Controls, Start-Up, Operation, Service, and Troubleshooting

CONTENTS

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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.

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), which operates 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.

⚠ CAUTION

The 30MPA model is a Partial Unit air conditioner, complying with Partial Unit requirements of UL 60335-2-40/CSA C22.2 No. 60335-2-40, and must only be connected to other units that have been confirmed as complying to corresponding Partial Unit requirements of the same standard or UL 1995/CSA C22.2 No 236.

The definition of Partial Units per UL 60335-2-40 is as follows:

Partial Unit - Condensing unit, evaporating unit, condenser unit, or evaporator unit which are part of a total assembly of a heat pump, air-conditioner, or sanitary hot water heat pump where not all assemblies to create the complete refrigeration system are specified by the manufacturer.

Note 1 to entry: Partial Units are evaluated for safety as a stand-alone.

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 Lower Flammability Limit (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 78.

⚠ 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 brazed plate heat exchanger when the equipment is exposed to temperatures below 32°F (0°C). Proof of flow switch is factory installed on all models. 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 result in loss of warranty coverage.

⚠ CAUTION

Compressors require specific rotation. Monitor control alarms during first compressor start-up for reverse rotation protection. Damage to unit may result.

⚠ CAUTION

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

⚠ WARNING

UNIT OPERATION AND SAFETY HAZARD

This system uses an A2L refrigerant (R-32) which have 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 refrigerant R-32 may result in equipment damage or personal injury. Refer to 30MP Controls, Start-up, Service, and Troubleshooting for guidelines on proper A2L refrigerant handling and equipment used for A2L refrigerant. If unsure about equipment, consult the equipment manufacturer.

GENERAL

This publication contains Start-Up, Service, Controls, Operation, and Troubleshooting information which covers the 30MPA, 30MPW, and 30MPQ units with PIC6 controls. For unit sizes, see Table 1. These liquid chillers are equipped with PIC6 controlling electronic expansion valves (EXV). The 30MPA units and the 30MPW units with optional medium temperature brine are also equipped with liquid line solenoid valves (LLSVs).

⚠ CAUTION

UNIT DAMAGE HAZARD

This unit uses a microprocessor-based electronic control system. Do not use jumpers or other tools to short out components or to bypass or otherwise depart from recommended procedures. Any short-to-ground of the control board or accompanying wiring may destroy the electronic modules or electrical components.

Table 1 — Chiller Unit Sizes

30MP UNIT MODEL	NOMINAL COOLING TONS
30MPW017	15
30MPA, MPW, MPQ021	20
30MPA, MPW, MPQ031	30
30MPW033	30
30MPA, MPW, MPQ041	40
30MPA, MPW, MPQ046	45
30MPA, MPW, MPQ051	50
30MPA, MPW, MPQ056	55
30MPA, MPW, MPQ066	65
30MPA, MPW, MPQ080	80

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, Table A on page 108 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 on page 125 for a list of CCN IP points. See Appendix C on page 128 for a list of BACnet points. See Appendix D on page 133 for a list of Modbus®[1] points. See Appendix E on page 140 for Maintenance Summary and Log Sheets. See Appendix F on page 142 for Carrier Controller Web and Network Interface Parameters. See Appendix G for Compressor Operating Map on page 144.

Abbreviations Used in This Manual

The following abbreviations are used in this manual:

ANSI — American National Standards Institute
ASHRAE — American Society of Heating, Refrigeration, and Air-Conditioning Engineers
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
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
EEPROM — Electronically Erasable Programmable Read-Only Memory
EMM — Energy Management Module
EOR — Enable-Off-Remote
EWT — Entering Water Temperature
EWTO — Entering Water Temperature Offset
EXV — Electronic Expansion Valve
FC — Fan Contactor
HMI — Human Machine Interface
HPS — High Pressure Switch
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
MOP — Maximum Operating Pressure
N/A — Not Applicable
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[a]
SDT[a] — Saturated Discharge Temperature[a]
SGT — Suction Gas Temperature
SH — Suction Superheat
SHD — Shield Wire on Shielded Cable
CIOB — Standard Input/Output Board
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

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

NOTE(S):

a. SCT and SDT are used interchangeably by software points.

CONTROLS

The 30MP Liquid Chillers/Heat Pumps 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, 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 20.

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 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 30MP 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. 7.

Table 2 — Control and Power Drawings

DRAWING DESCRIPTION	LOCATION
Component Arrangements (Sizes 017-080)	Fig. 1, page 7
24V Control Wiring Schematic	Fig. 2, page 8
Power Wiring Schematic	Fig. 3, page 10
24V Control Power Electrical Wiring Schematic	Fig. 4, page 11
Communication Accessory Wiring Schematic	Fig. 5, page 12
Field Wiring Connections	Fig. 6, page 13

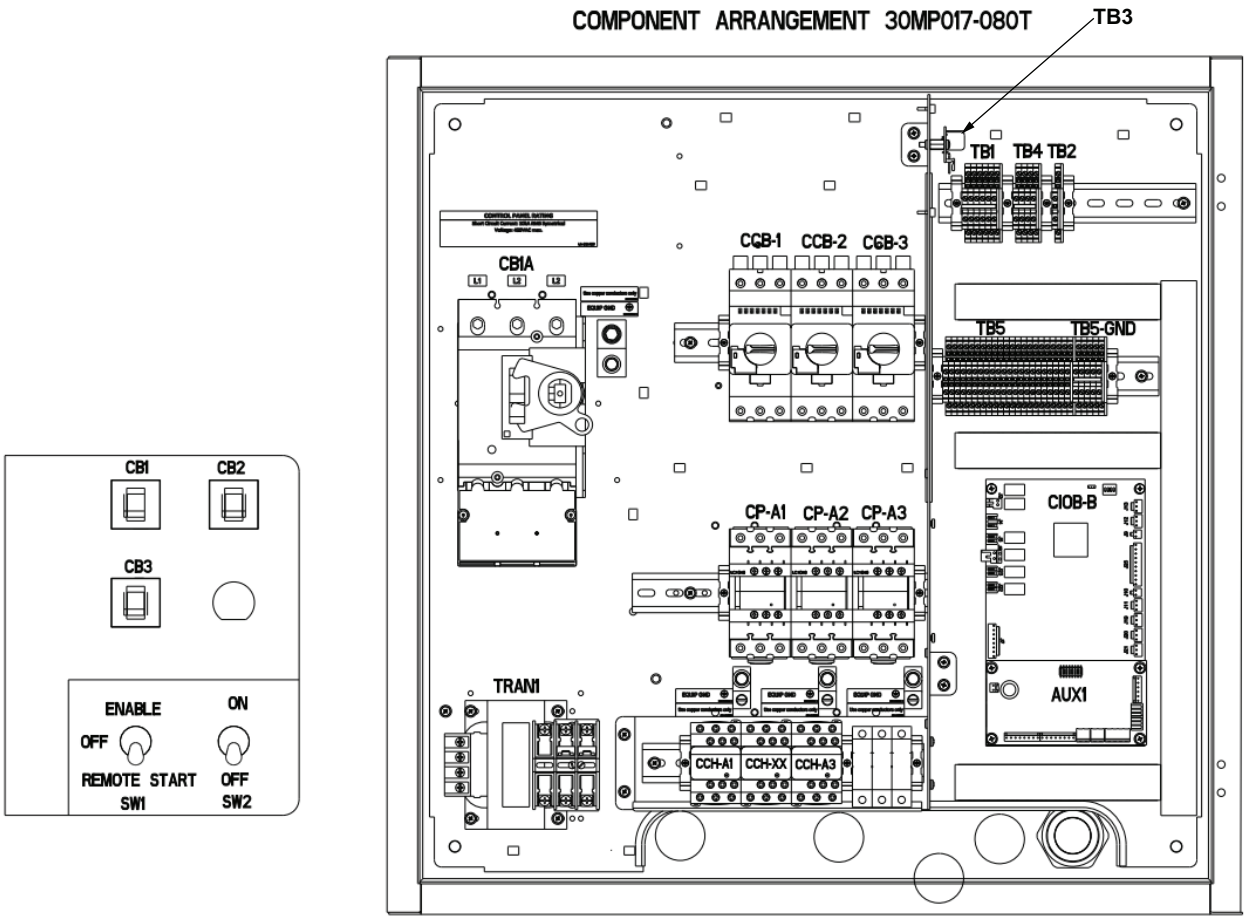
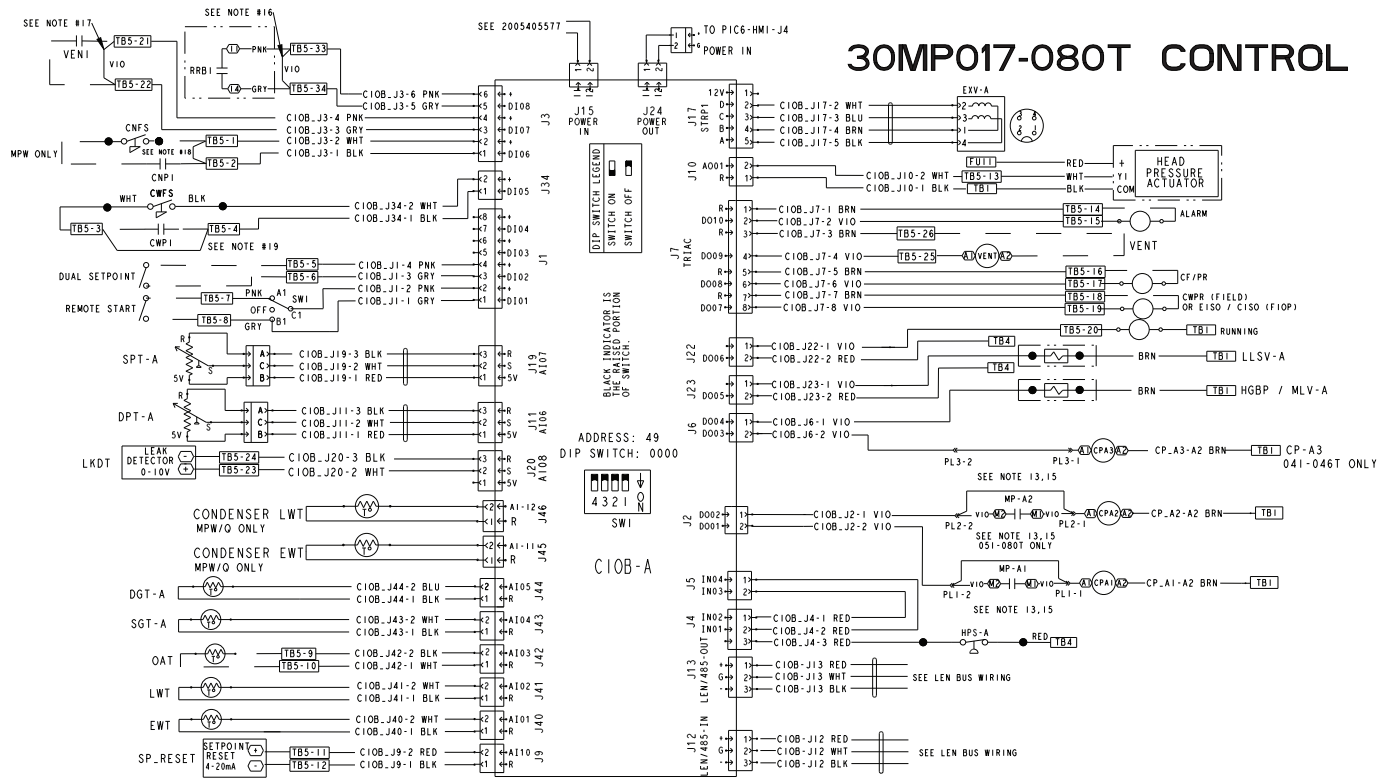


Fig. 1 — Component Arrangements (30MP Sizes 017-080)



NOTES:

1. FIELD-SUPPLIED CONTROL CONDUCTORS TO BE AT LEAST 18AWG (AMERICAN WIRE GAGE) OR LARGER. THE CONTROL CABINET SHOULD ONLY BE USED FOR LOW VOLTAGE FIELD WIRING (50-V MAXIMUM.)
2. EACH DIGITAL OUTPUT LOOP SHALL BE LIMITED TO A MAXIMUM OF 1A AC RMS STEADY-STAT @ 24VAC. LIGHT LOAD RELAY IS RECOMMENDED AND THE COIL VOLTAGE OF RELAY IS 24VAC. POWER SUPPLY SHALL BE PROVIDED BY CUSTOMER FUSED TRANSFORMER.
3. EACH DISCRETE INPUT LOOP IS POWERED BY INTERNAL 24VAC POWER SUPPLY. FIELD OPTIONAL CONTACTS OR SWITCH MUST HAVE 24VAC RATING, MAX CURRENT IS 60MA. NOMINAL CURRENT IS 10MA. SWITCHES WITH GOLD PLATED BIFURCATED CONTACTS ARE RECOMMENDED.
4. THE ANALOG INPUTS SUPPORT 5K/10K NTC THERMISTORS, 0/4-20MA SENSORS AND 5VDC SENSORS. IF 100K IS USED IT WILL REQUIRE A SOFTWARE CONVERSION TABLE TO CONVERT TO 10K. FOR DETAILS REFER TO THE CONTROLS, OPERATIONS, AND TROUBLE SHOOTING MANUAL AND MATCH WITH SOFTWARE.
5. EACH ANALOG OUTPUT LOOP SUPPORTS 0/4-20MA OR 0/2-10VDC VOLTAGE OUTPUT. THE ANALOG OUTPUT LOOP IS POWERED BY 10B BOARD. DO NOT SUPPLY EXTERNAL POWER. FOR DETAILS REFER TO THE CONTROLS, OPERATIONS, AND TROUBLE SHOOTING MANUAL AND MATCH WITH SOFTWARE.
6. DRY TYPE CONTACT, RATED SWITCHING LOAD 230VAC/5A OR 24VDC/5A.
7. GROUND SHIELDS AT SIGNAL GENERATING DEVICES
8. ALL FIELD INTERLOCK CONTACTS MUST HAVE A MINIMAL RATING OF 2A@24VAC SEALED.
9. IF MOTOR PROTECTOR IS USED REMOVE JUMPER FROM ASSOCIATED TERMINAL BLOCKS
10. IF CHILLED WATER PUMP INTERLOCK OR CONDENSER PUMP INTERLOCK IS USED REMOVE JUMPER ACROSS ASSOCIATED TERMINAL BLOCKS
11. FACTORY INSTALLED WIRING MUST MEET REQUIREMENTS OF UL 60335/ UL 1995, ANY FIELD INSTALLED MUST ALSO FOLLOW THE APPLIANCE CODES, ALL WIRING MUST BE RATED 75 DEGREE C
12. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED - THREE PHASE MOTORS PROTECTED AGAINST PRIMARY SINGLE PHASE CONDITIONS
13. CORESENSE COMPRESSOR PROTECTION MODULE IS USED ON THE FOLLOWING UNITS:
    A1 COMPRESSOR- DIGITAL OPTION- 031,033,041,046T (ALL VOLTAGES)
    A1,A2 COMPRESSOR- 051,056,066,080T (ALL VOLTAGES).
    JUMPER USED ON ALL OTHER COMPRESSORS.
14. FOR FUSE REPLACEMENT TABLE REFERENCE 2003I6045 SHEET 2
15. IF MP IS USED, REMOVE THE JUMPER
16. JUMPER TB5-33 AND TB5-34 IF PHASE MONITOR, RRB1, OPTION NOT USED
17. JUMPER TB5-21 AND TB5-22 IF REFRIGERANT LEAK DETECTOR SYSTEM IS NOT REQUIRED. SEE INSTALLATION MANUAL FOR REQUIREMENTS.
18. REMOVE JUMPER BETWEEN TB5-1 AND TB5-2 IF CNFS/CNPI OPTION IS USED.
19. REMOVE JUMPER BETWEEN TB5-3 AND TB5-4 IF CWPI OPTION IS USED.

LEGEND

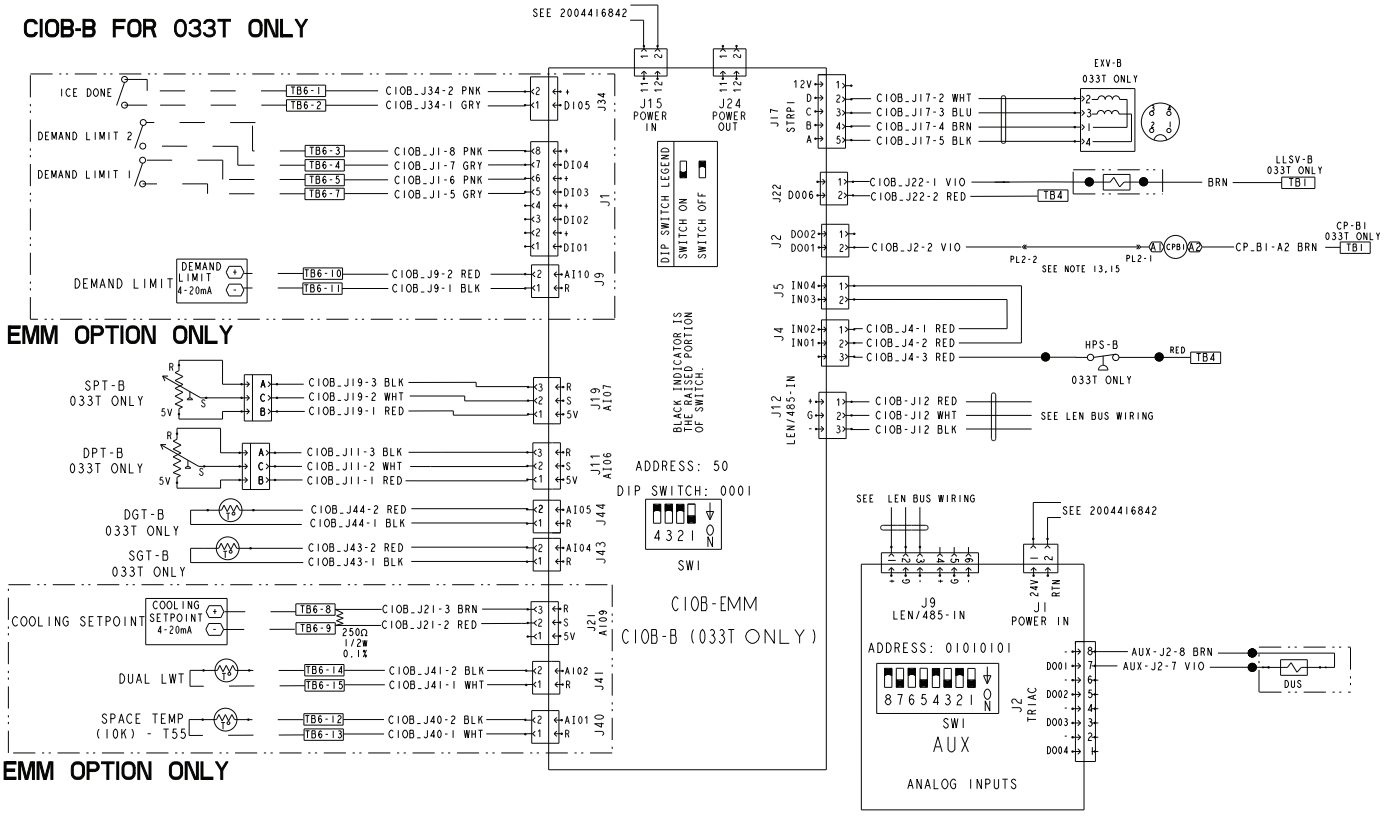
- DENOTES TEMPERATURE SENSOR
- DENOTES PRESSURE SENSOR
- DENOTES RELAY COIL
- DENOTES SHIELDED CABLE
- DENOTES SOLENOID
- DENOTES CONTACT
- DENOTES FLOAT SWITCH
- DENOTES SWITCH
- DENOTES FIELD WIRING
- DENOTES INTERNAL WIRING HARNESS

ABBREVIATION LISTING

CF	CONDENSER FAN	DGS	DISCHARGE GAS TEMPERATURE	LLSV	LIQUID LINE SOLENOID VALVE
CP	COMPRESSOR	DP	DISCHARGE PRESSURE	LWT	LEAVING WATER TEMPERATURE
CWFS	CHILLER WATER FLOW SWITCH	DUS	DIGITAL UNLOAD SOLENOID	MP	MOTOR PROTECTOR
CWPI	CHILLED WATER PUMP INTERLOCK	EXV	EXPANSION VALVE	OAT	OUTDOOR AIR TEMPERATURE
CNPI	CONDENSER PUMP INTERLOCK	EWT	ENTERING WATER TEMPERATURE	PR	CONDENSER PUMP RELAY
CNFS	CONDENSER FLOW SWITCH	EISOR	EVAPORATOR ISOLATOR RELAY	SP	SUCTION PRESSURE
CWP	CHILLED WATER PUMP	HPS	HIGH PRESSURE SWITCH	SUCT	SUCTION TEMPERATURE
CWPR	CHILLED WATER PUMP RELAY	HGBP	HOT GASBYPASS	VENI	VENTILATION INTERLOCK
CIOB	CARRIER INPUT/OUTPUT BOARD			VENT	VENTILATION OUTPUT

From 2004005001 Rev E

Fig. 2 — 24V Control Wiring Schematic — 30MP Sizes 017-080



NOTES:
1. FIELD-SUPPLIED CONTROL CONDUCTORS TO BE AT LEAST 18AWG (AMERICAN WIRE GAGE) OR LARGER. THE CONTROL CABINET SHOULD ONLY BE USED FOR LOW VOLTAGE FIELD WIRING (50-V MAXIMUM.)
2. EACH DIGITAL OUTPUT LOOP SHALL BE LIMITED TO A MAXIMUM OF 1A AC RMS STEADY-STAT @ 24VAC. LIGHT LOAD RELAY IS RECOMMENDED AND THE COIL VOLTAGE OF RELAY IS 24VAC. POWER SUPPLY SHALL BE PROVIDED BY CUSTOMER FUSED TRANSFORMER.
3. EACH DISCRETE INPUT LOOP IS POWERED BY INTERNAL 24VAC POWER SUPPLY. FIELD OPTIONAL CONTACTS OR SWITCH MUST HAVE 24VAC RATING, MAX CURRENT IS 60MA. NOMINAL CURRENT IS 10MA. SWITCHES WITH GOLD PLATED BIFURCATED CONTACTS ARE RECOMMENDED.
4. THE ANALOG INPUTS SUPPORT 5K/10K NTC THERMISTORS, 0/4-20MA SENSORS AND 5VDC SENSORS. IF 100K IS USED IT WILL REQUIRE A SOFTWARE CONVERSION TABLE TO CONVERT TO 10K. FOR DETAILS REFER TO THE CONTROLS, OPERATIONS, AND TROUBLE SHOOTING MANUAL AND MATCH WITH SOFTWARE.
5. EACH ANALOG OUTPUT LOOP SUPPORTS 0/4-20MA OR 0/2-10VDC VOLTAGE OUTPUT. THE ANALOG OUTPUT LOOP IS POWERED BY 10B BOARD. DO NOT SUPPLY EXTERNAL POWER. FOR DETAILS REFER TO THE CONTROLS, OPERATIONS, AND TROUBLE SHOOTING MANUAL AND MATCH WITH SOFTWARE.
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7. GROUND SHIELDS AT SIGNAL GENERATING DEVICES
8. ALL FIELD INTERLOCK CONTACTS MUST HAVE A MINIMAL RATING OF 2A@24VAC SEALED.
9. IF MOTOR PROTECTOR IS USED REMOVE JUMPER FROM ASSOCIATED TERMINAL BLOCKS
10. IF CHILLED WATER PUMP INTERLOCK OR CONDENSER PUMP INTERLOCK IS USED REMOVE JUMPER ACROSS ASSOCIATED TERMINAL BLOCKS
11. FACTORY INSTALLED WIRING MUST MEET REQUIREMENTS OF UL 60335/ UL 1995, ANY FIELD INSTALLED MUST ALSO FOLLOW THE APPLIANCE CODES, ALL WIRING MUST BE RATED 75 DEGREE C
12. COMPRESSOR AND FAN MOTORS ARE THERMALLY PROTECTED - THREE PHASE MOTORS PROTECTED AGAINST PRIMARY SINGLE PHASE CONDITIONS
13. CORESENSE COMPRESSOR PROTECTION MODULE IS USED ON THE FOLLOWING UNITS: A1 COMPRESSOR- DIGITAL OPTION- 031,033,041,046T (ALL VOLTAGES) A1,A2 COMPRESSOR- 051,056,066,080T (ALL VOLTAGES). JUMPER USED ON ALL OTHER COMPRESSORS.
14. FOR FUSE REPLACEMENT TABLE REFERENCE 2003716045 SHEET 2
15. IF MP IS USED, REMOVE THE JUMPER
16. JUMPER TB5-33 AND TB5-34 IF PHASE MONITOR, RRB1, OPTION NOT USED
17. JUMPER TB5-21 AND TB5-22 IF REFRIGERANT LEAK DETECTOR SYSTEM IS NOT REQUIRED. SEE INSTALLATION MANUAL FOR REQUIREMENTS.
18. REMOVE JUMPER BETWEEN TB5-1 AND TB5-2 IF CNFS/CNPI OPTION IS USED.
19. REMOVE JUMPER BETWEEN TB5-3 AND TB5-4 IF CWPI OPTION IS USED.

