valve

Operating Data:

Record the following information from the Run Status, Temperatures and Outputs Modes when machine is in a stable operating condition. If cooling load is insufficient, these readings must be obtained by putting the chiller in Quick Test mode and running each compressor.

TEMPERATURES

EVAPORATOR ENTERING FLUID	EWT _____
EVAPORATOR LEAVING FLUID	LWT _____
CONTROL POINT	CTPT _____
CAPACITY	CAP _____
OUTSIDE AIR TEMPERATURE	OAT _____
CHWS (CHILLED WATER SUP.) TEMP	CHWS _____ (Dual Chiller Control Only)

Install a manifold gage set to obtain readings and verify these against pressure transducers.

CIRCUIT A	CIRCUIT B
SCT.A _____	SCT.B _____
SST.A _____	SST.B _____
SGT.A _____	SGT.B _____
SUP.A _____	SUP.B _____
EXV.A_____	EXV.B _____

NOTE: EXV A and B positions are found in the output mode.

COMPRESSOR MOTOR CURRENT

	L1	L2	L3
COMPRESSOR A1	_____	_____	_____
COMPRESSOR A2	_____	_____	_____
COMPRESSOR B1	_____	_____	_____
COMPRESSOR B2	_____	_____	_____

CONDENSER FAN MOTOR CURRENT, FIXED SPEED UNITS

	L1	L2	L3
FAN MOTOR 1	_____	_____	_____
FAN MOTOR 2	_____	_____	_____
FAN MOTOR 3	_____	_____	_____
FAN MOTOR 4	_____	_____	_____

CONDENSER FAN MOTOR CURRENT, VARIABLE SPEED UNITS

	Hz	A
VFD A1	_____	_____

HEATER CURRENT

EVAPORATOR HEATER CURRENT _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

COMMENTS:

SIGNATURES:

Start-up Technician _____Date_____

Customer Representative _____Date_____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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