LEGEND

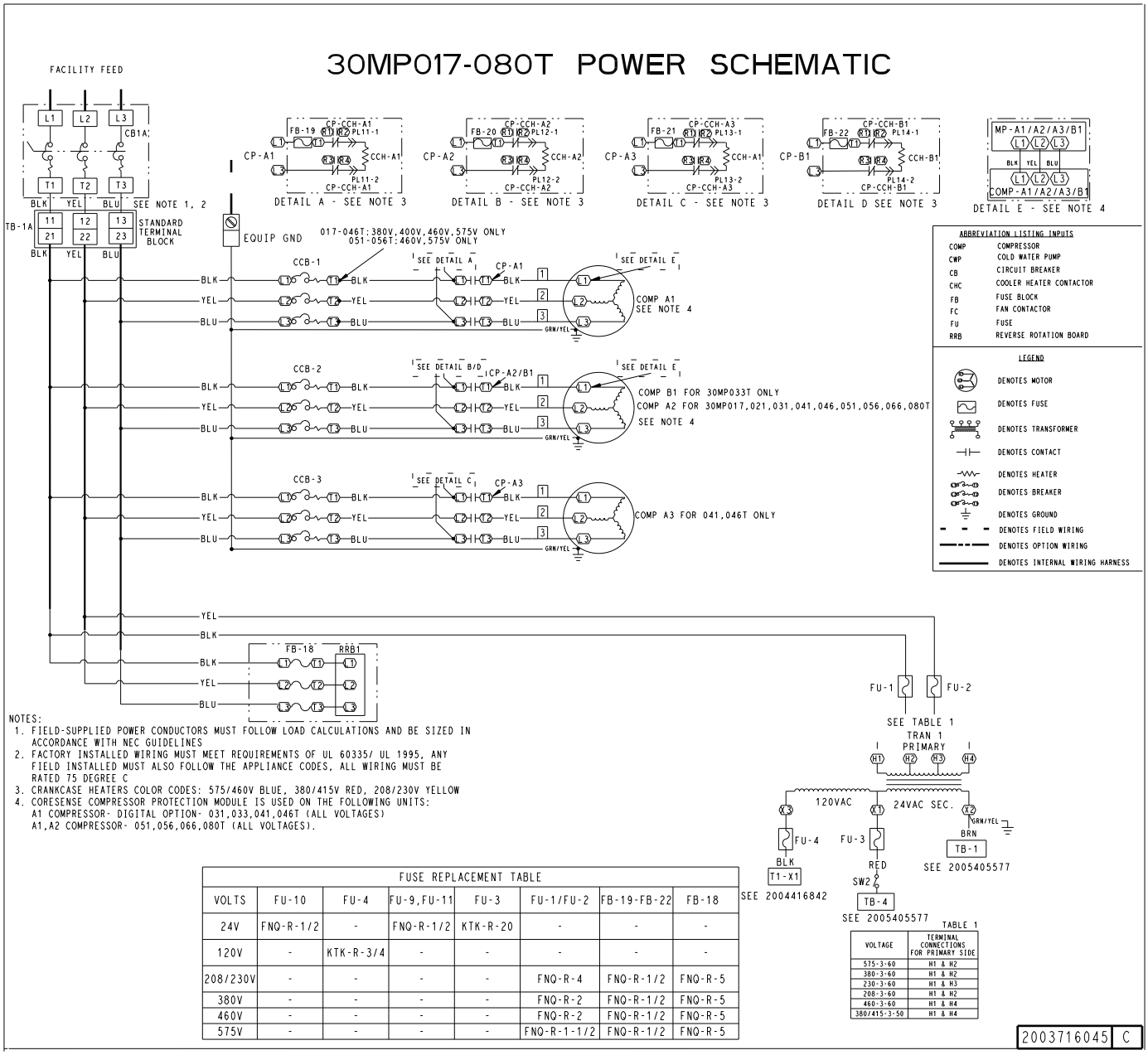
- DENOTES TEMPERATURE SENSOR
- DENOTES PRESSURE SENSOR
- DENOTES RELAY COIL
- DENOTES SHIELDED CABLE
- DENOTES SOLENOID
- DENOTES CONTACT
- DENOTES FLOAT SWITCH
- DENOTES SWITCH
- DENOTES FIELD WIRING
- DENOTES INTERNAL WIRING HARNESS

ABBREVIATION LISTING

CF	CONDENSER FAN	DGS	DISCHARGE GAS TEMPERATURE	LLSV	LIQUID LINE SOLENOID VALVE
CP	COMPRESSOR	DP	DISCHARGE PRESSURE	LWT	LEAVING WATER TEMPERATURE
CWFS	CHILLER WATER FLOW SWITCH	DUS	DIGITAL UNLOAD SOLENOID	MP	MOTOR PROTECTOR
CWPI	CHILLED WATER PUMP INTERLOCK	EXV	EXPANSION VALVE	OAT	OUTDOOR AIR TEMPERATURE
CNPI	CONDENSER PUMP INTERLOCK	EWT	ENTERING WATER TEMPERATURE	PR	CONDENSER PUMP RELAY
CNFS	CONDENSER FLOW SWITCH	EISOR	EVAPORATOR ISOLATOR RELAY	SP	SUCTION PRESSURE
CWP	CHILLED WATER PUMP	HPS	HIGH PRESSURE SWITCH	SUCT	SUCTION TEMPERATURE
CWPR	CHILLED WATER PUMP RELAY	HGBP	HOT GASBYPASS	VENI	VENTILATION INTERLOCK
C10B	CARRIER INPUT/OUTPUT BOARD			VENT	VENTILATION OUTPUT

From 2004005001 Rev E

Fig. 2 — 24V Control Wiring Schematic — 30MP Sizes 017-080 (cont)



NOTES:
1. FIELD-SUPPLIED POWER CONDUCTORS MUST FOLLOW LOAD CALCULATIONS AND BE SIZED IN ACCORDANCE WITH NEC GUIDELINES
2. FACTORY INSTALLED WIRING MUST MEET REQUIREMENTS OF UL 60335/ UL 1995, ANY FIELD INSTALLED MUST ALSO FOLLOW THE APPLIANCE CODES, ALL WIRING MUST BE RATED 75 DEGREE C
3. CRANKCASE HEATERS COLOR CODES: 575/460V BLUE, 380/415V RED, 208/230V YELLOW
4. CORESENSE COMPRESSOR PROTECTION MODULE IS USED ON THE FOLLOWING UNITS:
   A1 COMPRESSOR- DIGITAL OPTION- 031,033,041,046T (ALL VOLTAGES)
   A1,A2 COMPRESSOR- 051,056,066,080T (ALL VOLTAGES).

FUSE REPLACEMENT TABLE

VOLTS	FU-10	FU-4	FU-9,FU-11	FU-3	FU-1/FU-2	FB-19-FB-22	FB-18
24V	FNQ-R-1/2	-	FNQ-R-1/2	KTK-R-20	-	-	-
120V	-	KTK-R-3/4	-	-	-	-	-
208/230V	-	-	-	-	FNQ-R-4	FNQ-R-1/2	FNQ-R-5
380V	-	-	-	-	FNQ-R-2	FNQ-R-1/2	FNQ-R-5
460V	-	-	-	-	FNQ-R-2	FNQ-R-1/2	FNQ-R-5
575V	-	-	-	-	FNQ-R-1-1/2	FNQ-R-1/2	FNQ-R-5

TABLE 1

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY SIDE
575-3-60	H1 & H2
380-3-60	H1 & H2
230-3-60	H1 & H3
208-3-60	H1 & H2
460-3-60	H1 & H4
380/415-3-50	H1 & H4

Fig. 3 — Power Schematic (30MP Sizes 017-080)

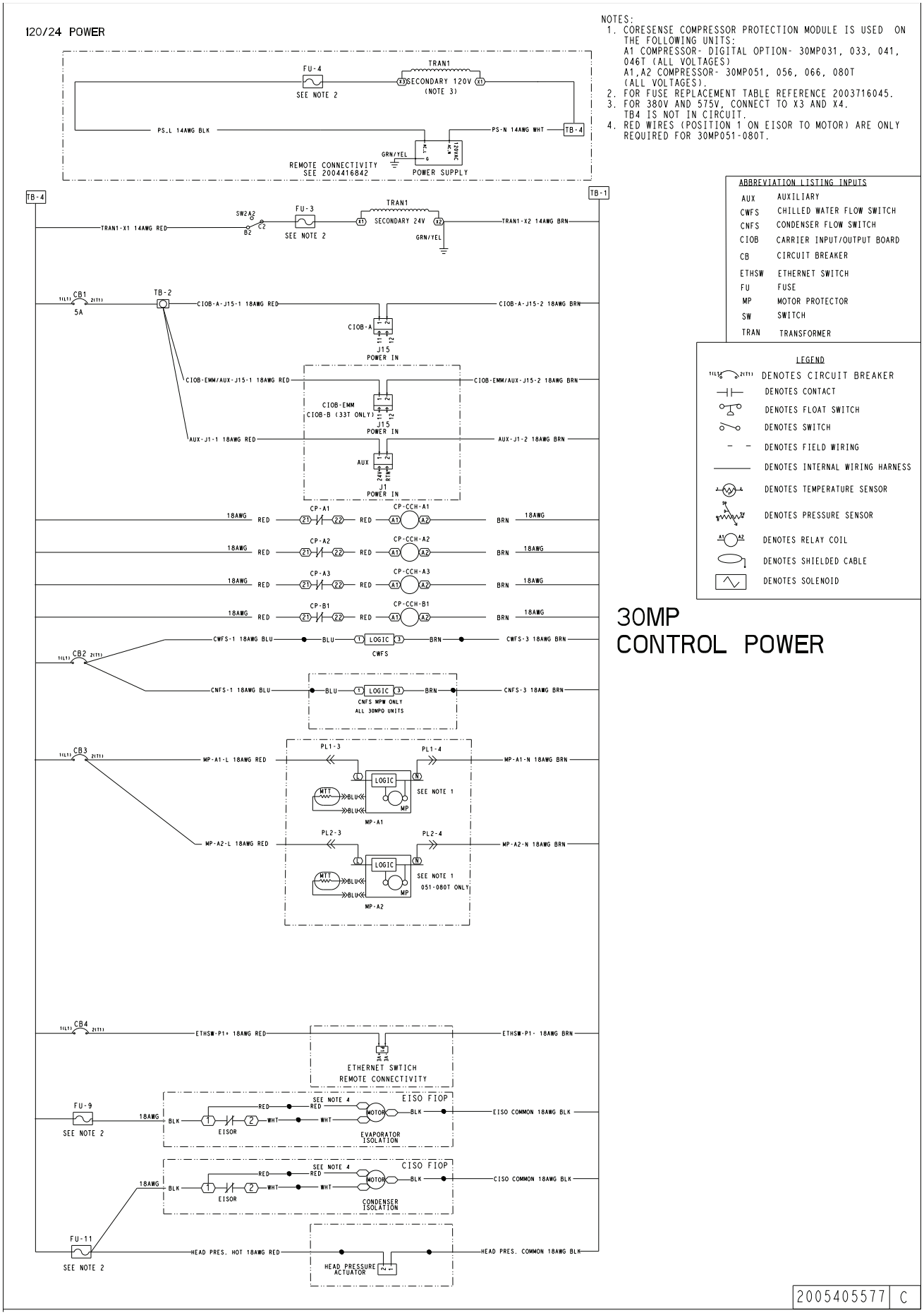


Fig. 4 — 24V Control Power Electrical Wiring Schematic (30MP Sizes 017-080)

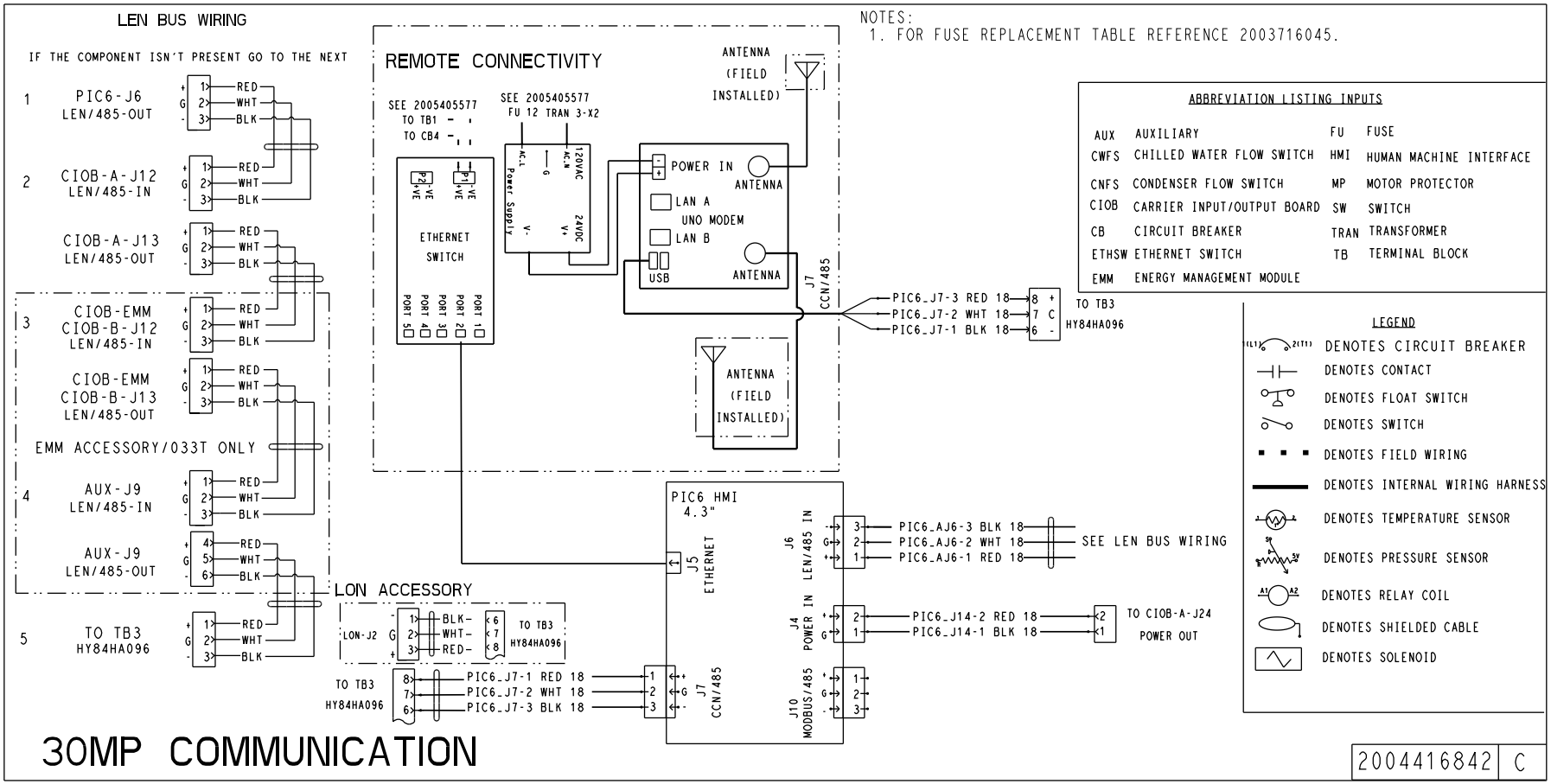


Fig. 5 — Communication Accessory Wiring Schematic (30MP)

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. TB5-18 AND TB5-19 ARE FOR CONTROL OF CHILLED WATER PUMP.
   TB5-16 AND TB5-17 ARE FOR CONTROL OF CONDENSER WATER PUMP.
   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 TB5-20 AND TB5-14,15 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 TB5-3 AND 4 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.
10. REMOVE FACTORY INSTALLED JUMPER BETWEEN TERMINALS TB5-1 AND TB5-2 WHEN FIELD CNPI IS INSTALLED.
11. REMOVE FACTORY INSTALLED JUMPER BETWEEN TERMINALS TB5-21 AND TB5-22 WHEN FIELD VENI IS INSTALLED.

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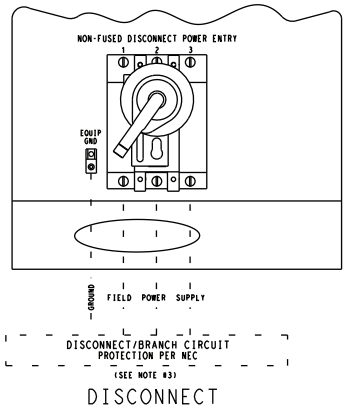
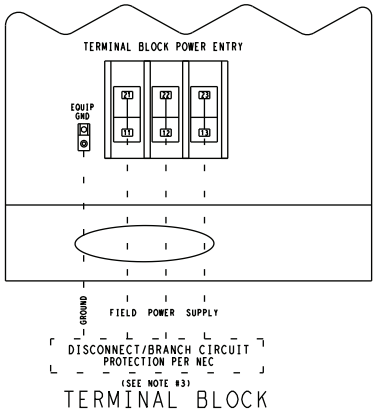
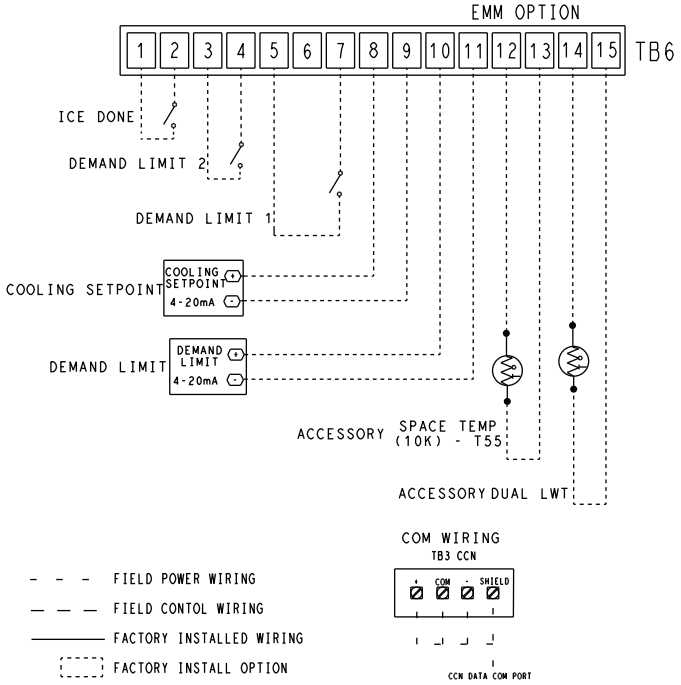
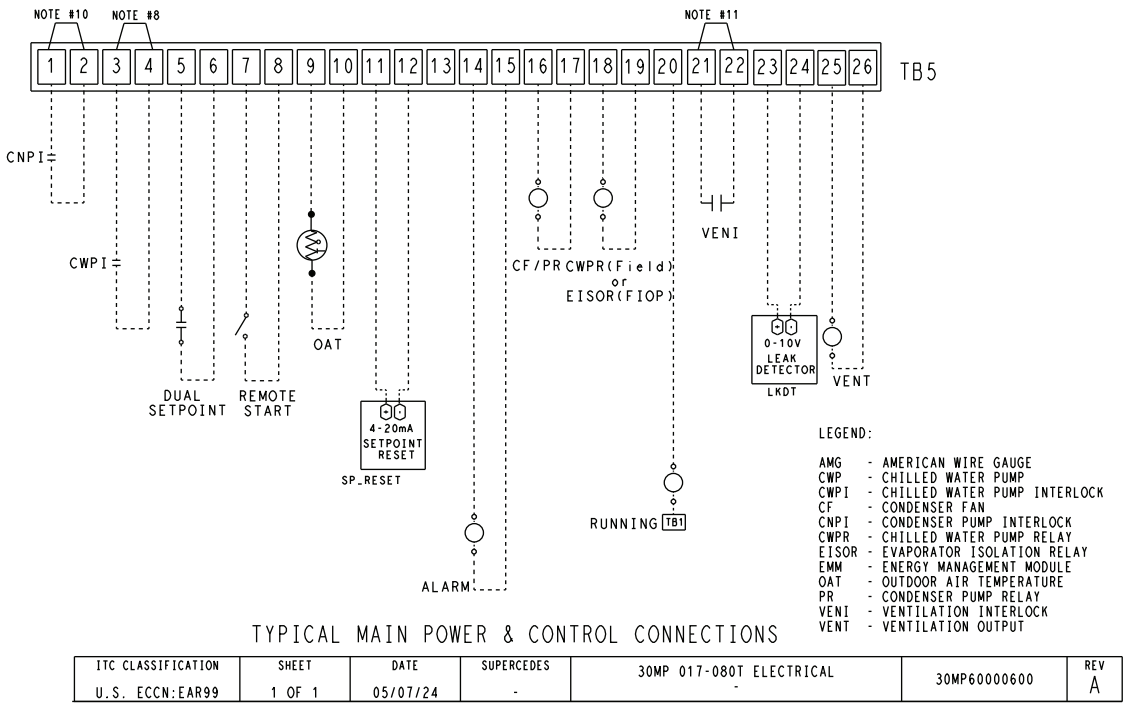




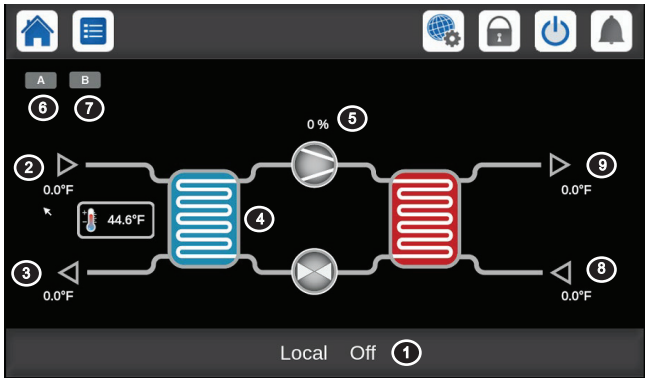




TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	30MP 017-080T ELECTRICAL	30MP60000600	REV
U.S. ECCN:EAR99	1 OF 1	05/07/24	-	-		A

Fig. 6 — Field Wiring Connections (30MP Sizes 017-080)



LEGEND

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

Fig. 7 — 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 20 for details.

Login — Press to enter passwords. See page 17 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 32 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 Table 66 on page 97 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 Fig. 7.
	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 17.
	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 32.
	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 jumpsback 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	FUNCTION
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	CCN Table successfully saved to system.
	COMMUNICATION FAILURE!	Equipment Controller did not respond while reading table content.
	LOW LIMIT EXCEEDED!	Value was written outside the lower bounds of the data point.
	HIGH LIMIT EXCEEDED!	Value was written outside the upper bounds of the data point.
	HIGH FORCE IN EFFECT!	Equipment controller rejects Force or Auto command due to a higher level force present.
	ACCESS DENIED!	A read-only data point or table was accessed and the request was denied.
	TABLE NOT FOUN !	
	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	FUNCTION
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.	
	Can not 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 20. 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. 8.)
- 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 20. 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 20. 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. 8 — 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. 9-11 for rolling password screen examples.

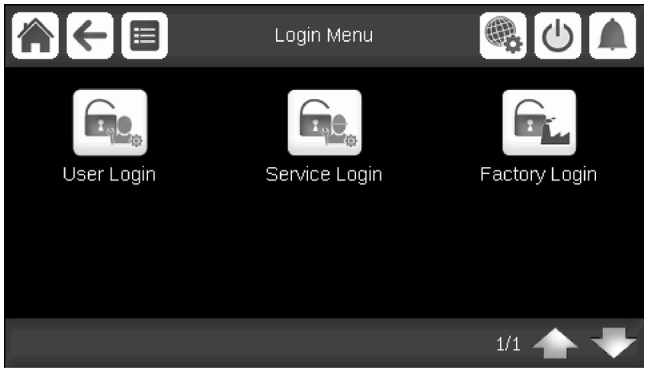


Fig. 9 — Rolling Password Login Screen

Fig. 10 — Factory Login Level Screen

Fig. 11 — 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 and 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. 12.)

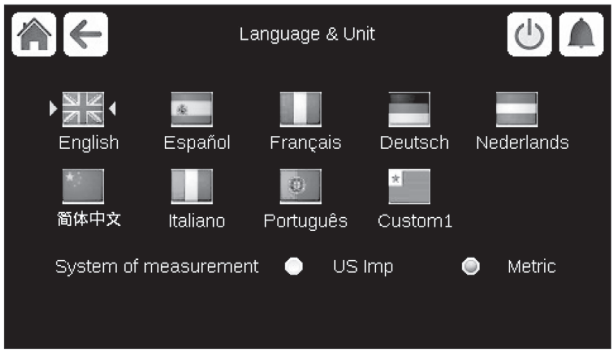


Fig. 12 — Language and Unit Screen

Changing the Units of Measurement

The Language and 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 and Unit screen, then press any other button or icon on the Language and Unit screen. The units can be changed without being logged in to the controller. (See Fig. 12.)

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 13 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 14 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.

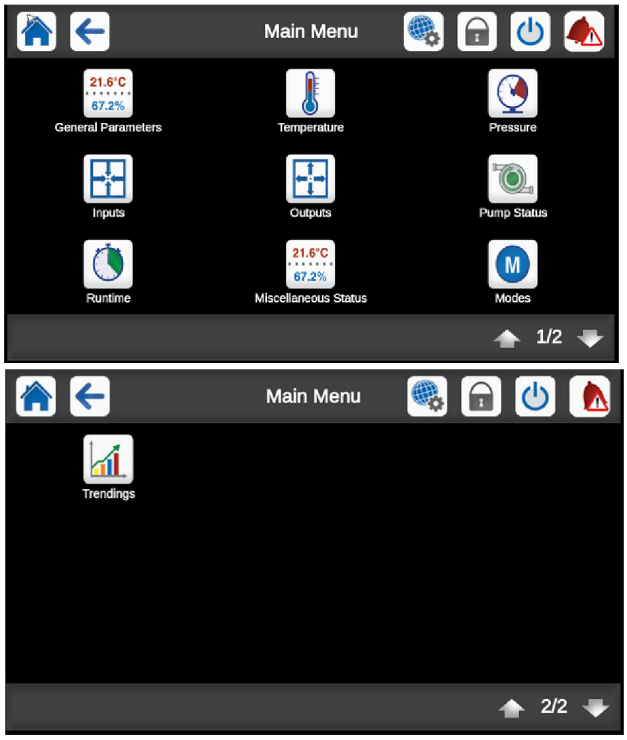


Fig. 13 — Main Menu, Page 1 and Page 2

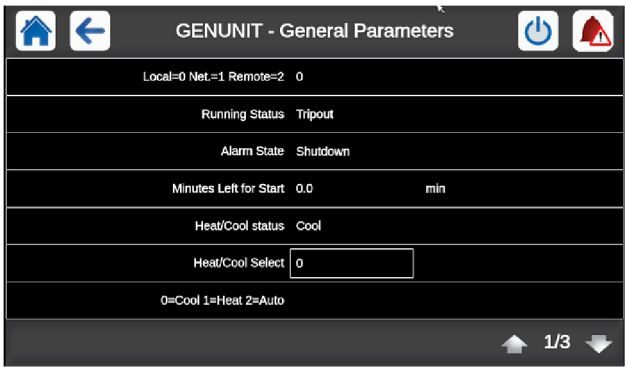


Fig. 14 — General Parameters, Page 1

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 in Appendix A, Table N on page 114 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. 15.) 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. 15 — Data Entry Keyboard

If a numeric response is required, either a numeric keypad (see Fig. 16) or a force/relinquish keypad (see Fig. 17) 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 .

GENERAL CONFIGURATION TABLE

This table contains configuration settings for the unit. Select ***Main Menu → Configuration Menu → General Configuration*** to access the table (Fig. 18).

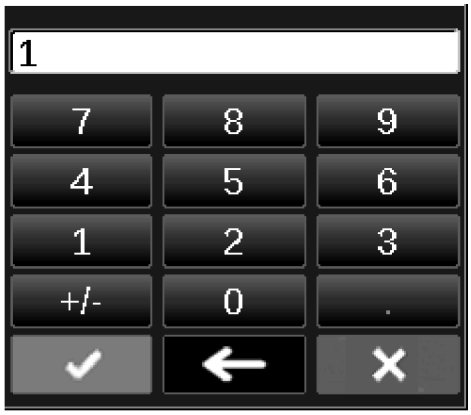


Fig. 16 — Numeric Keypad

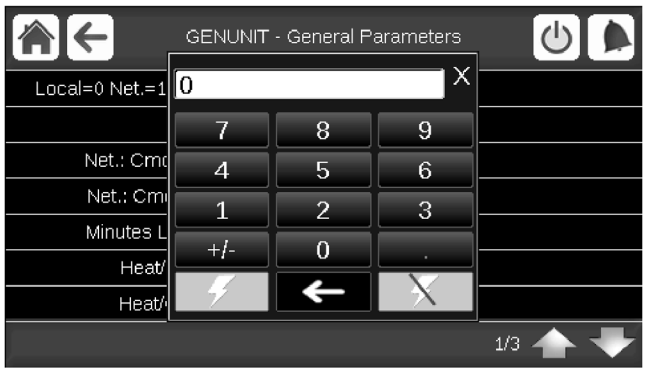


Fig. 17 — Force/Relinquish Keypad

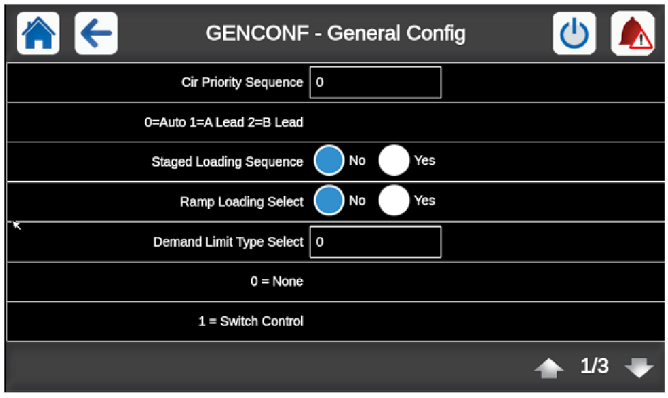


Fig. 18 — General Configuration

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 Table N on page 114 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. 19.

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. 20.

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.

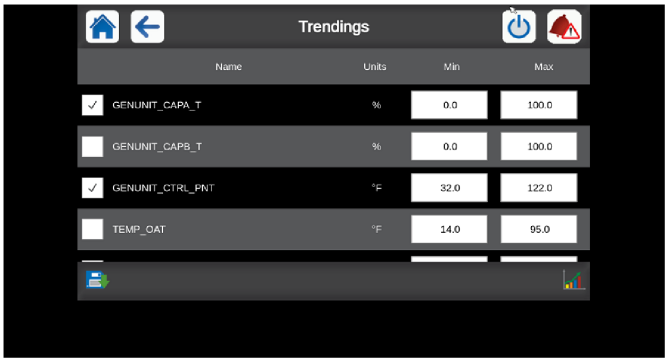


Fig. 19 — Trendings Display Screen

Fig. 20 — Trendings Configuration Screen

MENU ARCHITECTURE

See Fig. 21-24 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 108 and 125, respectively.

SETTING TIME AND DATE

The date and time for the controls can be set by opening the ***System Menu → Date & Time***. The Date and 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. 23 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 F for the "Carrier Controller Web and Network Interface Parameters" on page 142 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. 25 for interface and connectors.

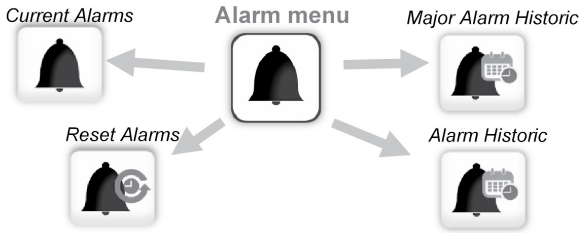


Fig. 21 — Alarm Menu

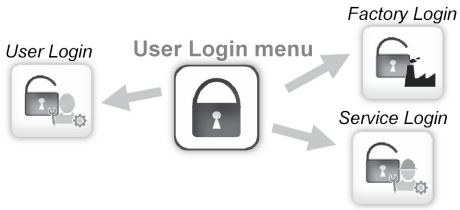


Fig. 22 — Login Menu

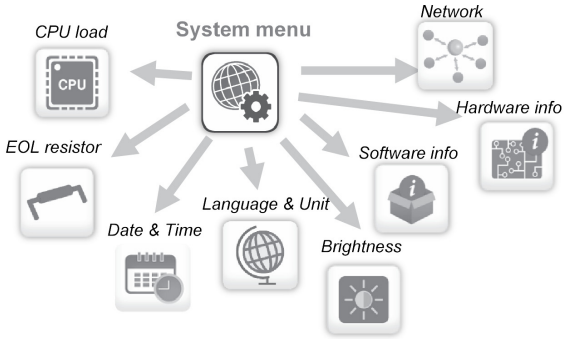


Fig. 23 — System Menu

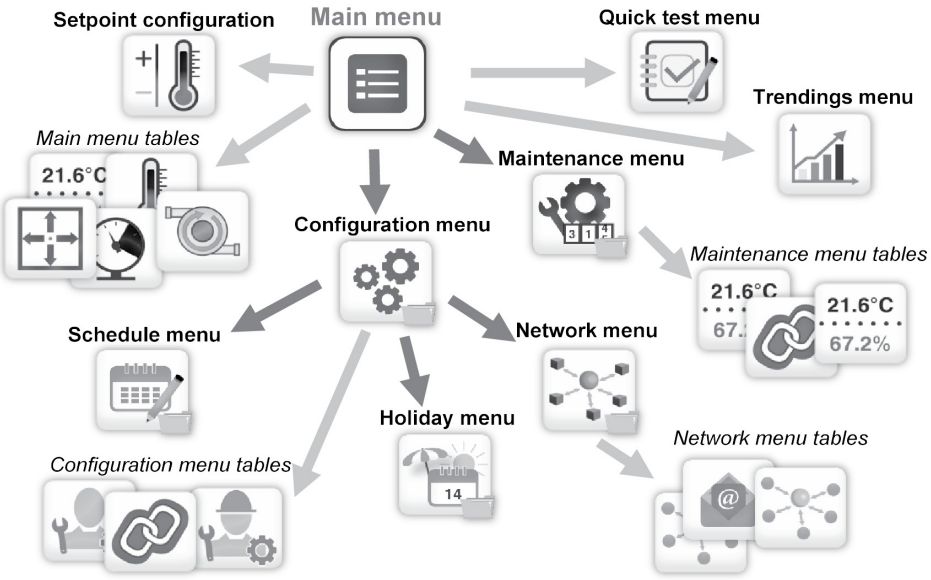


Fig. 24 — Main Menu

Table 5 — Carrier Controller Display Port Connections[a]

CONNECTOR	TYPE/ PINOUT	FUNCTION
J5	RJ45	ETH0: BMS Interface, BACnet, 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)
	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

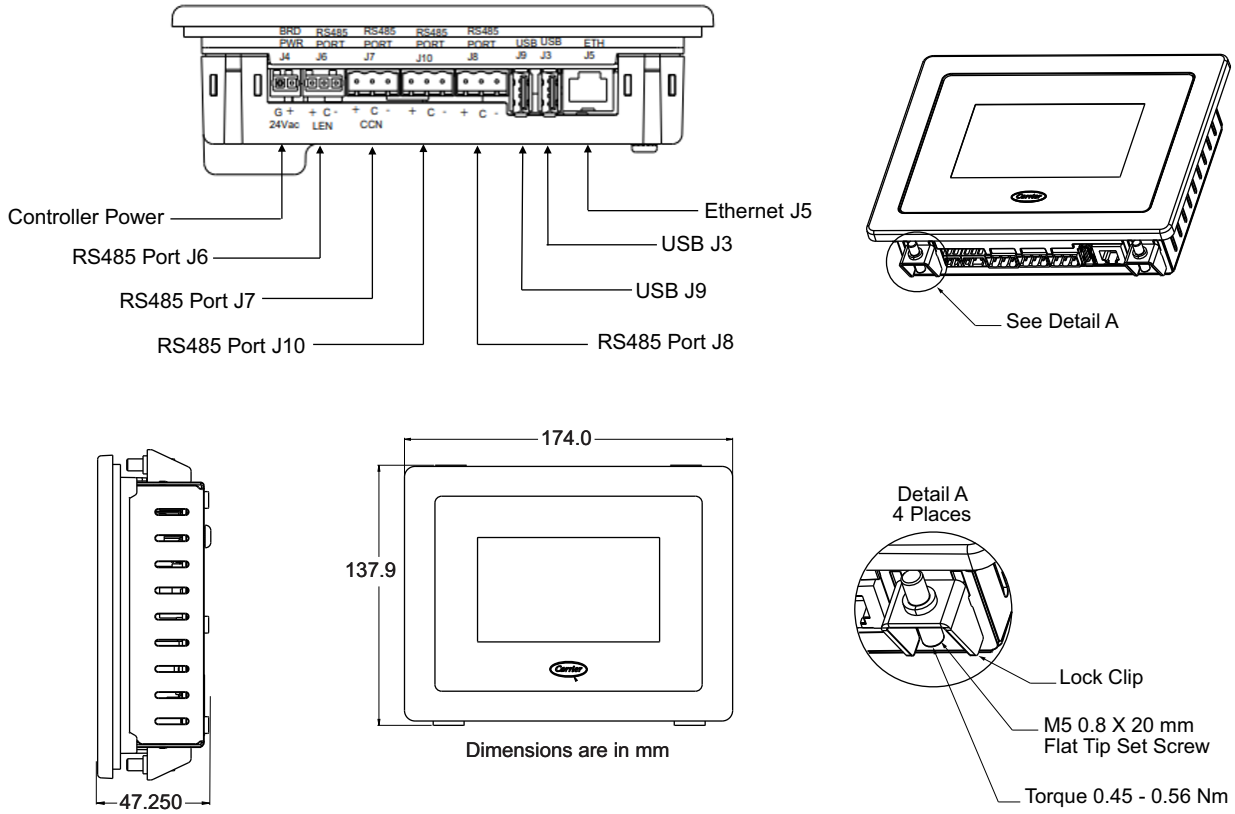


Fig. 25 — Carrier Controller Display Interface and Connectors

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. 26.) 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 Table 7 for auxiliary outputs. See Tables 8-9 for a list of inputs and outputs for CIOB-A/B.

NOTE: CIOB-B also includes the EMM function.

Table 6 — CIOB A and B/EMM DIP Switch Settings

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

Table 7 — AUX Outputs

POINT DESCRIPTION	I/O POINT NAME	BOARD CONNECTOR	IN/OUT TYPE	CCN POINT NAME
OUTPUTS				
Digital Unload Solenoid	DO-01	J2	Triac	DUS

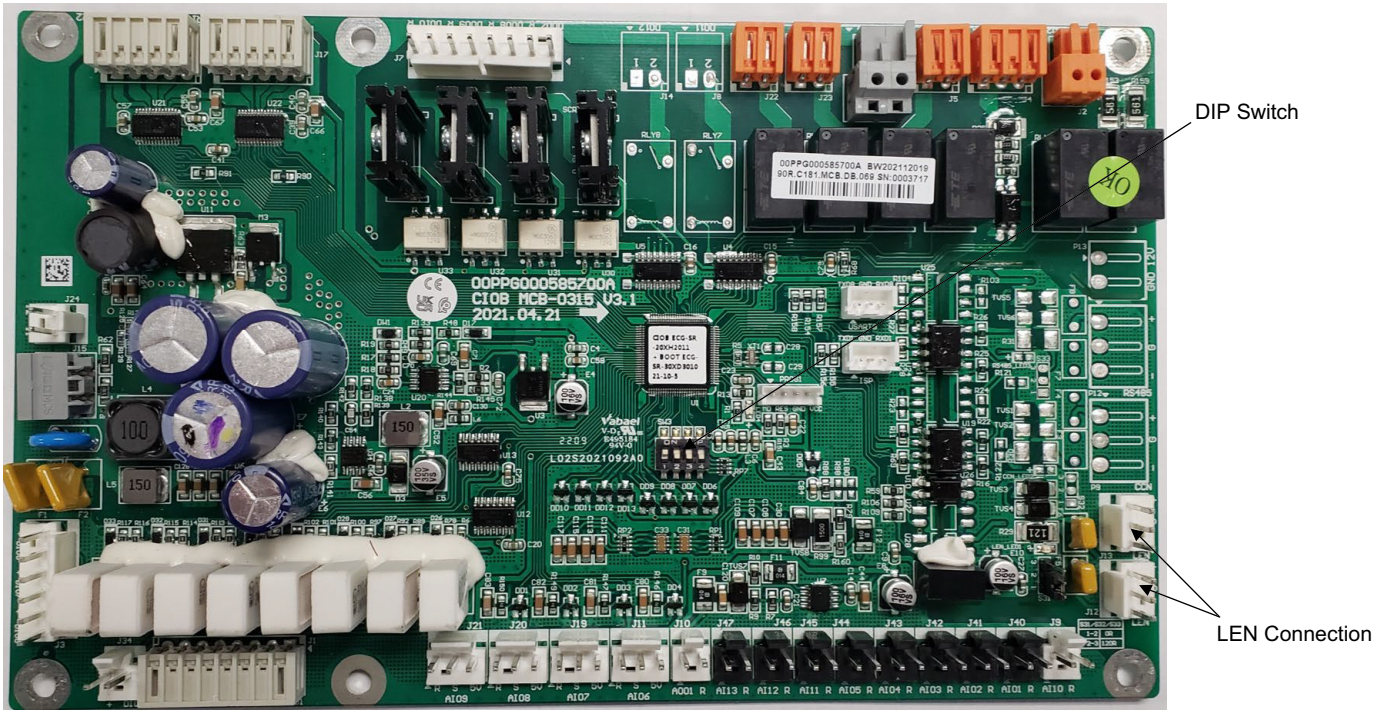


Fig. 26 — CIOB / Energy Management Module

Table 8 — 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
Chilled Water Flow Switch	DI-05	J34	Dry contact 5V	FLOW_SW
Condenser Water Flow Switch	DI-06	J3	Dry contact 5V	CNFS
Ventilation Interlock	DI-07	J3	Dry contact 5V	VENTI
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
Leak Detector	AI-08	J20	0..5V	LEAK V1
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
Leakage Detection	AI-08	J20	4-20mA	LEAK V1
Set Point Reset	AI-10	J9	4-20 mA	SP_RESET
Condenser Entering Water Temperature	AI-11	J45	Thermistor	CEWT
Condenser Leaving Water Temperature	AI-12	J46	Thermistor	CLWT
Outputs				
Compressor A1	DO-01	J2	Relay	CP_A1
Compressor A2	DO-02	J2	Relay	CP_A2
Compressor A3	DO-03	J6	Relay	CP_A3
Hot Gas Bypass	DO-04	J6	Relay	HGBP_V
Liquid Line Solenoid (Valve A)	DO-05	J23	Relay	LLSV_A
Running Relay	DO-06	J22	Relay	RUN
Evaporator Pump Relay	DO-07	J7	Triac	PUMP_1
Condenser Pump Relay	DO-08	J7	Triac	CPUMP
Ventilation Output	DO-09	J7	Triac	VENT
Alarm Relay	DO-10	J7	Triac	ALARM
EXV Position (Circuit A)	STPR1	J17	Stepper motor	EXV_A
Heat Pressure Actuator	AO-01	J10	0-10V	HEAD_ACT

LEGEND

CCN — Carrier Comfort Network

EMM — Energy Management Module

PCB — Printed Circuit Board

Table 9 — CIOB-B/EMM 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 Switch	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 250 Ω 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
Liquid Line Solenoid (Valve B)	DO-06	J22	Relay Contact	LLSV_B
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. 27.) 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. See Table 10.

DIAL SETTINGS

The reverse rotation board has 2 dials. (See Fig. 28.) 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.

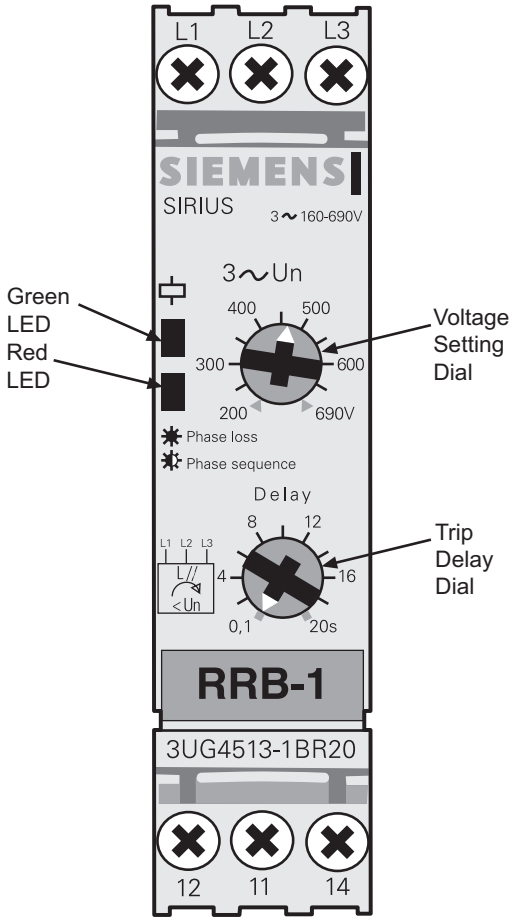


Fig. 27 — Reverse Rotation Board (RRB)

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.

Table 10 — LED Status/Functions

LED STATUS	FUNCTION[a]
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(S):

a. 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.

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 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

Table 12 — AUX 2 Board Configuration

POINT DESCRIPTION	I/O POINT NAME	IN/OUT TYPE	CCN POINT NAME
AUX 2 Board Outputs			
Digital Unloader Solenoid (DUS)	DO 1	Triac	DUS

LEGEND

CCN — Carrier Comfort Network

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.

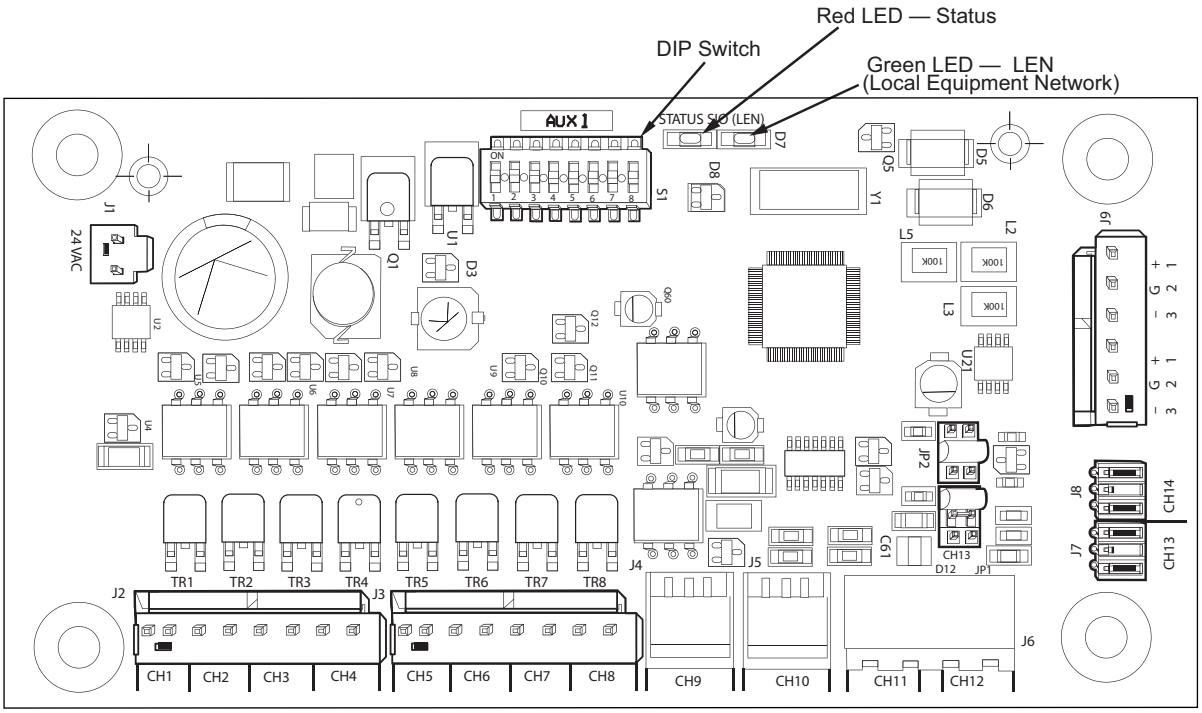


Fig. 28 — AUX Board

Energy Management Module (EMM)

The EMM (address 50) is available as a factory-installed option or as a field-installed accessory. (Refer to Fig. 26 on page 22.) 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 Configuration → 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 function is handled by the CIOB-B board which 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. Refer to Table 6 on page 22 for EMM dip switch settings and CIOB-B/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 30MP 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.

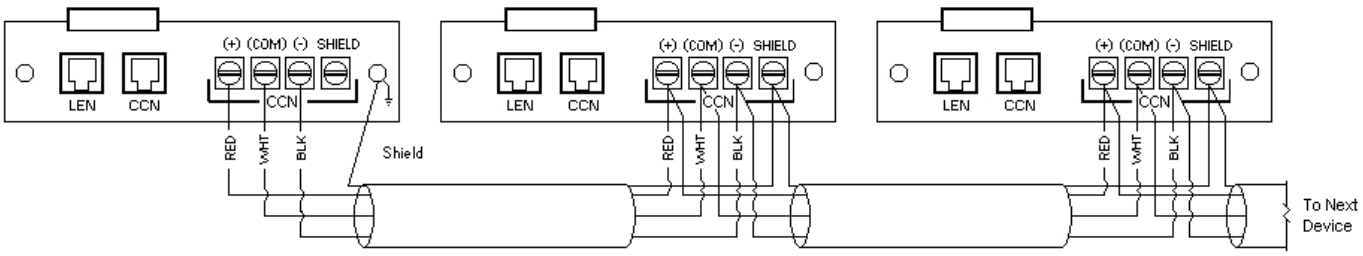


Fig. 29 — Carrier Controller CCN Communication Wiring

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 30MP 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. Fig. 1-6.

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

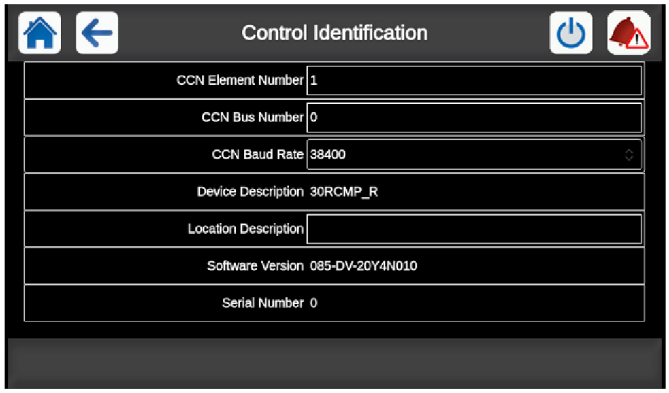


Fig. 30 — CCN Control Identification Screen

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, Table D on page 110 for login details. See Appendix A, Table A to AL starting on page 108 for descriptions of all control tables and parameters.

Table 14 — Main Menu[a]

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

NOTE(S):

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

Table 15 — Configuration Menu[a]

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

NOTE(S):

a. Minimum access level required.
b. User.
c. Factory.
d. Service.

Table 16 — Holiday Menu[a]

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

NOTE(S):

a. Minimum access level required.
b. User.

Table 17 — Schedule Menu[a]

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

NOTE(S):

a. Minimum access level required.
b. User.

Table 18 — Network Menu[a]

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	EMAILCFG	USER, SERVICE, FACTORY[b]	Email Configuration	
2	MODBUSRS	USER, SERVICE, FACTORY[b]	ModbusRTU Configuration.	
3	MODBUSIP	USER, SERVICE, FACTORY[b]	ModbusTCP/IP Configuration	
4	BACNET	USER, SERVICE, FACTORY[b]	BACNet Standard Configuration	

NOTE(S):

a. Minimum access level required.
b. User.

Table 19 — Maintenance Menu[a]

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	

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

Table 20 — System Menu[a]

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

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

Table 21 — Alarm Menu[a]

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

NOTE(S):

a. Minimum access level required.
b. User.
c. 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

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.

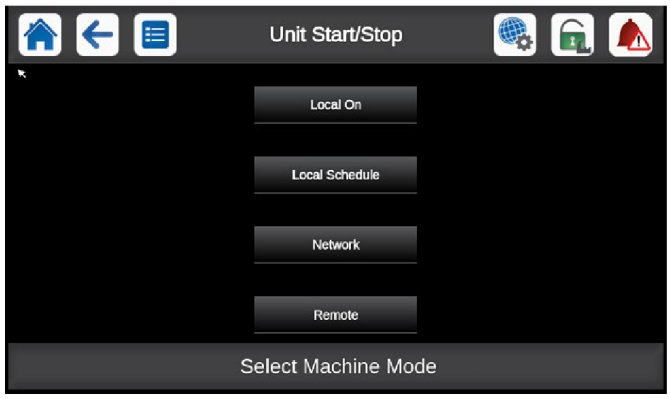


Fig. 31 — Machine Control Methods

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 35 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.

MASTER

With this mode selected, the unit is operating as the Master unit of a 2-unit Master Secondary Chiller Plant. The Master 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 Master 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 (refer to 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[a]

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**: Master control type. This parameter status will determine if the master unit is going to be controlled locally, remotely, or through Network ***(Main Menu → Maintenance → Primary Secondary Main → Primary Control Type)***.
- **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 transitions through the Off state before being allowed to start again. At this time the on-to-off delay is always applied.

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.

SETPOINT SELECTION

The Control Point shown on the left side for cooling or on the right side for heating 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 47.) 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 setpoints are set via the Setpoint Table (***Main Menu → Setpoint Configuration***). Cooling Setpoint 1, Cooling Setpoint 2, Heating Setpoint 1, Heating 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 and 26).

See the Ice Storage Operation section on page 53 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 37).

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

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 parameter Glycol in Loop (***Main Menu → Configuration Menu → Service Configuration → Glycol in Loop)*** is set to Yes. The Glycol in Loop parameter should only be set to Yes when 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).

Table 26 — Condenser Setpoint Limits

SETPOINT LIMITS	EVAPORATOR FLUID TYPE (flui_typ)
Minimum	77°F (25°C)
Maximum	140°F (60°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 or Heating Setpoint 1 will be activated, and when the period is Unoccupied, Cooling Setpoint 2 or Heating 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**) or Heating Setpoint 1 (**HSP1**) 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**) or Heating Setpoint 1 (**HSP1**) (***Main Menu → Setpoint Configuration → Cooling Setpoint 1*** or ***Heating Setpoint 1***) during the occupied period and Cooling Setpoint 2 (**CSP2**) or Heating Setpoint 2 (**HSP2**) (***Main Menu → Setpoint Configuration → Cooling Setpoint 2*** or ***Heating 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 27 for details on how the active cooling setpoint is determined based on unit operating type and parameter settings.

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.

Table 27 — 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/hsp1
	sp-2	No	Any configuration	Any configuration	Default	csp2/hsp2
	sp-2	Yes	Close	Any configuration	—	csp2/hsp2
	sp-2	Yes	Open	Any configuration	—	Ice_sp
	Auto	Default	Any configuration	Any configuration	Occupied	csp1/hsp1
	Auto	No	Any configuration	Any configuration	Unoccupied	csp2/hsp2
	Auto	Yes	Close	Any configuration	Unoccupied	csp2/hsp2
	Auto	Yes	Open	Any configuration	Unoccupied	Ice_sp
Remote	Default	Default	Any configuration	Open	Default	csp1/hsp1
	Default	No	Any configuration	Close	Default	csp2/hsp2
	—	Yes	Close	Close	—	csp2/hsp2
	Default	Yes	Open	Close	Default	Ice_sp
Network	Default	Default	Any configuration	Any configuration	Occupied	csp1/hsp1
	Default	No	Any configuration	Any configuration	Unoccupied	csp2/hsp2
	Default	Yes	Close	Any configuration	Unoccupied	csp2/hsp2
	Default	Yes	Open	Any configuration	Unoccupied	Ice_sp

LEGEND

csp1 — Cooling Setpoint 1
csp2 — Cooling Setpoint 2
hsp1 — Heating Setpoint 1
hsp2 — Heating Setpoint 2
Ice_sp — Cooling Ice Setpoint

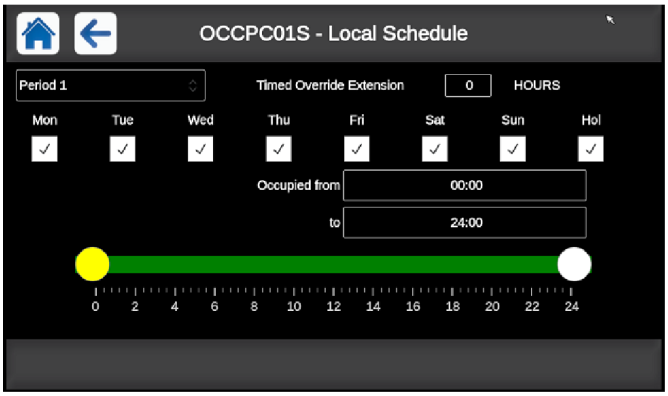


Fig. 33 — Schedule Menu

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 28, 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 28 — 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 32). 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 Configuration → 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 Configuration***
	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°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 the parameter Glycol in Loop ***(Main Menu → Configuration Menu → Service Configuration → Glycol in Loop)*** is set to YES. The Glycol in Loop parameter should only be set to YES when the chiller is used in comfort cooling applications and 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. These units are factory equipped with lower refrigerant charge and must have brine or glycol added to the chilled water loop. The Low Brine option will allow for a setpoint temperature down to 20°F (–6.7°C). See 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 Configuration → 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.

Heating Application

The 30MPQ units are designed to use condenser water loop for heating. The control logic will vary capacity to meet the condenser leaving water temperature. The heating function can provide leaving condenser temperature, CLWT, from 77 to 140°F. This is configured by changing the Heat/Cool Select to 1 (Heat) (***Main Menu → General Parameters → Heat → Cool Select***). Condenser entering and leaving water temperature thermistors must be installed and enabled (***Main Menu → Configuration → Service Parameters → Enable Cond. EWT/LWT***=Yes) to use heating application. Service level access is required to enable condenser loop thermistors.

NOTE: Heating function is not compatible with head pressure control option. This must be disabled if option is present, ***Main Menu → Configuration → Factory → Enable Head Press Act A*** = No. Assure valve is in open position. See “Manual Override” on page 66.

Cooler Pump Sequence of Operation

Whenever the unit is in an ON status, as defined by the one of the following conditions, the cooler pump relay will be enabled.

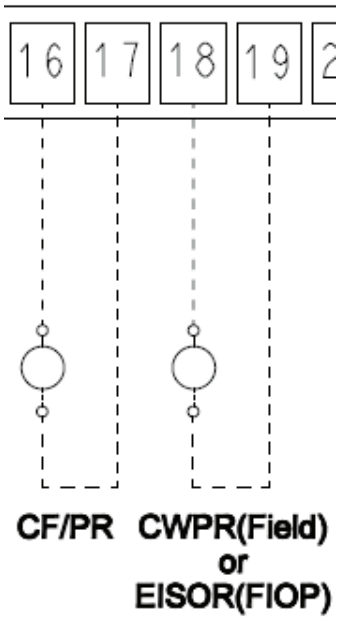
1. The Enable-Off-Remote Switch in ENABLE, (***CTRL***=0).
2. Enable-Off-Remote Switch in REMOTE with a Start-Stop remote control closure (***CTRL*=0**).
3. An Occupied Time Period from an Occupancy Schedule in combination with items 1 or 2 (***CTRL*=2**).
4. A CCN Start-Stop Command to Start in combination with items 1 or 2 (***CTRL*=3**).

Certain alarm conditions and Operating Modes will turn the cooler pump relay ON. This sequence will describe the normal operation of the pump control algorithm.

When the unit cycles from an ON state to an OFF state, the cooler pump output will remain energized for the Cooler Pump Shutdown Delay (***Configuration → OPT1 → PM.DY***). The delay is configurable from 0 to 10 minutes. The factory default is 1 minute. If the pump output was deenergized during the transition period, the pump output will not be energized.

The Cooler Pump Relay will be energized when the machine is ON. The chilled water pump interlock circuit consists of a chilled water flow switch and a field-installed chilled water pump interlock. If the chilled water pump interlock circuit does not close within five (5) minutes of starting, an A200 - Cooler Flow/Interlock failed to close at Start-Up alarm1 will be generated and chiller will not be allowed to start.

If the chilled water pump interlock or chilled water flow switch opens for at least three (3) seconds after initially being closed, an A201 - Cooler Flow 1 Interlock Contacts Opened During Normal Operation alarm will be generated and the machine will stop. See Fig. 34.



LEGEND

CF	—	Condenser Fan
CWPR	—	Chilled Water Pump Relay
EISOR	—	Evaporator Isolation Relay
PR	—	Condenser Pump Relay

Fig. 34 — Wiring for Pump Control

Condenser Pump/Fan Output Control

The PIC6 controller has the capability to control either a condenser fan output or a condenser pump output.

To activate the output, go to (***Main Menu → Configuration → Pump Configuration → Cond Pump Sequence)*** and select 1**.** (0 = No Pump, 1 = One Pump Only). Output will activate during the delay state to mix the water for an accurate temperature reading. When unit is *Ready* and no capacity is called for, the output is stopped after 2 minutes. *On call* for cooling the output will be activated. The output will deactivate 2 minutes after the last compressor is stopped.

Pumps can be forced on through CCN provided that the **CHIL_S_S** variable is disabled. NOTE: The cooler and condenser pumps cannot be CCN forced 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 fluid temperature setpoint. The optional minimum load control 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 or condenser for heating function, 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 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.

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 Minimum Load Control is enabled (***Main Menu → Configuration Menu → Factory Configuration → 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.

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

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 or 32°F (0°C) for comfort cooling units with glycol ***(Main Menu → Configuration Menu → Service Configuration → Glycol in Loop = Yes).*** The Exchanger Fluid Type ***(Main Menu → Configuration Menu → Factory Configuration → Exchanger Fluid Type)*** is set to 1 for both of the above. The freeze setpoint is Brine Freeze Setpoint ***(Main Menu → Configuration Menu → Service Configuration → Brine Freeze Setpoint)*** for Low Temperature Brine ***(Main Menu → Configuration Menu → Factory Configuration → 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 Minimum Load Control 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 or 32°F (0°C) for comfort cooling units with glycol (***Main Menu → Configuration Menu → Service Configuration → Glycol in Loop*** = **Yes**). The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Configuration → Exchanger Fluid Type***) is 1 for both of the above. 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 Configuration → 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 or 32°F (0°C) for comfort cooling units with glycol ***(Main Menu → Configuration Menu → Service Configuration → Glycol in Loop = Yes)***. The Exchanger Fluid Type ***(Main Menu → Configuration Menu → Factory Configuration → Exchanger Fluid Type)*** is 1 for both of the above. 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 Configuration → 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 no. 26 and no. 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 leaving water 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 Fig. 6 on page 13 and Fig. 35 on page 43 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 in the following paragraphs.

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 Error***). See Table 29 for descriptions of assembly error codes.

DUAL CHILLER CONTROL FOR PARALLEL APPLICATIONS

To configure the primary chiller for parallel applications, see Table 30. To configure the secondary chiller for parallel applications, see Table 31.

Table 29 — Primary/Secondary Assembly Error Codes

ERROR CODE	DESCRIPTION
1	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**).
2	Primary and secondary units have the same network address.
3	There is no secondary configured at the secondary address (**lagstat = 0, M_MSTSLV**).
4	Secondary pump sequence configuration incorrect.
5	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.
6	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.
7	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)**
8	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.
9	The secondary chiller is in Local or Remote control (**chilstat = 3**).
10	The secondary chiller is down due to fault (**chilstat = 5**).
11	The primary chiller operating type is not Primary.
12	No communication with the secondary unit.
13	Heat/Cool status for Primary is different than the Heat/Cool status for Secondary.
14	Primary and secondary serial/parallel configurations are different.
15	Primary using entering fluid control while in series mode.
16	Secondary using entering fluid control while in series mode.

Table 30 — 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 31 — 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 32. To configure the secondary chiller for series applications, see Table 33.

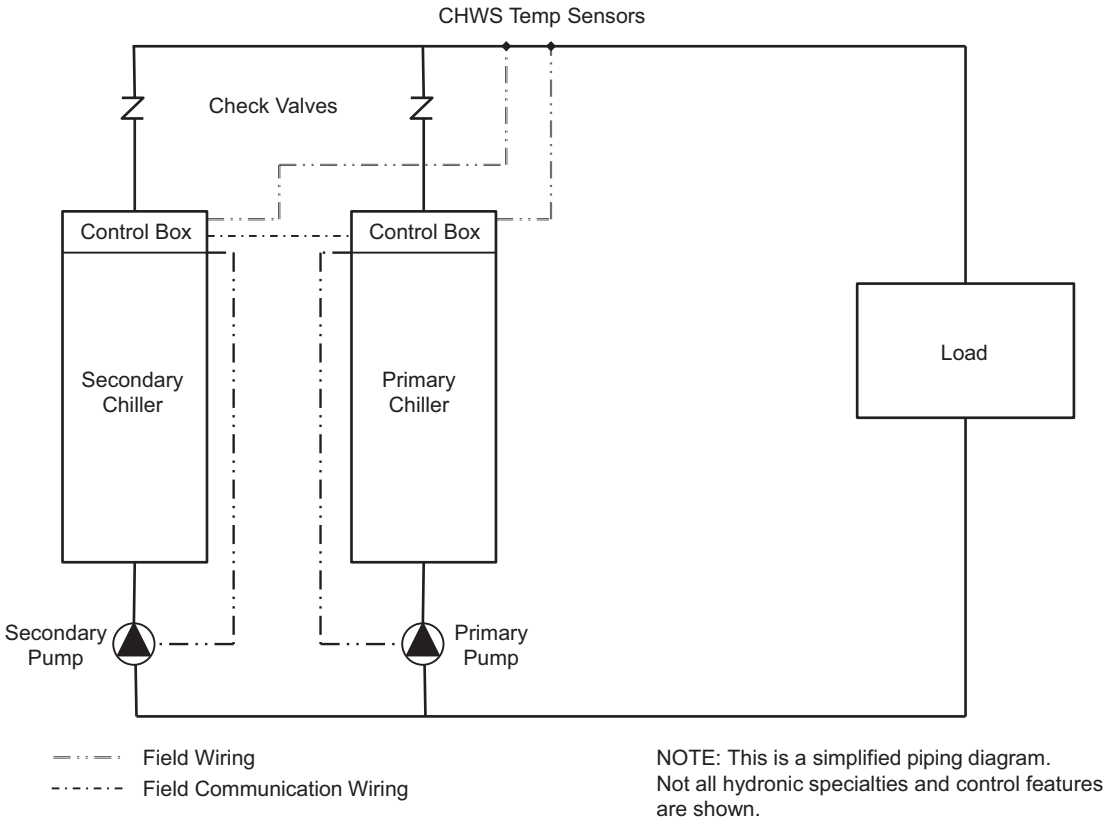


Fig. 35 — Typical Parallel Primary/Secondary Chillers Dedicated Primary Pumping, Variable Flow, Leaving Water Control

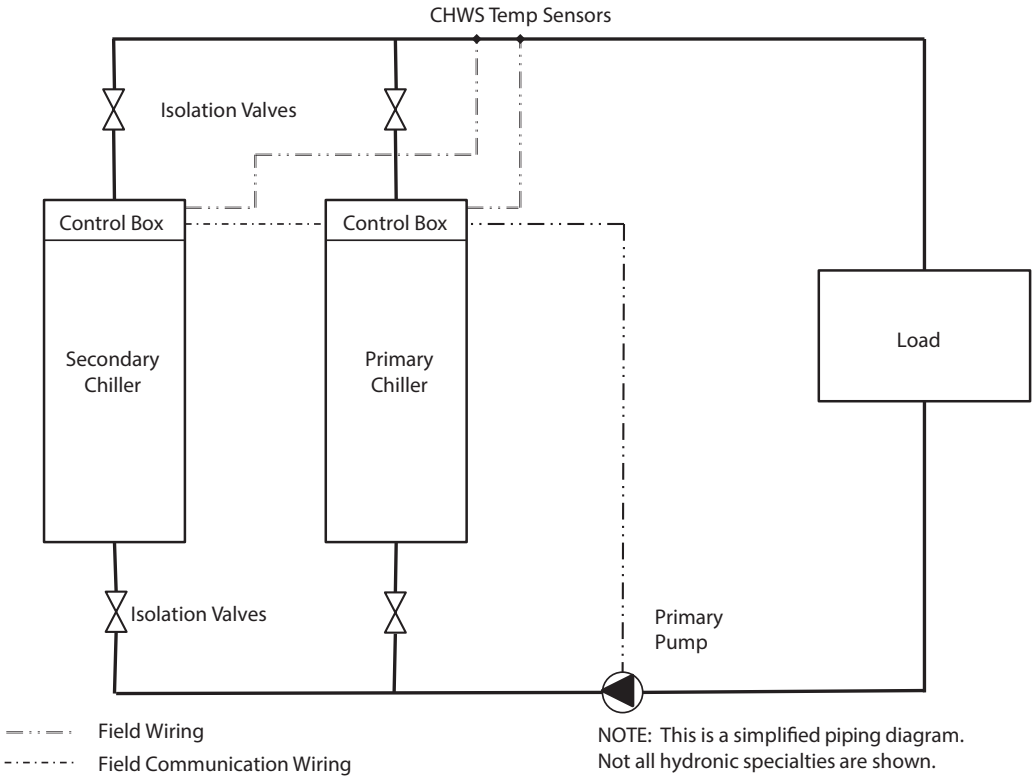


Fig. 36 — Typical Parallel Primary/Secondary Chillers Common Primary Pumping, Constant Flow, Leaving Water Control

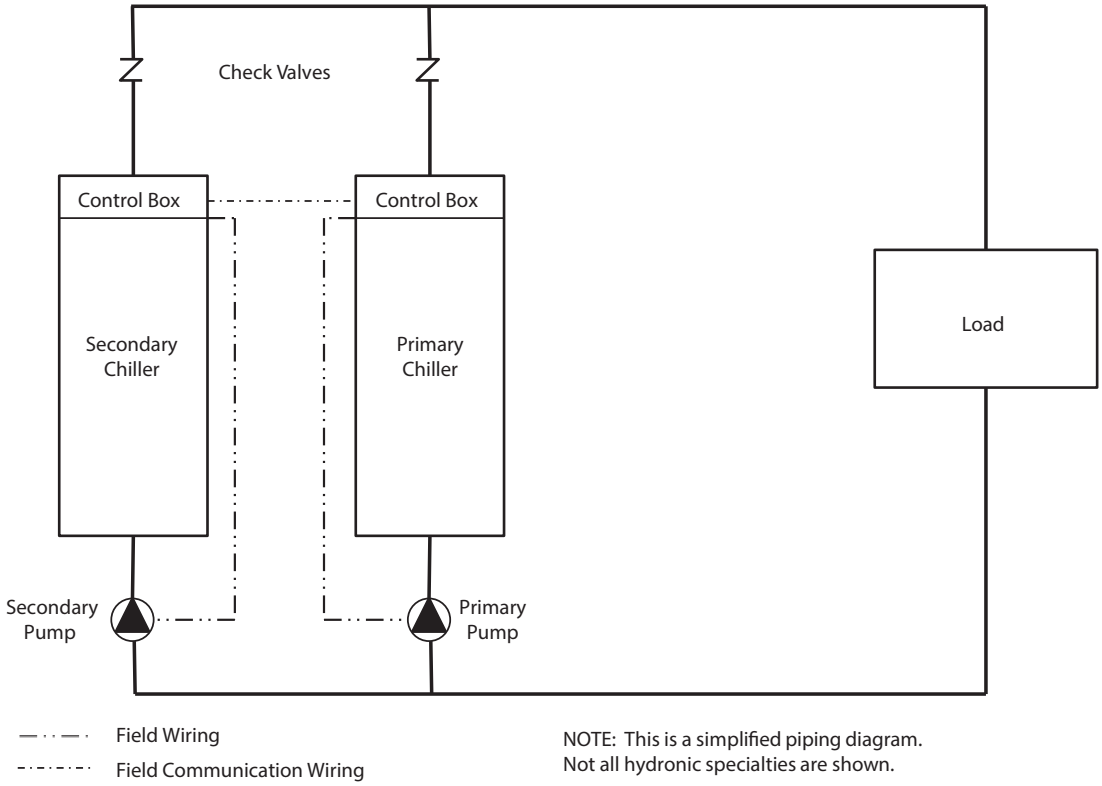


Fig. 37 — Typical Parallel Primary/Secondary Chillers Dedicated Primary Pumping, Variable Flow, Entering Water Control

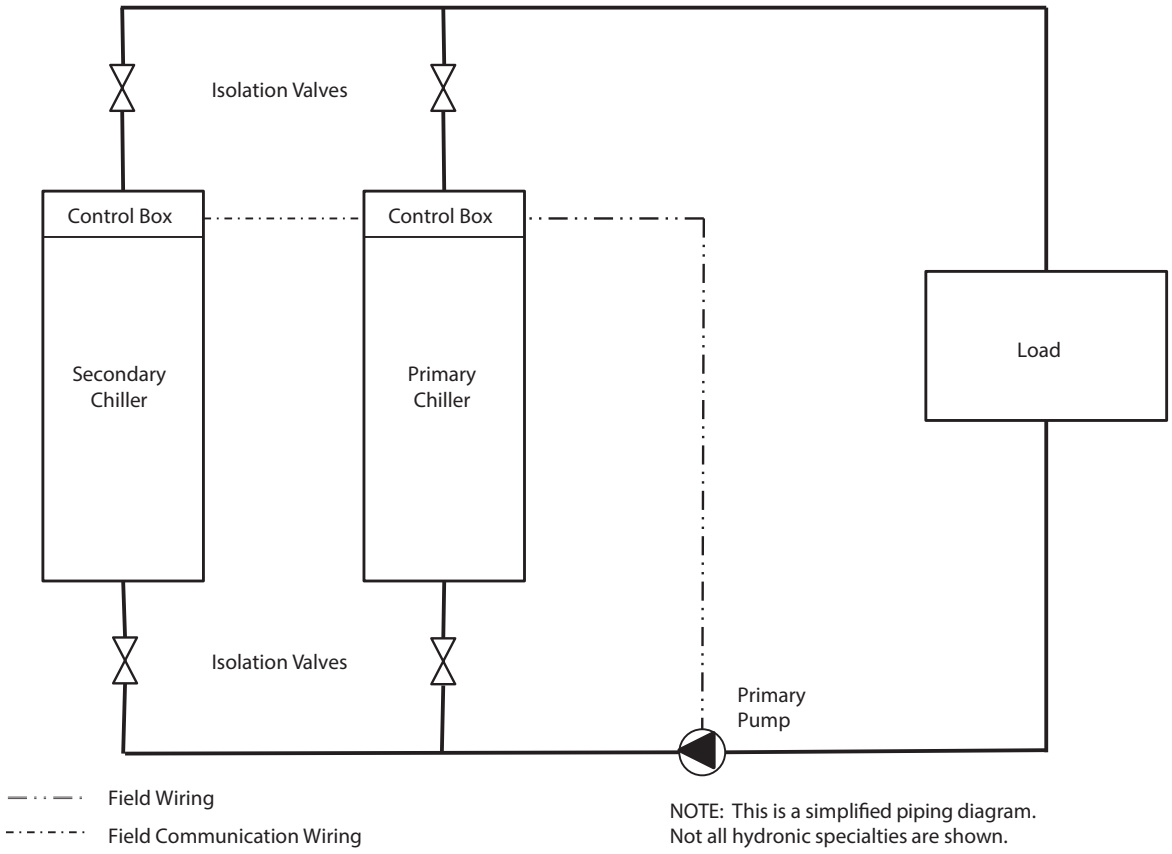


Fig. 38 — Typical Parallel Primary/Secondary Chillers Common Primary Pumping, Variable Flow, Entering Water Control

Table 32 — 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	

NOTE(S):

a. For primary/secondary series chiller application, primary chiller should always be downstream of secondary.

Table 33 — 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 59. 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***
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 or heating 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 → Heat → Cool Configuration***
Heating Reset Select	0 = None 1 = OAT 2 = Delta T 3 = 4 to 20 mA Control 4 = Space Temp	***Main Menu → Configuration Menu → Heat → Cool 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.

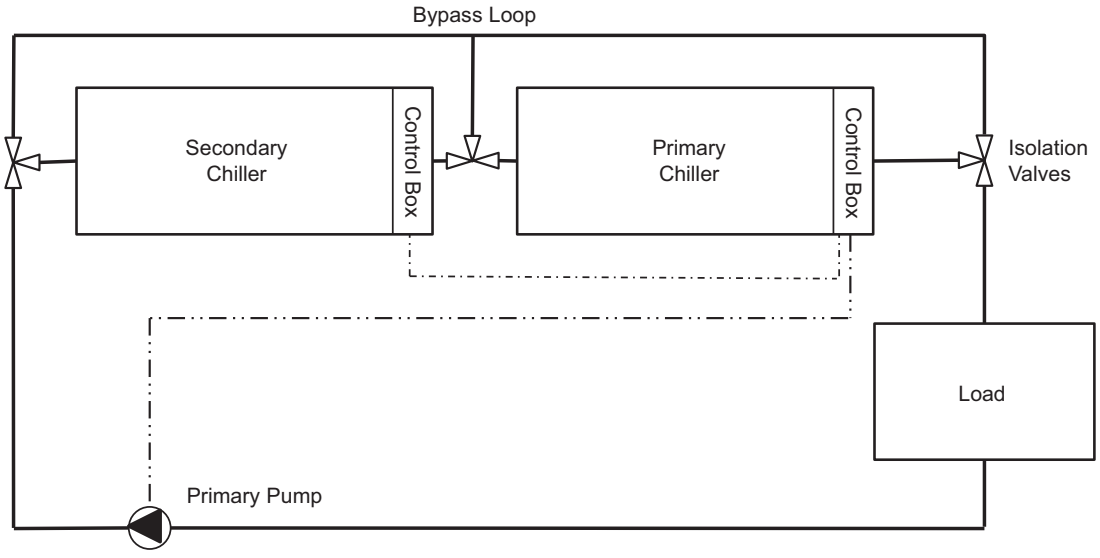
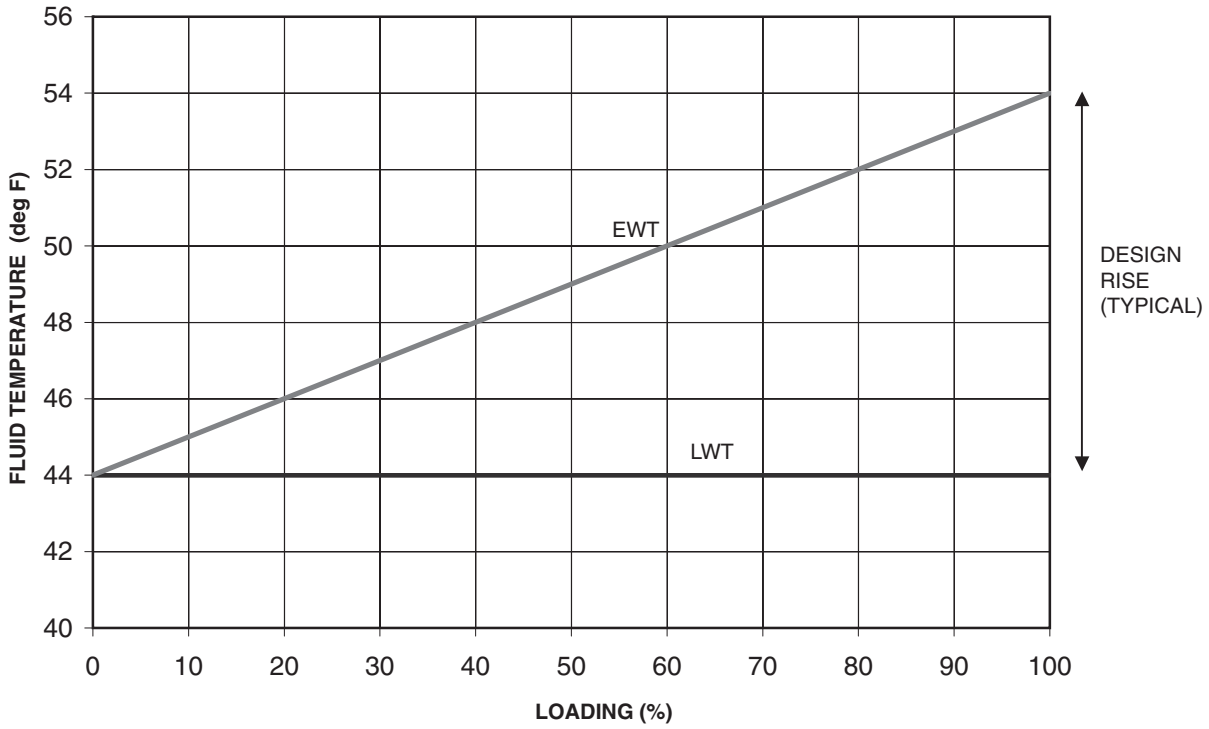
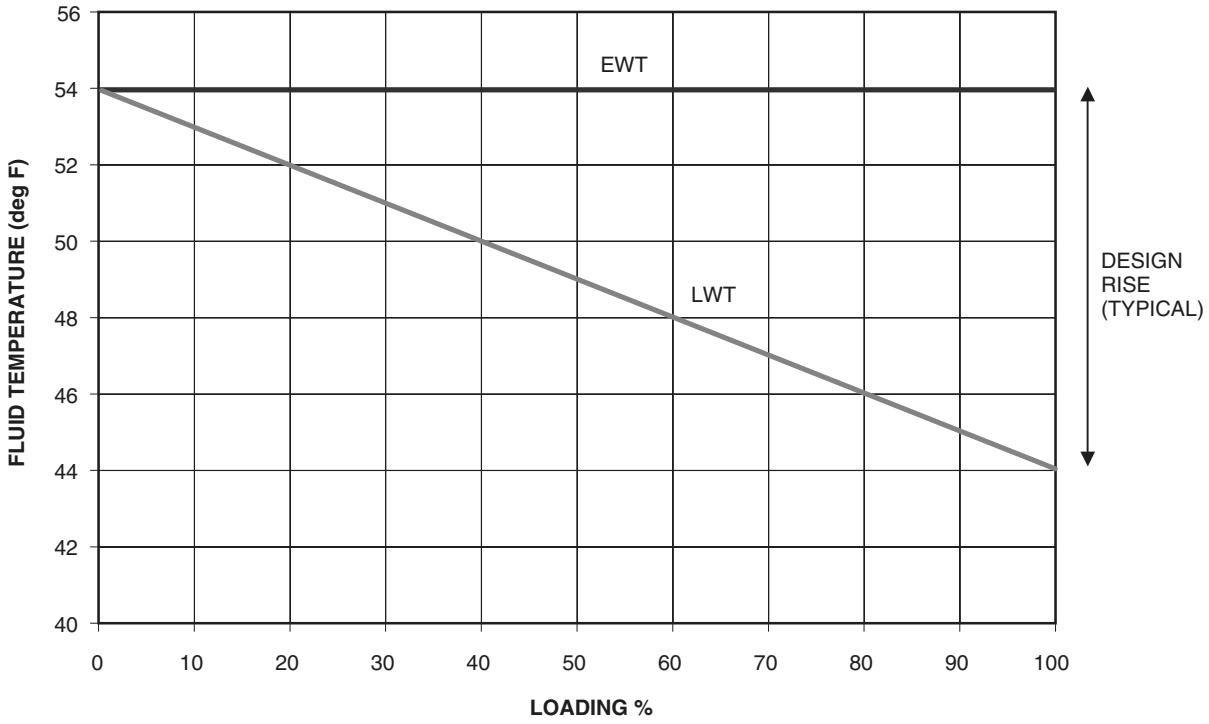


Fig. 39 — Typical Series Primary/Secondary Chillers Dedicated Primary Pumping, Constant Flow, Leaving Water Control



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

NOTE(S):

a. Reset menu contains a Cooling Reset Section and a Heater Reset section with these values in each.

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.

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 → Heat → Cool Configuration***
Heating Reset Select	Default = 1 0 = None 1 = OAT 2 = Delta T 3 = 4 to 20 mA control 4 = Space Temp	
Delta T No Reset Value[a]	Default = 0°F (0°C) Range 0°F to 25°F (0°C to 13.8°C)	***Main Menu → Configuration Menu → Reset Configuration***
Delta T Full Reset Value[a]	Default = 0°F (0°C) Range 0°F to 25°F (0°C to 13.8°C)	
Cooling Reset Deg Value[a]	Default = 0°F (0°C) Range –30 to 30°F (–16.7 to 16.6°C)	

NOTE(S):

a. Reset menu contains a Cooling Reset Section and a Heater Reset section with these values in each.

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).

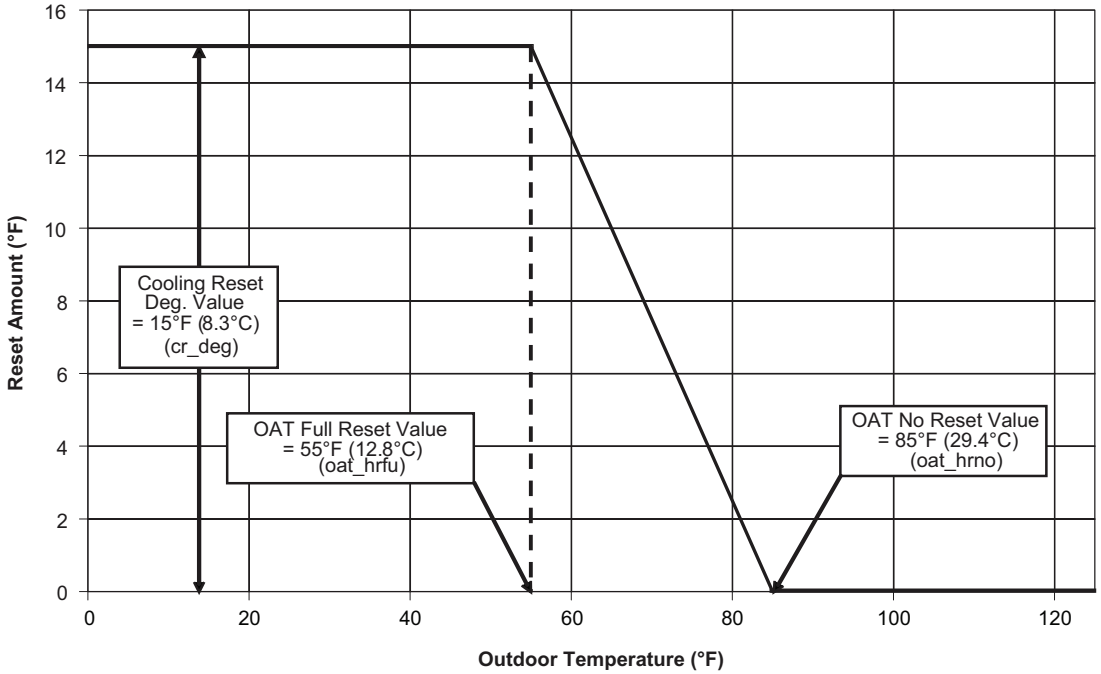


Fig. 42 — Example: OAT Reset

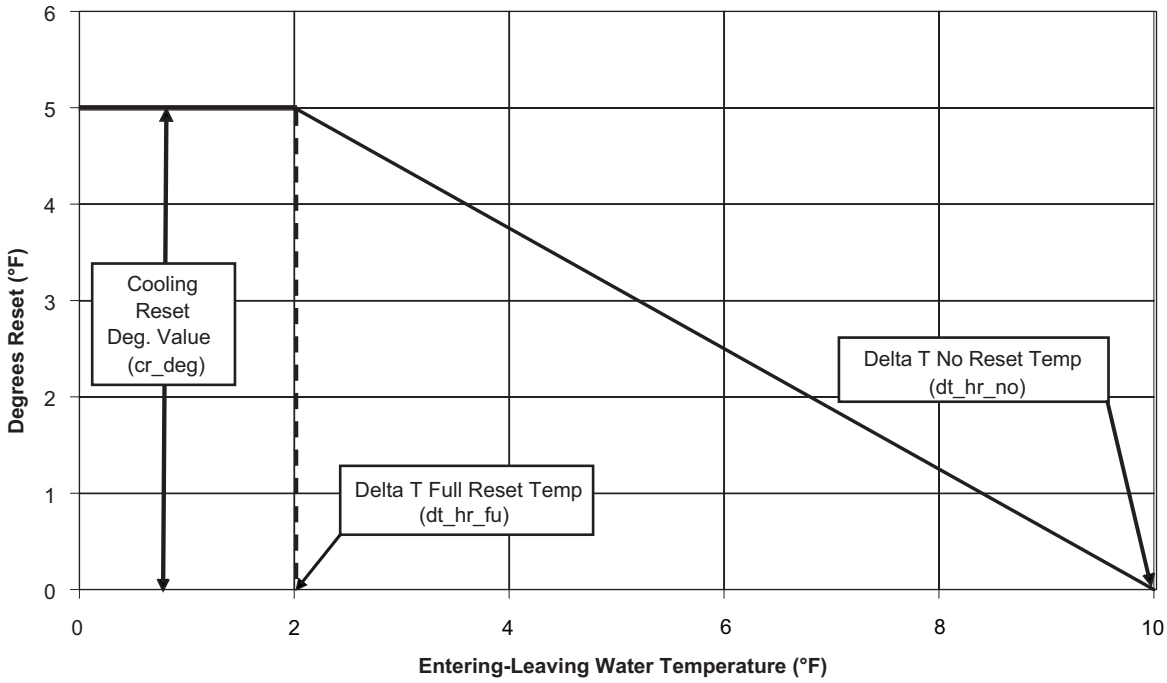


Fig. 43 — Example: Return Water Reset

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

NOTE(S):

a. Reset menu contains a Cooling Reset Section and a Heater Reset section with these values in each.

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.

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

NOTE(S):

a. Reset menu contains a Cooling Reset Section and a Heater Reset section with these values in each.

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).

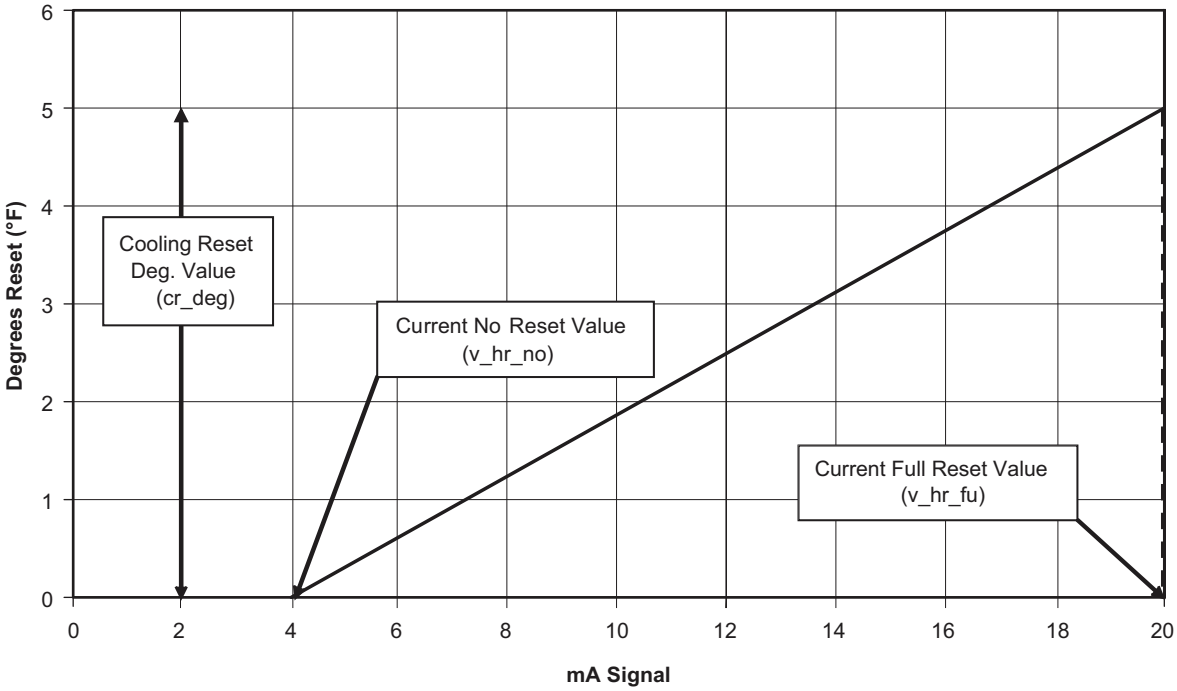


Fig. 44 — Example: 4 to 20 mA Temperature Reset

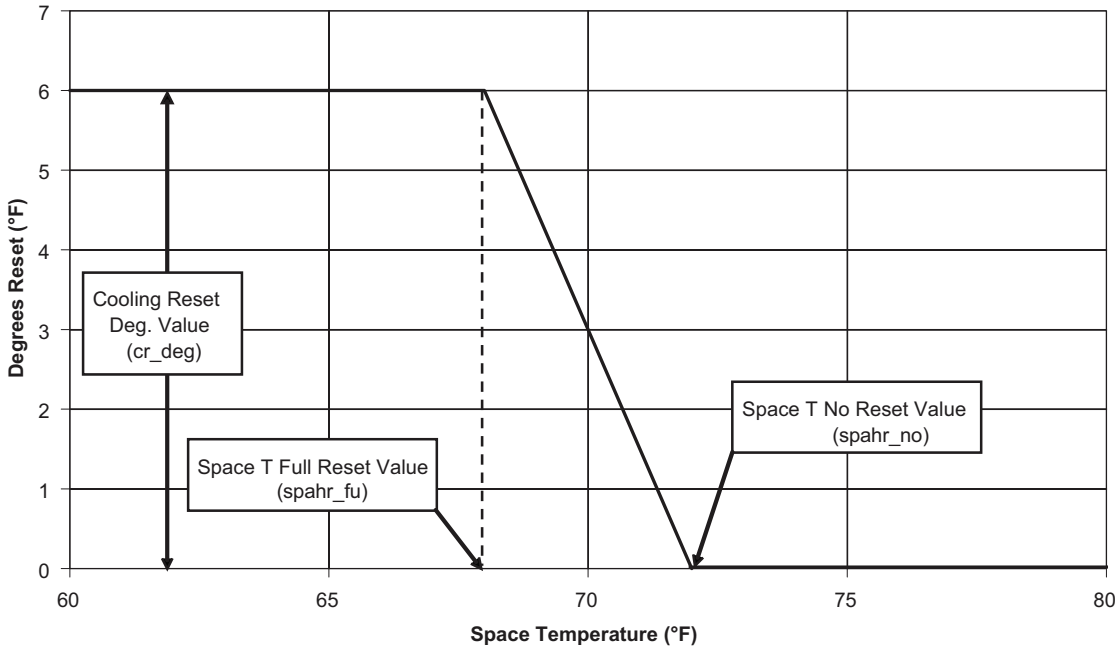


Fig. 45 — Example: Space Temperature Reset

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 39. See Fig. 46.

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 Configuration menu ***(Main Menu → Configuration Menu → Factory Configuration)*** 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%

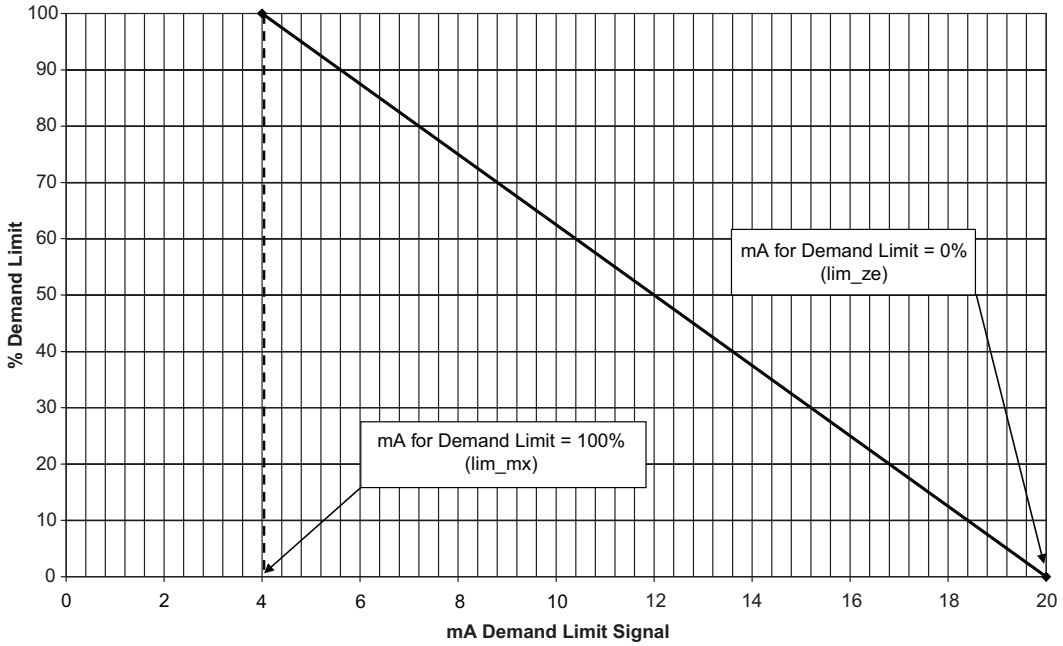


Fig. 46 — Example: 4 to 20 mA Demand Limit

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 N on page 114 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 setpoint will be artificially lowered to force the chiller to load to the demand limit value.

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. Chillers with brine application option are factory charged with lower refrigerant, as well as increased oil for R-32 chillers. 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 Fig. 6 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)**.

ALARM EQUIPMENT PRIORITY

The ComfortVIEW 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)**.

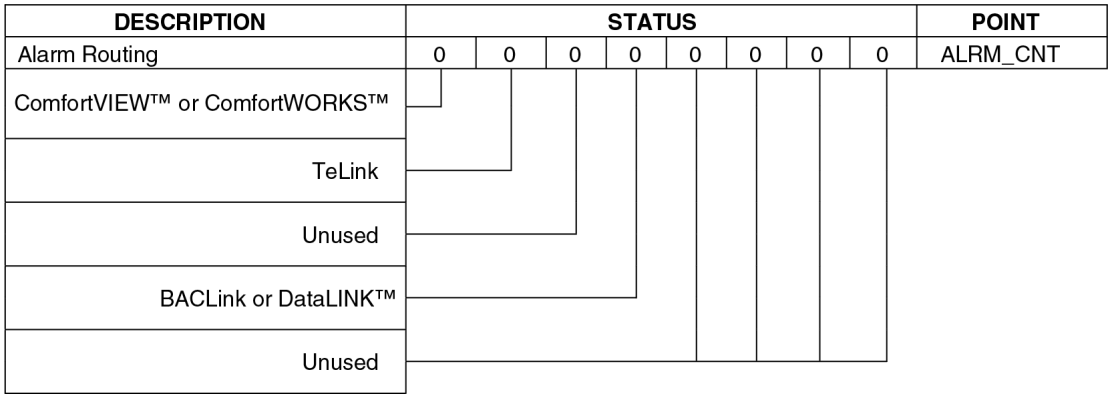


Fig. 47 — Alarm Routing Control

PRE-START-UP

IMPORTANT: Before beginning Pre-Start-Up or Start-Up, complete Start-Up Checklist for 30MP Liquid Chiller at end of this publication (pages CL-1 to CL-10). 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 following checks have been completed.

System Check

1. Check all auxiliary components, such as chilled fluid pumps, air-handling equipment, condenser pump or other equipment to which the chiller supplies liquid. Consult manufacturer's instructions. Verify that any pump interlock contacts have been properly installed. If the unit has field-installed accessories, be sure all are properly installed and wired correctly. Refer to unit wiring diagrams.
2. Use the PIC6 display to adjust the Cooling Set Point.
3. Fill chilled 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 chilled water is to be maintained at a temperature below 40°F (4.4°C), a brine of sufficient concentration must be used to prevent freeze-up at anticipated suction temperatures. To ensure sufficient loop volume, see Tables 34 and 35.
4. Check tightness of all electrical connections.
5. Oil should be visible in the compressor sight glass(es). See Fig. 48. An acceptable oil level in the compressors is from 3/8 to 5/8 of sight glass when the compressors are off. Adjust the oil level as required. See Oil Charge section on page 84 for Carrier approved oils.
6. Crankcase heaters must be firmly attached to compressors, and must be on for 24 hours prior to start-up (30MPA021-046, 30MPA, MPW051-080 only).
7. Electrical power source must agree with unit nameplate.
8. Check rotation of scroll compressors. Monitor control alarms during first compressor start-up for reverse rotation protection alarm.

Table 34 — Minimum Flow Rates and Minimum Loop Volume — English

UNIT SIZE	FLOW RATE		NORMAL AIR CONDITIONING APPLICATION Gal/Ton			PROCESS COOLING OR LOW AMBIENT OPERATION APPLICATION Gal/Ton		
	EVAPORATOR	CONDENSER						
	Gal/Min	Gal/Min	Std Unit	HGBP	Digital	Std Unit	HGBP	Digital
30MP017	22	22	12	2	N/A	12	3.4	N/A
30MP021	28	28	6	4	3	10	10	6
30MP031	43	43	6	4	3	10	10	6
30MP033	43	43	6	4	3	10	10	6
30MP041	55	55	3	3	3	6	6	6
30MP046	64	64	3	3	3	6	6	6
30MP051	70	70	6	4	N/A	10	6	N/A
30MP056	77	77	6	4	N/A	10	6	N/A
30MP066	91	91	6	4	N/A	10	6	N/A
30MP080	104	104	6	4	N/A	10	6	N/A

LEGEND

HGBP — Hot Gas Bypass

Table 35 — Minimum Flow Rates and Minimum Loop Volume — SI

UNIT SIZE	FLOW RATE		NORMAL AIR CONDITIONING APPLICATION L per kW			PROCESS COOLING OR LOW AMBIENT OPERATION APPLICATION L per kW		
	EVAPORATOR	CONDENSER						
	L/s	L/s	Std Unit	HGBP	Digital	Std Unit	HGBP	Digital
30MP017	1.4	1.4	13.0	8.6	N/A	13.0	13.0	N/A
30MP021	1.8	1.8	6.5	4.3	3.3	10.8	10.8	6.5
30MP031	2.7	2.7	6.5	4.3	3.3	10.8	10.8	6.5
30MP033	2.7	2.7	6.5	4.3	3.3	10.8	10.8	6.5
30MP041	3.5	3.5	3.3	3.3	3.3	6.5	6.5	6.5
30MP046	4.0	4.0	3.3	3.3	3.3	6.5	6.5	6.5
30MP051	4.5	4.5	6.5	4.3	N/A	10.8	6.5	N/A
30MP056	4.9	4.9	6.5	4.3	N/A	10.8	6.5	N/A
30MP066	5.8	5.8	6.5	4.3	N/A	10.8	6.5	N/A
30MP080	6.6	6.6	6.5	4.3	N/A	10.8	6.5	N/A

LEGEND

HGBP — Hot Gas Bypass

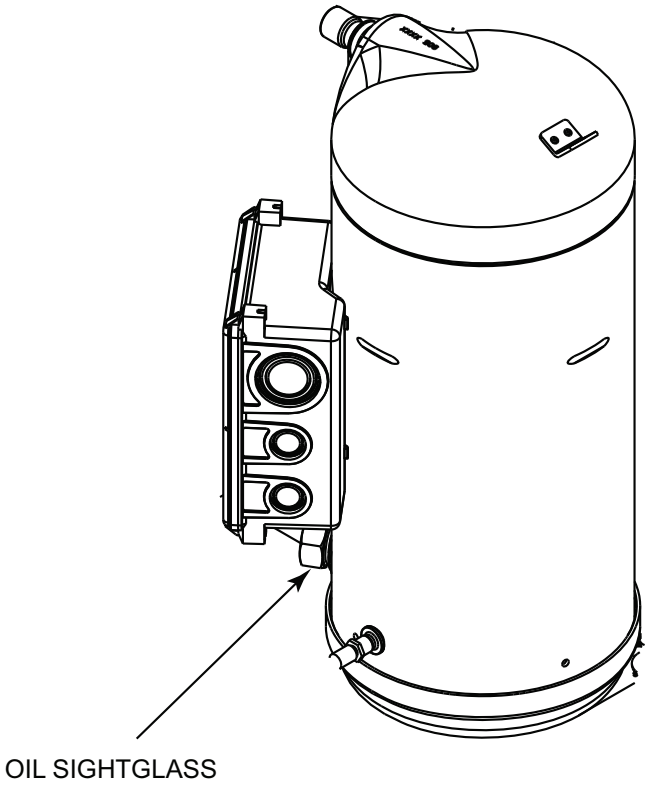


Fig. 48 — Sight Glass Location

START-UP AND OPERATION

IMPORTANT: Before beginning Pre-Start-Up or Start-Up, review Start-Up Checklist at the back 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.

⚠ CAUTION

Crankcase heaters are wired into the control circuit, so they are always operable as long as the main power supply disconnect is on (closed), even if any safety device is open. Compressor heaters must be on for 24 hours prior to the start-up of any compressor. Equipment damage could result if heaters are not energized for at least 24 hours prior to compressor start-up.

Compressor crankcase heaters must be on for 24 hours before start-up. To energize the crankcase heaters, close the field disconnect. Leave the compressor circuit breakers off/open. The crankcase heaters are now energized.

NOTE: Refer to Start-Up Checklist on page CL-1.

PRELIMINARY CHARGE (30MPA)

Refer to GTAC II (General Training Air Conditioning), Module 5, Charging, Recovery, Recycling and Reclamation for charging procedures.

The 30MPA units (condenserless) are shipped with a nitrogen holding charge only. Leak check the 30MPA unit, discharge and liquid lines, and the condenser. Be sure the liquid line service valve is open. After leak check is completed, system must be evacuated and dehydrated. Following the evacuation, the system must be fully charged.

The liquid charging method is recommended for complete charging or when additional charge is required.

Using the liquid charging method and charging by weight procedure, charge the circuit with the amount of refrigerant (R-32) with the sum of the operating charge listed in Table 36 for the base unit, the liquid line charge and the operating charge of the condenser as the preliminary charge.

Table 36 — Preliminary Refrigerant (R-32) Charge, lb (kg)

UNIT SIZE	OPERATING CHARGE AMOUNT LB (kg)
30MPA021	8.5 (3.8)
30MPA031	9.4 (4.2)
30MPA041	12.6 (5.7)
30MPA046	12.9 (5.8)
30MPA051	25.4 (11.5)
30MPA056	28.2 (12.8)
30MPA066	29.7 (13.4)
30MPA080	36.6 (16.6)

NOTE: For liquid line piping, use the following information:

- 1/2 in. (12.7 mm) liquid line - 0.6 lb per 10 linear feet (0.27 kg per 3 m)
- 5/8 in. (15.9 mm) liquid line - 1.0 lb per 10 linear feet (0.45 kg per 3 m)
- 7/8 in. (22.2 mm) liquid line - 2.0 lb per 10 linear feet (0.91 kg per 3 m)
- 1-1/8 in. (28.6 mm) liquid line - 3.5 lb per 10 linear feet (1.59 kg per 3 m)
- 1-3/8 in. (34.9 mm) liquid line - 5.3 lb per 10 linear feet (2.32 kg per 3 m)

⚠ CAUTION

Never charge liquid into the low pressure side of the system. Do not overcharge. Overcharging results in higher discharge pressure, possible compressor damage, and higher power consumption. During charging or removal of refrigerant, be sure evaporator water is continuously circulating through the evaporator to prevent freezing.

While the unit is running at full capacity, add refrigerant until the sight glass is clear. The required refrigerant is R-32A.

With the unit operating at full load, check liquid line sight glass to be sure the unit is fully charged (bubbles in the sight glass indicate the unit is not fully charged).

IMPORTANT: For proper charging, units equipped with a digital compressor must have the digital compressor operation disabled to maintain stable operation. To disable digital compressor operation, set (***Main Menu → Configuration → Factory Parameters → Digital Compressor***) to **NO**. Save the selection. Controller will reboot. Be sure to re-enable the digital operation after charging operation is complete.

Follow approved evacuation procedures when removing refrigeration. Release remaining pressure to an approved evacuated cylinder.

Actual Start-Up

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

1. Be sure all service valves are open (30MPA units only).
2. Adjust setpoint if required in (***Main Menu → Set Point***).
3. Start chilled fluid pump (if not configured for evaporator pump control).
4. Start condenser fluid pump (if not configured for condenser pump control (30MPW only).
5. Turn ENABLE/OFF/REMOTE CONTROL switch to ENABLE position.
6. Allow unit to operate and confirm that everything functions properly. Check to see that leaving fluid temperature agrees with leaving set point ***(Main Menu → Set Point → Cooling Setpoint 1 or Cooling Setpoint 2***).
7. Check the evaporator leaving chilled water temperature to see that it remains well above 32°F (0°C), or the brine freezing point if the unit is a medium temperature brine unit.
8. Recheck compressor oil level (see Oil Charge section on page 84).

Check Refrigerant Charge

All 30MPW units are shipped with a complete operating charge of R-32 and should be under sufficient pressure to conduct a leak test after installation. If there is no system pressure, admit nitrogen until a pressure is observed and then proceed to test for leaks. After leaks are repaired, the system must be dehydrated.

All refrigerant charging should be done through the 1/4 in. Schrader connection on the liquid line. Do NOT add refrigerant charge through the low-pressure side of the system. If complete charging is required, weigh in the appropriate charge for the circuit as shown on the unit nameplate. If partial charging is required, operate circuit at full load and add charge to reach 9 to 12°F (–12.8 to –11.1°C) subcooling for 30MPW and 17°F to 18°F (–8.3 to –7.8°C) for 30MPA entering expansion valve. See Liquid Charging Method on page 57 for details.

The liquid charging method is recommended for complete charging or when additional charge is required.

NOTE: On units with digital scroll option do not check refrigerant; charge if compressor is operating at less than 100% capacity; digital operation can be disabled by configuring ***(Main Menu → Configuration → Factory Parameters → Digital Compressor***). Selection to **NO**. Save the changes and controller will reboot. Change back to **YES** when charging is complete.

⚠CAUTION

Never charge liquid into low-pressure side of system. Do not overcharge. Overcharging results in higher discharge pressure, possible compressor damage, and higher power consumption. During charging or removal of refrigerant, be sure water is continuously circulating through the evaporator and condenser (30MPW) to prevent freezing.

⚠CAUTION

Be careful not to overcharge the system. Overcharging results in higher discharge pressure, possible compressor damage, and higher power consumption.

EVACUATION AND DEHYDRATION

All chillers use polyol ester (POE) oil. Because oil can absorb moisture, it is important to minimize the amount of time that the system interior is left exposed to the atmosphere. Minimizing the exposure time of the oil to the atmosphere will minimize the amount of moisture that needs to be removed during evacuation.

Once all of the piping connections are complete, leak test the unit and then pull a deep dehydration vacuum. Connect the vacuum pump to the high flow Schrader valve in the suction line and liquid line. For best results, it is recommended that a vacuum of at least 500 microns (0.5 mm Hg) be obtained. Afterwards, to ensure that no moisture is present in the system, perform a standing vacuum-rise test.

With the unit in deep vacuum (500 microns or less), isolate the vacuum pump from the system. Observe the rate-of-rise of the vacuum in the system. If the vacuum rises by more than 50 microns in a 30-minute time period, then continue the dehydration process. Maintain a vacuum on the system until the standing vacuum requirement is met. This will ensure a dry system.

By following these evacuation and dehydration procedures, the amount of moisture present in the system will be minimized. It is required that liquid line filter driers be installed between the condenser(s) and the expansion devices to capture any foreign debris and provide additional moisture removal capacity.

LIQUID CHARGING METHOD

For 30MP017-046: Add charge to the unit through the liquid line service valve. Never charge liquid into the low-pressure side of the system.

For 30MP051-080: Add the charge to the unit through the high flow Schrader valve on the filter drier.

1. Close liquid line ball valve (30MPA only).
2. Connect a refrigerant cylinder loosely to the high flow Schrader valve connection on the liquid line. Purge the charging hose and tighten the connections.
3. Open the refrigerant cylinder valve.
4. If the system has been dehydrated and is under vacuum, break the vacuum with refrigerant gas. For R-32, build up system pressure to 101 psig and 32°F (697 kPa and 0°C). Invert the refrigerant cylinder so that the liquid refrigerant will be charged.
   a. For complete charge of 30MPW units, follow charging by weight procedure. When charge is nearly full, complete the process by observing the sight glass for clear liquid flow while the unit is operating. *The use of sight glass charging is valid only when unit is operating at full capacity*.
   b. For complete charge of 30MPA units or where refrigerant cylinder cannot be weighed, follow the condenser manufacturer's charging procedure or follow charging by sight glass procedure. *The use of sight glass charging is valid only when unit is operating at full capacity*.
5. The 30MPA condenserless units are shipped with a nitrogen holding charge. After installation with the field-supplied system high side, the complete system should be evacuated and charged per the condenser manufacturer's charging procedure or charged until the sight glass is clear (with the unit running at full capacity). To achieve maximum system capacity, add additional charge equal to the difference between the condenser optimal charge and the condenser minimum charge, which can be obtained from the charge data provided in the condenser installation instructions.
6. To ensure maximum performance of 30MPW/Q units, raise the compressor saturated discharge temperature (SDT) to approximately 100°F (37.8°C) by throttling the condenser water intake. Add charge until there is approximately 9 to 12°F (5.0 to 6.6°C) of system subcooling (SDT minus actual temperature entering the expansion valve) for 30MPW/Q units and 18 to 20°F (–7.7 to –6.6°C) for 30MPA units.

FIELD CHARGE QUANTITY (30MPA ONLY)

Charge unit per the instructions supplied with the compression section of the system. Record final refrigerant change amount on label near the nameplate of the 09RC unit. Mark with fine-tip permanent marker. Marker must comply with ASTM D-4236. It is recommended to also record this on the interior of the control panel for backup.

Check Compressor Oil Level

After adjusting the refrigerant charge, allow each circuit to run fully loaded for 20 minutes. Stop the compressors and check the oil level. Oil level should be 3/8 to 5/8 up on the sight glass.

IMPORTANT: Oil level should only be checked when the compressors are off.

Add oil only if necessary to bring the oil into view in the sight glass. If oil is added, run the circuit for an additional 10 minutes, then stop and check oil level. If the level remains low, check the piping system for proper design for oil return; also, check the system for leaks. If checking the oil level with unit running in part load, let unit run one hour, then run at full load for 10 minutes. If oil does not return to acceptable sight glass levels, check for correct suction piping and line sizing.

Adjust Oil Charge

Although the compressors are factory charged with oil, additional oil is likely required to maintain the oil level in the compressor. Tables 37 and 38 indicate the likely amount required based on the liquid line size and system piping length. Additional lubricant estimate is based on using recommended pipe sizes. Values listed are estimates only. See Add Oil section on page 84 for Carrier-approved oils. After operating the compressor for a period of time, the oil level should be between 3/8 and 5/8 of the oil sight glass. The compressor oil level should be checked with the compressor off to avoid the sump turbulence when the compressor is running. Oil must be added if the oil level does not meet the requirements.

Table 37 — 60 Hz Additional Lubricant (English)

UNIT SIZE	CONDENSER 09RC	ADDITIONAL LUBRICANT (FLUID OUNCES) REQUIRED FOR PIPING AND REFRIGERANT							
		Up to 25 ft	25 to 50 ft	50 to 75 ft	75 to 100 ft	100 to 125 ft	125 to 150 ft	150 to 175 ft	175 to 200 ft
30MPA021	S020	11	12	13	14	21	23	26	28
30MPA031	S030	13	15	17	20	22	24	27	29
30MPA041	M040	27	30	33	36	51	57	63	68
30MPA046	M050	27	30	33	37	52	57	63	69
30MPA051	M050	27	30	34	38	53	59	65	71
30MPA056	M060	33	37	41	45	59	65	71	77
30MPA066	M060	33	37	41	45	59	65	71	77
30MPA080	M060	33	37	41	45	59	65	71	77

Table 38 — 60 Hz Additional Lubricant (SI)

UNIT SIZE	CONDENSER 09DP	ADDITIONAL LUBRICANT (ML) REQUIRED FOR PIPING AND REFRIGERANT							
		Up to 7.5 m	7.5 to 15 m	15 to 22.5 m	22.5 to 30 m	30 to 37.5 m	37.5 to 45 m	45 to 52.5 m	52.5 to 60 m
30MPA021	S020	315	347	380	413	620	688	756	823
30MPA031	S030	372	440	508	575	643	710	778	846
30MPA041	M040	784	881	977	1074	1511	1676	1841	2005
30MPA046	M050	791	888	984	1081	1518	1683	1848	2012
30MPA051	M050	783	898	1014	1129	1546	1722	1897	2073
30MPA056	M060	976	1091	1206	1322	1739	1914	2090	2266
30MPA066	M060	976	1091	1206	1322	1739	1914	2090	2266
30MPA080	M060	976	1091	1206	1322	1739	1914	2090	2266

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. Minimum load control (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 minimum load control is equipped, then minimum load control 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, minimum load control 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.

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 (refer to 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 39 for a list of operating modes.

Table 39 — 30MP 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 Cir A	Yes/No
14	High Press Override Cir B	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 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 or 32°F (0°C) for comfort cooling units with glycol (***Main Menu → Configuration Menu → Service Configuration → Glycol in Loop*** = **Yes**). The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Configuration → Exchanger Fluid Type***) is 1 for both of the above. 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 Configuration → 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.

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 or 32°F (0°C) for comfort cooling units with glycol (***Main Menu → Configuration Menu → Service Configuration → Glycol in Loop*** = **Yes**). The Exchanger Fluid Type (***Main Menu → Configuration Menu → Factory Configuration → Exchanger Fluid Type***) is 1 for both of the above. For low temperature brine systems, (***Main Menu → Configuration Menu → Factory Configuration → 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.

This mode will terminate when, or if, the circuit refrigerant conditions return to within the compressor map, see Fig. 49.

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 CIRCUIT A/HIGH PRESS OVERRIDE CIRCUIT 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. 49.

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.

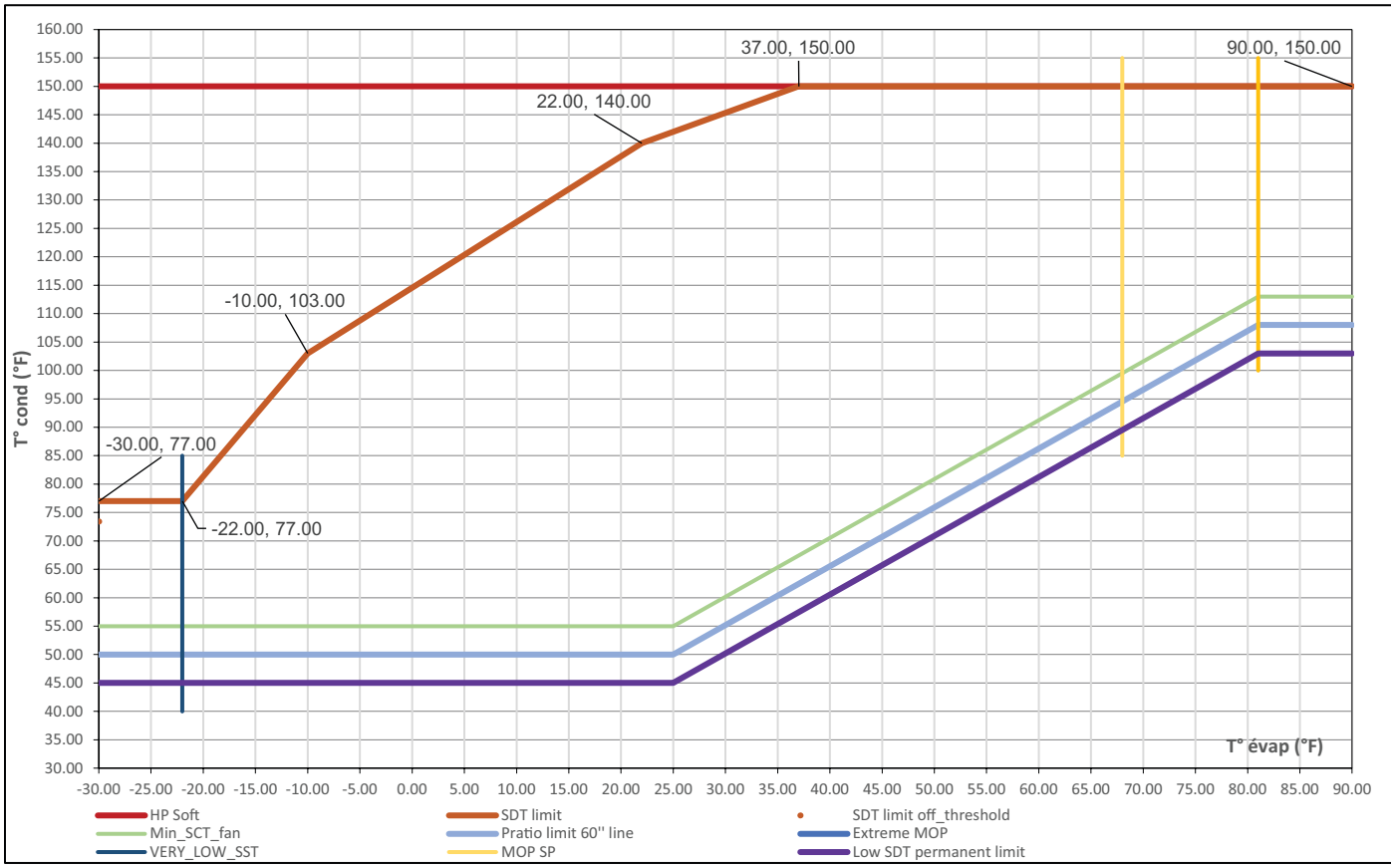


Fig. 49 — Compressor Map

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.

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).

Operating Limitations

TEMPERATURES

See Table 40 for 30MP standard temperature limits. Due to the 15 hp per refrigerant circuit requirement, 30MPW 017 and 033 have a limited operating envelope.

⚠ CAUTION

Do not operate with evaporator leaving chiller water (fluid) temperature (LCWT) below 32°F (0°C) for standard units with proper brine solution, 40°F (4.4°C) for the standard units with fresh water, or below 15°F (–9.4°C) for units factory built for medium temperature brine, or unit damage may occur.

Table 40 — Temperature Limits

TEMPERATURE LIMIT	UNIT MODEL/SIZE							
	30MPW/MPQ 021, 031, 041, 046, 051, 056, 066, 080		30MPA		30MPW 017		30MPW 033	
	°F	°C	°F	°C	°F	°C	°F	°C
Maximum Condenser LWT[a]	140	60	130	54	115	46	104	40
Minimum Condenser EWT[b]	65	18	65	18	65	18	65	18
Maximum Cooler EWT	83	28	83	28	83	28	83	28
Maximum Cooler LWT	68	20	68	20	68	20	68	20
Minimum Cooler LWT	40	4	40	4	40	4	40	4
Minimum Cooler LWT (Brine)[a]	14	–10	14	–10	14	–10	14	–10

NOTE(S):

a. Maximum condenser LWT decreases as evaporator LWT drops below 40°F (4°C) LWT for brine applications.
b. Operation below 65°F (18°C) requires the head pressure control option.

LEGEND

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

VOLTAGE — ALL UNITS

Main Power Supply

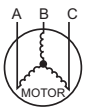
Minimum and maximum acceptable supply voltages are listed in the Installation Instructions.

Unbalanced 3-Phase Supply Voltage

Never operate a motor where a phase imbalance between phases is greater than 2%. To determine percent voltage imbalance:

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

Example: Supply voltage is 240-3-60



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

$$\text{Average Voltage} = \frac{(243 + 236 + 238)}{3} = \frac{717}{3} = 239$$

Determine maximum deviation from average voltage.
(AB) 234 – 239 = 4-v
(BC) 239 – 236 = 3-v
(AC) 239 – 238 = 1-v
Maximum deviation is 4-v.
Determine percent of voltage imbalance.

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

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

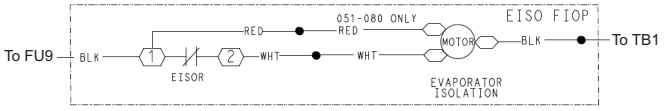
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately. Do not operate unit until imbalance condition is corrected.

Control Circuit Power

Power for the control circuit is supplied from the main incoming power through a factory-installed control power transformer (TRAN1) for all models. Field wiring connections are made to the LVT.

Evaporator Isolation (All Units)

All 30MP units have a factory-installed option for evaporator isolation. This option consists of a reverse acting electronic actuator installed on the evaporator leaving water valve and an additional normally closed control relay in the control panel. The relay coil is connected across the TB5-18 and 19 in the 30MP control panel. The actuator is connected across normally closed contacts 2 and 1 on the relay. The valve is controlled based on the unit state, whether enabled or disabled (see Operation of Machine Based on Control Method section on page 32). When the unit is disabled, the water valve will close. When the unit is enabled, the water valve will open. This option is recommended for units operating under supervision of the 30MP Multi-Unit Controller. See Actuator Installation and Operation section on page 64 for actuator installation and operation details. See Fig. 50 for evaporator isolation relay power and actuator wiring and Fig. 51 for evaporator pump control wiring. See Table 41 for pump configuration parameters.



LEGEND

CWPR	—	Chilled Water Pump Relay
CF	—	Condenser Fan
EISOR	—	Evaporator Isolation Relay
PR	—	Actuator Motor

Fig. 50 — Evaporator Isolation Relay Power and Actuator Wiring

Table 41 — 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 → Control Identification***
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	

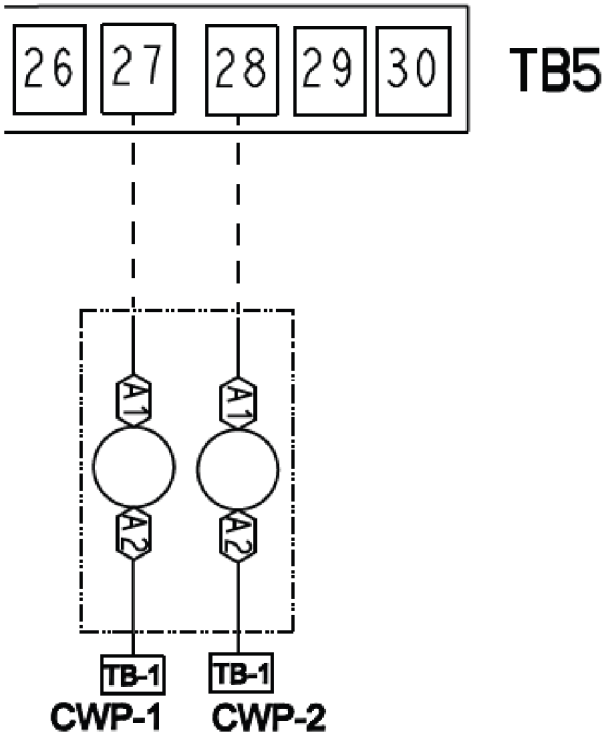


Fig. 51 — Wiring for Evaporator Pump Control

For troubleshooting the evaporator isolation actuator, simply change the unit state from Enable to Disable. The water valve should be open when the unit is in the enable state, and closed when the unit is in the disable state (refer to Operation of Machine Based on Control Method section on page 32).

Head Pressure Control (30MPW Only)

The 30MPW units have a factory-installed option for head pressure control which will modulate condenser water flow to maintain a target saturated condensing temperature. The factory-installed head pressure control option includes a reverse acting actuator and water valve installed on the leaving condenser water piping between the condenser and the 6 in. water manifold. The control board provides a 2 to 10 vdc signal to the actuator. The water valve is controlled based on each circuit's saturated condensing temperature and compressor status. 30MPW units operating at less than 65°F condenser entering water temperature require the use of head pressure control.

The control scheme monitors the saturated condensing temperature and uses a PI (proportional integral) loop to control the head pressure. Proportional and integral gain parameters for the water-cooled controls are adjustable and can be found through the PIC6 controller under, (***Main Menu → Configuration → Head Pressure Config).***

For 30MPW 033 units, the head pressure control algorithm will compare the saturated condensing temperature (SCT) from each circuit and control to whichever is lower. The circuit switch deadband, (***Main Menu → Configuration → Head Pressure Control → Sw deadband)*** determines when the control function switches from controlling the saturated condensing temperature in one refrigerant circuit to controlling the SCT in the other refrigerant circuit. For instance, if both circuits are running, the SCT in circuit B will have to be lower by the **SW.DB** value before switching from controlling the circuit **A SCT**. The **SW.DB** point is only used on 30MPW 033 units that are configured for condenser water valve head pressure control, (***Main Menu → Configuration → Factory Parameters → Enable Head Press Act A)***.

Actuator Installation and Operation

⚠ 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.

See Table 42 and Fig. 52-55 for actuator valve and part number details. Refer to the following sections for the specific settings of each actuator prior to installation. The fail position of the actuator is defined as the position when there is no power to the actuator. The normal position of the actuator is defined as the position when the actuator is powered and no signal applied. All actuators use 24-v power. The signal for all head pressure control actuators is 2-10v. Every actuator mounting bracket has a 10-32 bolt installed. The actuator must attach to this bolt to operate correctly. See Fig. 52.

Table 42 — 30MP Valve and Actuator Part Numbers

30MP UNIT	CARRIER PART NUMBER				
	VALVE AND ACTUATOR COMBINATION		ACTUATOR ONLY		WATER VALVE ONLY
	Head Pressure Control	Evaporator Isolation	Head Pressure Control	Evaporator Isolation	Head Pressure Control or Evaporator Isolation
017	EF04ZZ422	EF04ZZ421	HF680034	HF680035	EC28ZZ421
021					
031	EF04ZZ482	EF04ZZ481			EC28ZZ481
033					
041					
046					
051	EF04ZZ541		HF680036		EC28ZZ541
056					
066					
080					

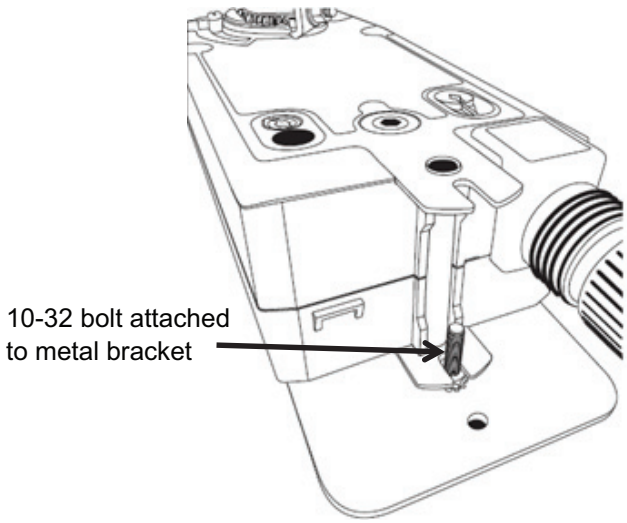


Fig. 52 — Actuator Bracket 10-32 Bolt Location

Actuator Removal (30MP017-031, 041-080)

Each actuator is positioned horizontally. Find the wire splice which connects the actuator wires to the control box wires. For head pressure control, the splice is located 24 in. of wire length from the control box. For evaporator isolation, the splice is located in the terminal box mounted on the chassis next to the compressor sled. Select a location to cut the wires, ensuring there is at least 1/2 in. of length to strip back the wires to connect to the new actuator. Remove the actuator by loosening the 10 mm nuts on the actuator stem clamp. Lift the actuator off the stem and the bracket.

Actuator Removal (30MP033)

Find the wire splice which connects the actuator wires to the control box wires. For head pressure control, the splice is located 24 in. of wire length from the control box. For evaporator isolation, the splice is located in the terminal box mounted on the chassis next to the compressor sled. Select a location to cut the wires, ensuring there is at least 1/2 in. of length to strip back the wires to connect to the new actuator. Loosen the 10 mm nuts on the actuator stem clamp. Next, using a 1/8 in. hex tool, loosen the valve stem set screw. The valve stem does not need to be removed. With the valve stem loose, move the actuator away from the 10-32 bracket bolt and lift it off the valve stem. To avoid interference with the chassis or piping, the actuator must be lifted off the valve stem at approximately 45 degrees.

Actuator Installation

Prior to installing the new actuator, refer to the following sections for specific actuator settings for each 30MP unit. The fail position and normal position of the actuator must be set to fully open for correct operation.

Replacement actuators are shipped with multiple size universal clamps. The universal clamp is the small V-shaped insert which clamps to the actuator stem. For all 30MP units, the 3/4 in. size universal clamp should be installed on the actuator. The metal bracket installed on the water valve has a 10-32 bolt which is used to hold the actuator in place during operation Slide the actuator down over the water valve stem. The actuator should locate on the 10-32 bolt, attached to the bracket. Ensure the actuator is level with the mounting bracket and perpendicular to the shaft. Tighten the 10 mm actuator clamp nuts to 7.5 ft-lb. Tighten the water valve stem set screw to 60 in.-lb. See Fig. 53.

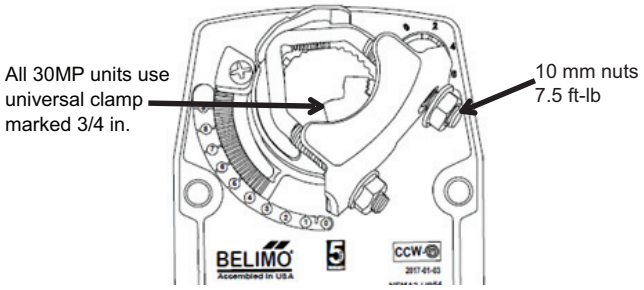


Fig. 53 — Universal Clamp Size and Nut Torque for All 30MP Units

Actuator Settings

30MPW 017-046 HEAD PRESSURE CONTROL

The actuator is a 5-wire actuator with 2-10vdc control. The actuator is reverse acting, spring return, normally open. The red and black wires are used to power the actuator. The signal connection is made at the actuator white wire. The orange and pink wires are not used. The default settings on the actuator are normally open and fail open. The actuator must be installed with CCW facing up; see Fig. 54. This will ensure that if the actuator were to fail, the water valve would open fully. The dial setting Y=0 should be set to counterclockwise to ensure the normal position of the actuator and valve is fully open. Ensure the water valve is in the fully open position prior to tightening.

30MP 017-046 EVAPORATOR ISOLATION

The actuator is a two-wire actuator with On/Off control, reverse acting, spring return. When no power is applied to the actuator the water valve will be open. When 24-v is applied to the actuator, the water valve will close. The actuator must be installed with CCW facing up; see Fig. 54. The dial setting Y=0 should be set to counterclockwise to ensure the actuator is reverse acting.

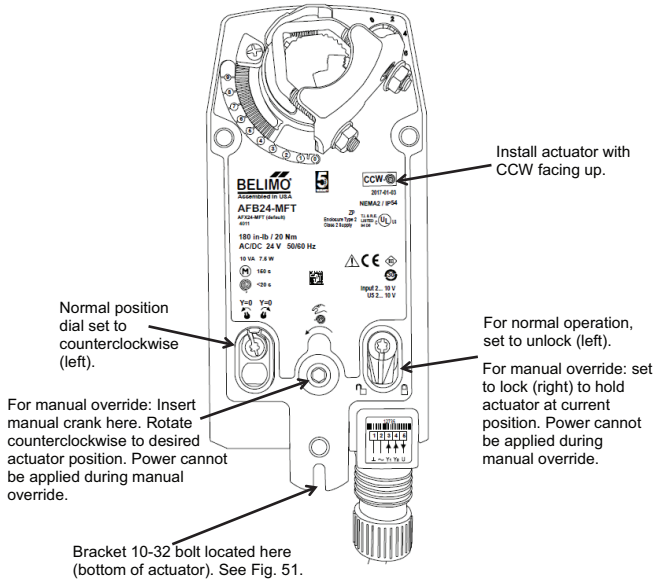


Fig. 54 — Actuator Settings, 30MP017-046 Head Pressure Control and Evaporator Isolation

30MPW 051-080 HEAD PRESSURE CONTROL AND EVAPORATOR ISOLATION

All actuators are 5-wire, 2-10vdc control, reverse acting, electronic fail-safe. The actuator is pre-programmed for the unit and should not require field programming. The red and black wires are used to power the actuator. The signal connection is made at the actuator white wire. The orange and pink wires are not used. The default settings on the actuator are normally open and fail open. The normal position dial should be set to 0 (Fig. 55), which will ensure the actuator will move to the full counterclockwise position. The fail-safe position dial should be set to counterclockwise. The actuator should be in the fully counterclockwise position prior to installation. If necessary, press and hold the manual override button while turning the actuator to the full counterclockwise position prior to installing the actuator on the water valve.

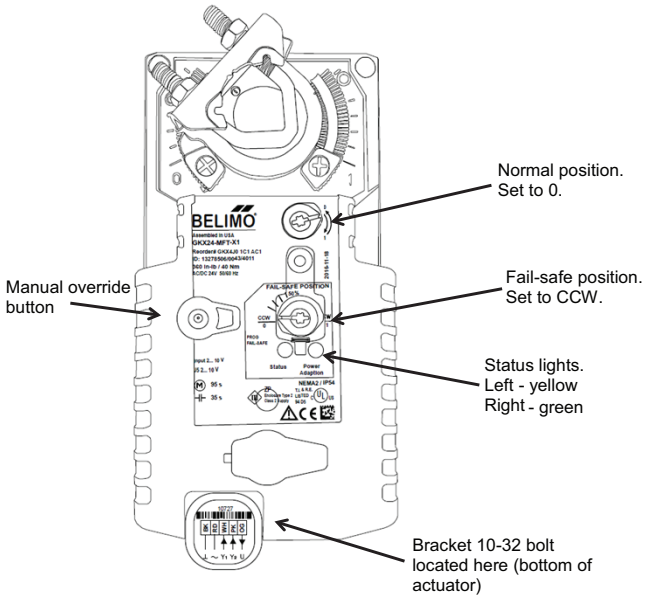


Fig. 55 — Actuator Settings, 30MP051-080 Head Pressure Control and Evaporator Isolation

Manual Override

Each actuator can be manually positioned as necessary for actuator installation, troubleshooting, or unit service.

IMPORTANT: The manual override will only operate if no power is applied to the actuator.

30MP017-046

Each actuator is shipped with a manual crank from the factory. The manual crank is installed on the actuator. Insert the manual crank in the hexagon hole located on the actuator (Fig. 54). With CCW facing up on the actuator, turn the crank in the counterclockwise direction. This will open the water valve. To lock the actuator in the required position, flip the lock switch (located to the right of the crank) to the locked position. The manual override can be disengaged in two ways: Flip the lock switch to the unlocked position, or apply 24-v power for greater than 3 seconds to the red and black wires. In either case, the actuator will go to the fully open position (fully counterclockwise).

30MP051-080

For isolation during heat exchanger service, turn the fail-safe position dial fully clockwise (CW), see Fig. 55. and remove power to the actuator. This will hold the water valve in the fully closed position. Do not return power to the actuator until service is complete. Each actuator includes a manual override button. Pressing this button will release the actuator drive gear. With the manual override button held down, the water valve shaft can be rotated manually. Upon releasing the manual override button, the actuator will return to the fail-safe position. The manual override is not recommended for heat exchanger isolation, as the manual override does not lock in the actuator in position.

Actuator Troubleshooting

30MP051-080

Each actuator contains a front LED panel to indicate the actuator status. The green light (Power Adaptation) is on the right, the yellow light (Status) is on the left. See Tables 43 and 44.

Table 43 — 30MP Indicator Lights[a]

30MP051-080 ACTUATOR LED STATUS INDICATOR LIGHTS SEQUENCE		
YELLOW LIGHT STATUS	**GREEN LIGHT STATUS**	**ACTUATOR STATUS**
Off	On	Operation ok, no faults.
Off	Blinking	Fail-safe mechanism is active.
On	Off	Fault is detected.
Off	Off	Not in operation/capacitors charging.
On	On	Adaptation running.
Blinking	On	Communication with programming tool.

NOTE(S):

a. Refer to Fig. 55 for location of indicator lights.

Table 44 — Troubleshooting

SYMPTOM	CAUSE	REMEDY			
Signal applied to actuator, no response.	Blown actuator Fuse 9 or Fuse 11 in control panel.	Replace fuse, inspect wiring for short or overloaded circuit.			
	Low supply voltage.	Minimum actuator voltage 21.6 vdc.			
	Input voltage out of range.	Check input voltage with a digital volt meter. Input signal must be above 2 vdc to have the actuator move.			
	The torque load has exceeded the actuator's torque. An object or circumstance is preventing the motion of the actuator or water valve.	Inspect actuator and water valve for debris or interference: • luid flow outside unit limits • improper actuator installation • actuator damage • dirt and debris build-up			
Actuator operation is reversed.	Incorrect actuator switch settings.	Turn normal position switch to correct setting; Refer to Fig. 54 and 55. Switch must be turned all the way to the proper setting.			
Actuator does not drive toward target position.	Actuator input voltage polarity incorrect.	Actuator	Control Box Terminal	Actuator Wire Color	Polarity
		Head Pressure Control	Fuse 11	Red	(+)
			TB-1	Blk	(-)
			TB5-13	Wht	(+)
		Evap Isolation	Evap Iso Relay, 2	Wht	(+)
			Evap Iso Relay, 1	Red (050-071 only)	(+)
			TB1	Blk	(-)

Head Pressure Control Configuration and Operation

The Head Pressure Control option must be enabled in the unit software, (***Main Menu → Configuration → Factory Parameters → Enable Head Press Act A)***. With this option enabled, condenser fluid thermistors are installed and enabled from the factory. The 30MPW control loop utilizes three sets of gains depending on the stage of capacity. The Low set of gains is 0 to 40%, Medium is 40 to 62%, and High is capacity above 62%. Condenser water thermistors are required when Head Pressure Control is enabled ***(Main Menu → Configuration → Service Parameters → Enable Cond.EWT/LWT***) and will be installed from the factory. Table AK on page 122 in Appendix A.

SATURATED CONDENSING TEMPERATURE SETPOINT

The target saturated condensing temperature is adjustable, (***Main Menu → Setpoints → Head Pressure SCT)***. This is the target saturated condensing temperature which the unit control algorithm will use to modulate the condenser leaving water valve. The default value for ***cond_en*** is 75°F (23.9°C). See Table 45.

ADJUSTING PI ROUTINES

The 30MPW head pressure control routines use PI (proportional integral) loops to maintain a user-configurable head pressure set point. Gain default values can be adjusted through the PIC6 controller. The default gain values, shown below, should provide steady operation under most operating conditions. However, in some instances, these values may need to be adjusted. If the control routine is not responding fast enough to large changes (circuit starting, for example), increase the proportional term.

When the routine is making too great a change to valve position, decrease the proportional term. To minimize hunting, keep the integral time constant as high as possible.

For operating conditions where the saturated condensing temperature setpoint (HSP) is configured above 85°F it is recommended to change the control gains. See Table 45.

Table 45 — Condenser Valve Parameters

POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	MENU
evap_en	No_Yes	0	—	Enable Evap Isolator Rel	0	1	Factory Parameters
h_act_en	No_Yes	0	—	Enable Head Press Act A	0	1	
blank	—	—	—	PID used :	—	—	Head Pressure Config.
crt_pg	–20 to 20	0	—	Current Prop PID gain	–20	20	
crt_ig	–5 to 5	0	—	Current Int PID gain	–5	5	
crt_dg	–20 to 20	0	—	Current Deri PID gain	–20	20	
blank	—	—	—	PID sets :	—	—	
blank	—	—	—	Available if cap < 40%	—	—	
pgl	–20 to 20	1	—	Low Prop PID gain	–20	20	
igl	–5 to 5	0	—	Low Int PID gain	–5	5	
dgl	–20 to 20	0	—	Low Deri PID gain	–20	20	
blank	—	—	—	Available if 40 < cap < 62			
pgm	–20 to 20	1.1	—	Medium Prop PID gain	–20	20	
igm	–5 to 5	0.1	—	Medium Int PID gain	–5	5	
dgm	–20 to 20	0	—	Medium Deri PID gain	–20	20	
blank	—	—	—	Available if cap > 62%	—	—	
pgh	–20 to 20	1.2	—	High Prop PID gain	–20	20	
igh	–5 to 5	0.2	—	High Int PID gain	–5	5	
dgh	–20 to 20	0	—	High Deri PID gain	–20	20	
blank	—	—	—	—	—	—	
min_sp	0 to 100	7	—	Min Valve Opening	0	100	
max_sp	0 to 100	100	—	Max Valve Opening	0	100	
SW_DB	0 to 10	2	^F	Sw deadband	0	10	
headSct	70 to 130	75	F	Head Pressure SCT sp	70	130	Setpoint
q_head_p	70 to 130	0	%	Head Pressure Actuator A	0	100	Quick Test 1

SERVICE

Electronic Expansion Valve

See Fig. 56 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 46. 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***). See Table 47 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 68 to test EXVs.

Table 46 — EXV Usage Guide

30MP UNIT	EXV SIZE	
	CKT A	CKT B
17	12.5	—
21	25	—
31	50	—
33	12.5	12.5
41	50	—
45	50	—
56	50	—
66	50	—
80	100	—

Table 47 — 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 wobbling
25	Setpoint increase return from SH wobbling
30	Regular EXV control with PID
33	Return from Gain Decrease in HP
34	Gain Decrease in HP

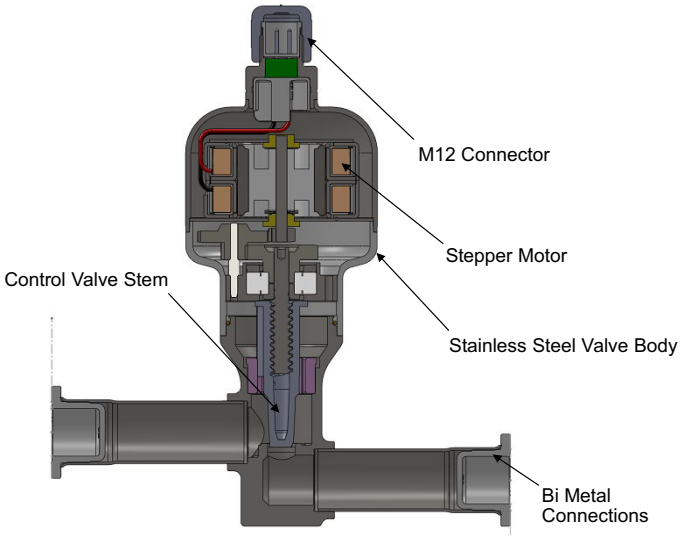


Fig. 56 — Cutaway View of the Electronic Expansion Valve

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 89. 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 8 and 9 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 89, 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 57.

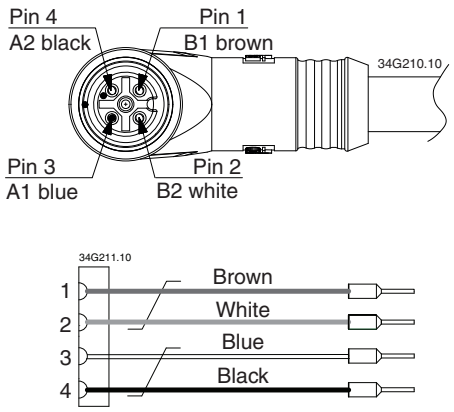


Fig. 57 — EXV Pins and Wiring Connections

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, see Fig 58.

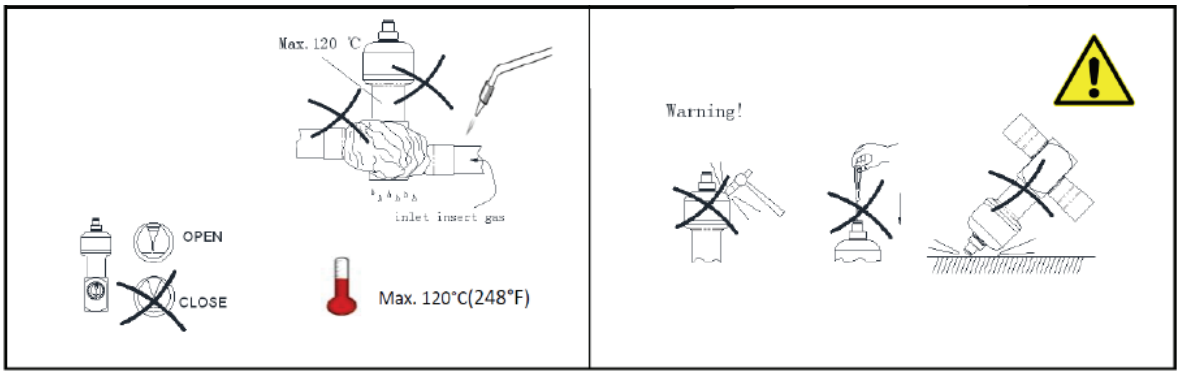


Fig. 58 — EXV Brazing

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 48 for units with R-32. Change the filter drier at the first sign of moisture in the system.

Table 48 — Color Indicators When Moisture Is Present

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

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 50-54. 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 condenser entering and leaving water temperature. 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. 59 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. 59.

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.

Condenser Leaving Water Sensor (CLWT)

This sensor is installed on manifolds when added for multiple unit installations. Also included with Head Pressure Control option.

Condenser Entering Water Sensor (CEWT)

This sensor is installed on manifolds when added for multiple unit installations. Also included with Head Pressure Control option.

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. 60. 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. 60):

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.

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 49 lists pressure transducers for controlling chiller operation. See Fig. 61 on page 80 for transducer locations.

Table 49 — 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.

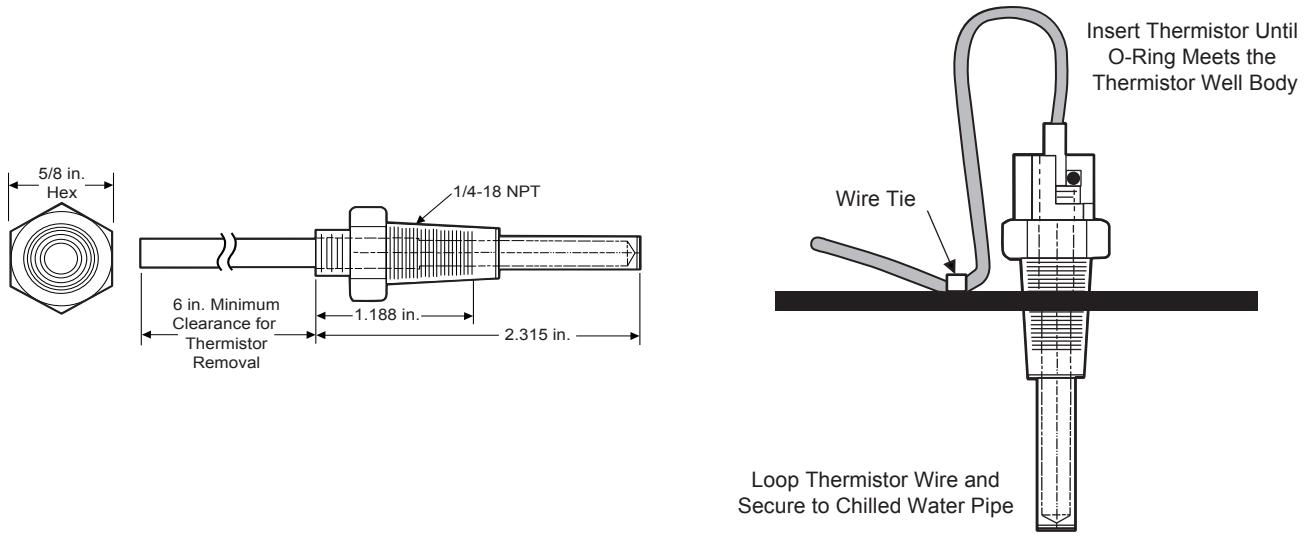


Fig. 59 — Dual Chiller Accessory Kit Leaving Water Thermistor and Well (P/N 00PPG000008000A)

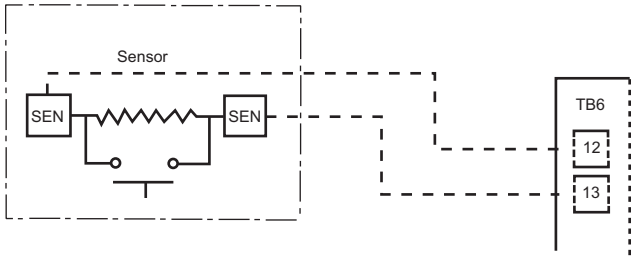


Fig. 60 — Typical Space Temperature Sensor (33ZCT55SPT) Wiring

Table 50 — Thermistor Identification

THERMISTOR ID	DESCRIPTION	RESISTANCE AT 77°F (25°C)	CONNECTION POINT
CEWT	Condenser Entering Water Temperature Thermistor	5k Ω	CIOB-A-J45-AI11
CLWT	Condenser Leaving Water Temperature Thermistor	5k Ω	CIOB-A-J46-AI12
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 51 — 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
77	25	5,000
79	26	4,786

Table 51 — 5K Thermistor Temperature vs. Resistance (cont)

°F	°C	RESISTANCE (Ohms)
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
194	90	458
196	91	444
198	92	431
199	93	418

Table 51 — 5K Thermistor Temperature vs. Resistance (cont)

°F	°C	RESISTANCE (Ohms)
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 52 — 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
37	3.697	28,373
38	3.670	27,597
39	3.654	26,838

Table 52 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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
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

Table 52 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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
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

Table 52 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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
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

Table 52 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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
207	0.343	737
208	0.338	725
209	0.333	714

Table 52 — 10K Thermistor Temperature (°F) vs. Resistance (cont)

TEMP (°F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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 53 — 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
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

Table 53 — 10K Thermistor Temperature (°C) vs. Resistance (cont)

TEMP (°C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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
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

Table 53 — 10K Thermistor Temperature (°C) vs. Resistance (cont)

TEMP (°C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
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 54 — 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
73.4	23	109.2
75.2	24	104.5
77.0	25	100

Table 54 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
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
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

Table 54 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
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
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

Table 54 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
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
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

Table 54 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
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
426.2	219	0.4293

Table 54 — 100K Thermistor Temperature (°F and °C) vs. Resistance (cont)

TEMP (°F)	TEMP (°C)	RESISTANCE (KOhms)
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
455.0	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

AL2 Refrigerant Safety for Service

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 30MP 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 30MP 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.

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.

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

LABELING

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.

Compressor Replacement

All models contain scroll compressors and have two or three compressors. A compressor is most easily removed from the side of the unit or above, depending on where clearance space was allowed during unit installation. See Fig. 61.

⚠ WARNING

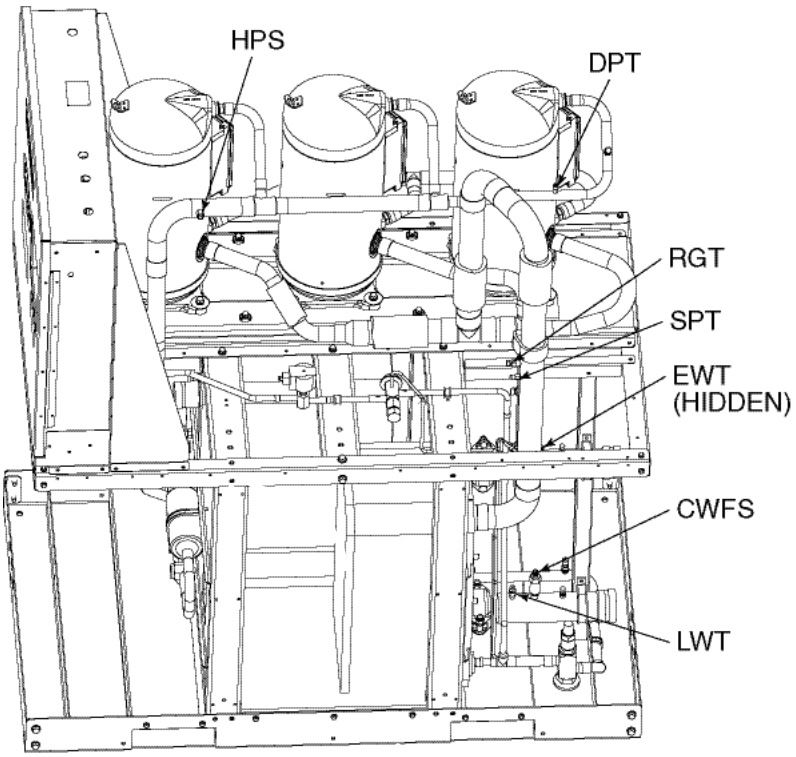
Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

1. Open and tag all disconnects following proper lock-out tag-out procedures. Use proper personal protective equipment.
2. Remove the junction box cover and disconnect the compressor power and ground connections. See Fig. 62-64.
3. Disconnect and remove the crankcase heater from the compressor. Save the ground screw for re-installation later.
4. If compressor is equipped with a motor protection module, disconnect the wiring to the device. See Fig. 63 or 64.
5. Remove the cable from the compressor junction box.
6. If the compressor is a digital compressor, remove the digital unloader solenoid (Fig. 65). Save the mounting screw for re-installation later. Remove the harness from the junction box.
7. Isolate the circuit and remove the refrigerant using standard refrigeration techniques.
8. If the circuit high pressure switch (HPS), discharge temperature thermistor (DTT), return gas thermistor (RGT), discharge pressure transducer (DPT), or suction pressure transducer (SPT) are in an area where brazing could damage the sensor, remove the device from the line and secure it out of the way.
9. For tandem and trio compressor circuits, remove the oil from the compressors as described in the section Removing Oil on page 84. This is required to cut (tandem compressor circuits) or remove (trio compressor circuits) the oil equalizer line. For tandem compressor circuits, cut the oil equalizer with a tubing cutter in a convenient place to be able to reconnect with a coupling.
10. Remove the bolts securing the compressor. Be sure to save all of the mounting hardware for compressor installation.
11. Using a tubing cutter, cut the suction and discharge lines in an area of the manifold that can be reconnected with a coupling.
12. Carefully remove the compressor from the unit. All compressors must be lifted by the lifting rings. Use care and extreme caution when lifting and moving compressors.

⚠ WARNING

All compressors must be lifted by the lifting rings. Use care and extreme caution when lifting and moving compressors to avoid personal injury and equipment damage.

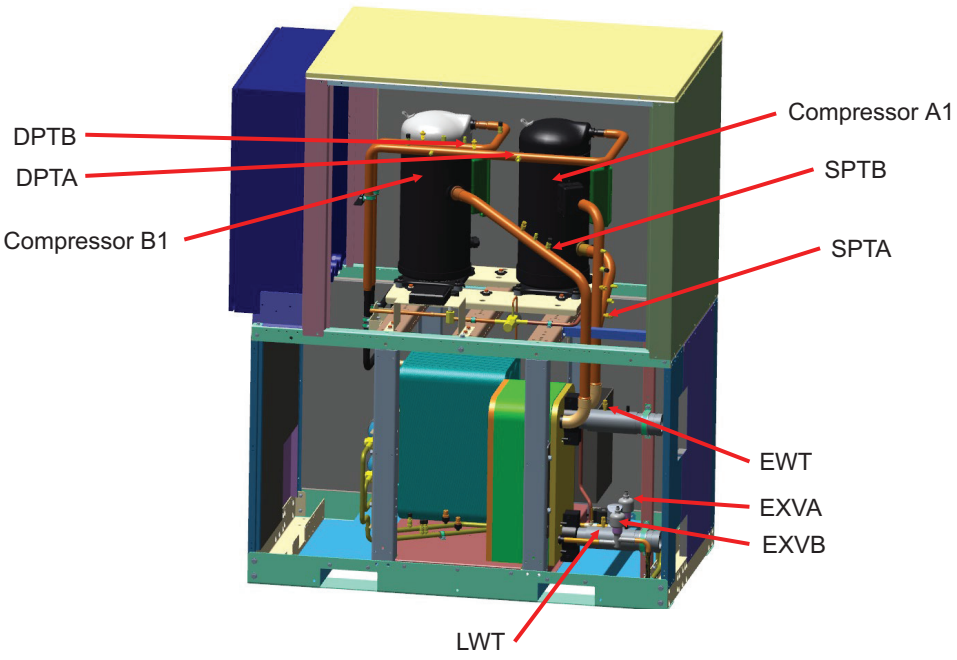
The replacement compressor will come with an oil charge. If the compressor will be mounted in a tandem or trio compressor circuit, the oil must be drained below the connection point. Be sure to measure the amount of oil removed and replace it with new oil once the assembly is complete. In tandem compressor applications, while connecting the oil equalizer line, it is recommended that the compressor be tipped back approximately 12 degrees from the horizontal to move the oil away from the fitting so any remaining oil moves away from the oil equalizer connection point.



Compressor Location — 30MPW046 Shown

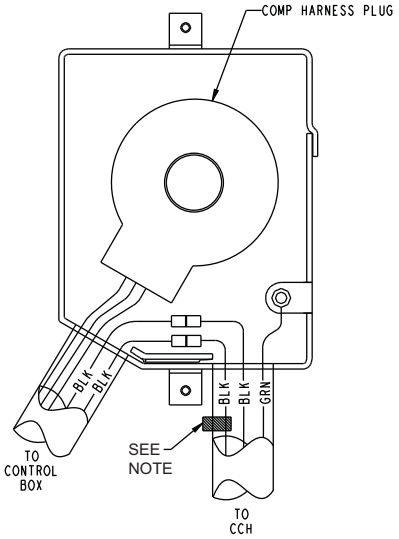
LEGEND

CWFS	—	Chilled Water Flow Switch
DPT	—	Discharge Pressure Transducer
EWT	—	Entering Water Thermistor
HPS	—	High Pressure Switch
LWT	—	Leaving Water Thermistor
RGT	—	Return Gas Thermistor (Optional)
SPT	—	Suction Pressure Transducer



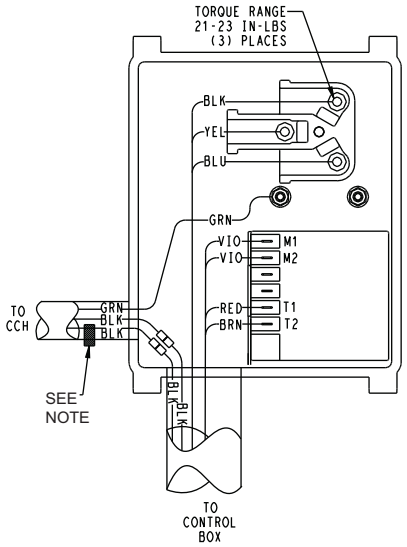
Compressor Location — 30MPW033 Shown with Sound Enclosure

Fig. 61 — Compressor Location — 30MP017-046 Units



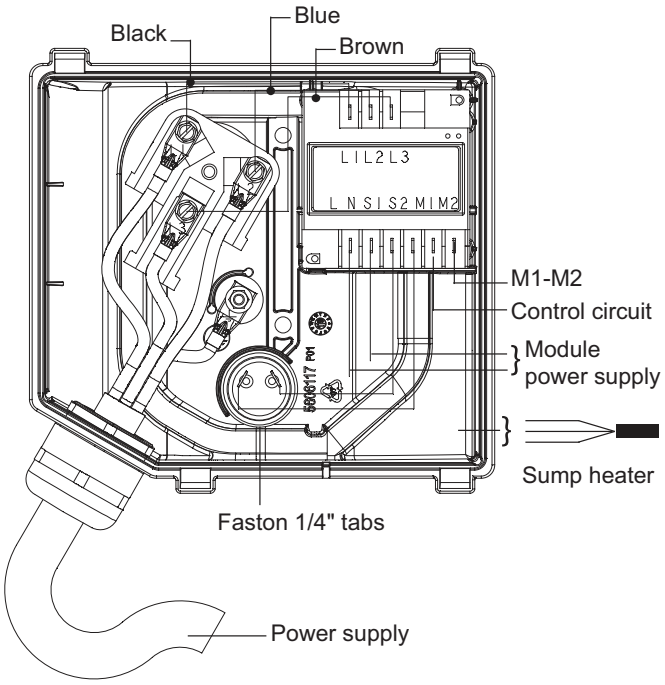
NOTE: See wire color codes in Crankcase Heater Wiring section, page 83.

Fig. 62 — 30MP017-046 Compressor Junction Box without Motor Protection Module



NOTES:
1. See wire color codes in Crankcase Heater Wiring section, page 83.
2. 30MP 017 units have internal motor protection.

Fig. 63 — 30MP017-046 Compressor Junction Box with Motor Protection Module



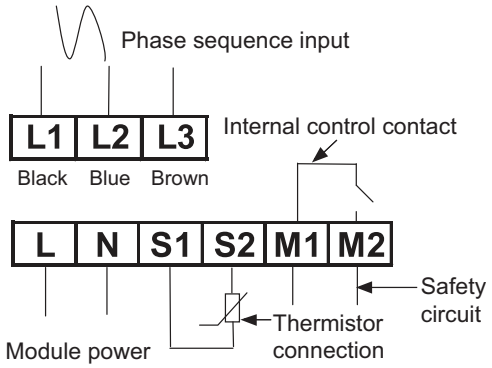


Fig. 64 — External Motor Protection Module, 30MP051-080 Units

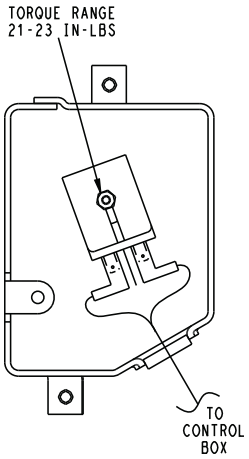


Fig. 65 — Digital Unloader Solenoid Valve

13. Before moving the compressor into its final location, install the mounting grommets on the compressor.
14. Carefully move the compressor into place on the unit. All compressors must be lifted by the lifting rings. Use care and extreme caution when lifting and moving compressors.
15. Secure the compressor using the mounting hardware removed in Step 10. Tighten mounting hardware to torque values listed in Tables 55 and 56.
16. Using new fittings and tubing, reconnect the suction and discharge lines. In tandem compressor circuits, the oil equalizer line for the new compressor should be as close to the original as possible. Make the connections using proper service techniques. In trio compressor circuits, reconnect the oil equalizer line. Be sure to use a new O ring to make the connection. Proper torque values are listed in Tables 55 and 56.

Table 55 — Unit Torque Specification (30MP017-046)

FASTENER	RECOMMENDED TORQUE
Compressor Sled Mounting Bolts	7 to 10 ft-lb (9.5 to 13.5 N-m)
Compressor Mounting Bolts	7 to 10 ft-lb (9.5 to 13.5 N-m)
Compressor Power Connections	24 to 28 in.-lb (2.7 to 3.2 N-m)
Compressor Ground Terminal Connection	14 to 18 in.-lb (1.6 to 2.0 N-m)
Trio Compressor Assembly Oil Equalizer Connection	74 to 81 ft-lb (100 to 110 N-m)

Table 56 — Unit Torque Specification (30MP051-080)

FASTENER	RECOMMENDED TORQUE
Compressor Mounting Bolts	7 to 10 ft-lb (9.5 to 13.5 N-m)
Compressor Power Connections	3.33 to 3.75 ft-lb (4.5 to 5.1 N-m)
Compressor Ground Terminal Connections	3.33 to 3.75 ft-lb (4.5 to 5.1 N-m)

17. Replace the liquid line filter drier.
18. If the compressor failure was as a result of a motor burn, install a suction line filter drier. This device must be removed after 72 hours.
19. Leak check all braze connections and repair if necessary.
20. Evacuate the circuit using proper service techniques.
21. Knock the same holes out of the new compressor junction box, if required, and install the cable connectors from the old compressor.
22. Install the crankcase heater on the compressor as described in the section Crankcase Heater Mounting on page 82 and wire the crankcase heater as described in the same section. Crankcase heater position is critical to proper operation.
23. For compressors with the motor protection module, wire the power wiring and control wiring as shown in Fig. 63 and 64. Be sure the correct motor protection module is installed. Copeland replacement compressors can be shipped with one of two motor protection modules or CoreSense communication module. Replacement compressors shipped with Kriwan motor protection modules are shipped with two solid-state motor protection modules. A 120/240-v module is installed and a 24-v module is shipped with the compressor. Replacement 30MP021-046 compressors with CoreSense modules are shipped with a voltage specific solid-state motor protection module. These units require the 24-v module be field installed. Failure to install the 24-v module will result in a compressor failure alarm. For compressors without a motor protection module, install the motor plug by hand only. Refer to Fig. 62.

⚠ CAUTION

The molded electrical plug should be installed by hand to properly seat the plug on the electrical terminals. To avoid damage, the plug should not be struck with a hammer or any other device.

24. If the compressor is a digital compressor, connect the digital unloader solenoid as shown in Fig. 65.

⚠ CAUTION

Do not start the compressor while the system is in a deep vacuum. Compressor failure may occur.

25. Recharge the compressors with new oil as described in the section Add Oil on page 84.
26. Charge the circuit as described in "START-UP AND OPERATION" on page 56.
27. Check the operation of the compressor.

CRANKCASE HEATER MOUNTING

All 30MPA units and 30MPW 031-080 units have crankcase heaters as standard equipment. It is important that the crankcase heater be tight to the compressor shell and in proper location. See Fig. 66-68 for proper locations.

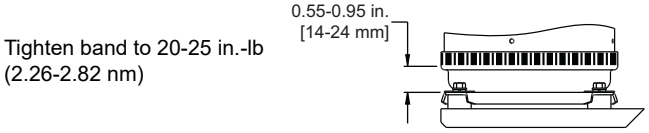


Fig. 66 — 30MPA 021 Crankcase Heater Location

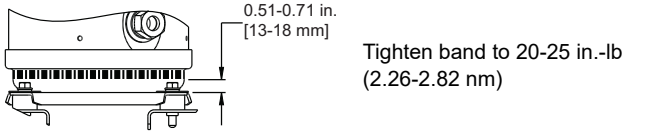


Fig. 67 — 30MPA,W,Q 031-046 Crankcase Heater Location

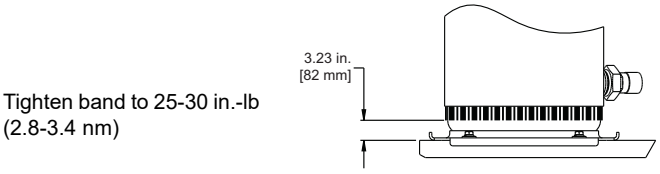


Fig. 68 — 30MPA,W,Q 051-080 Crankcase Heater Location

CRANKCASE HEATER WIRING

Crankcase heaters are specific to unit voltage. Each crankcase heater has a color-coded tag to indicate voltage. Table 57 identifies tag color code for each voltage. Refer to Fig. 62 and 63 for compressor junction box connection information.

Table 57 — Crankcase Heater Color-Coded Tags

UNIT POWER SUPPLY	TAG COLOR
208/230-3-60 380-3-60 380/415-3-50	Yellow
460-3-60	Red
575-3-60	Blue

30MP Evaporator and 30MPW/30MPQ Condenser

BRAZED-PLATE EVAPORATOR AND CONDENSER HEAT EXCHANGER REPLACEMENT

Brazed-plate heat exchangers cannot be repaired if they develop a leak. If a leak (refrigerant or water) develops, the heat exchanger **must be** replaced. To replace a brazed plate heat exchanger:

1. Disconnect the liquid-in and liquid-out connections at the heat exchanger.
2. Check that the replacement heat exchanger is the same as the original heat exchanger. For the condensers, compare part numbers on the heat exchangers. For the evaporators, insulation covers the manufacturer's part number. Make sure the depths of the replacement and original evaporator heat exchangers are the same.
3. Recover the refrigerant from the system, and unsolder the refrigerant-in and refrigerant-out connections.
4. Remove the four nuts holding the heat exchanger to the brackets. Save the nuts.
5. Install the replacement heat exchanger in the unit and attach to the bracket using the four nuts removed in Step 4. For sizes 017-021, torque is 7 to 10 ft-lb. For sizes 031-046, torque is 35 to 50 ft-lb. For sizes 051-080, torque is 7 to 8 ft-lb.
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.
7. For coolers, ensure that the original size tubing is used between the EXV outlet and the evaporator inlet.
8. Reconnect the water/brine lines.
9. Dehydrate and recharge the unit. Check for leaks.

BRAZED-PLATE COOLER AND CONDENSER HEAT EXCHANGER CLEANING

Brazed-plate heat exchangers must be cleaned chemically. 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 strainers in front of the water/brine inlets of the heat exchangers should be cleaned periodically, depending on condition of the chiller water/brine.

Water Treatment

WATER SYSTEM OVERVIEW

⚠ CAUTION

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

A system installed incorrectly such that air is not handled properly can develop pipe leaks, vent leaks, or air in pipes, and may behave as an open system and thus have unsatisfactory operation. Pump seal wear can also cause leaks that cause poor system operation.

Proper system design and installation procedures should be followed closely. The system must be constructed with pressure tight components and thoroughly tested for installation leaks.

Installation of water systems should follow sound engineering practice as well as applicable local and industry standards. Improperly designed or installed systems may cause unsatisfactory operation and/or system failure. Consult a water treatment specialist or appropriate literature for information regarding filtration, water treatment, and control devices.

Water quality should be maintained within the limits indicated in Table 58.

Table 58 — Water Quality Characteristics and Limitations

WATER CHARACTERISTIC	QUALITY LIMITATION
Alkalinity (HCO_3^-)	70 – 300 ppm
Sulfate (SO_4^{2-})	Less than 70 ppm
HCO_3^-/SO_4^{2-}	Greater than 1.0
Electrical Conductivity	10 – 500 μS/cm
pH	7.5 – 9.0
Ammonium (NH_3)	Less than 2 ppm
Chlorides (Cl^-)	Less than 300 ppm
Free Chlorine (Cl_2)	Less than 1 ppm
Hydrogen Sulfide (H_2S)[a]	Less than 0.05 ppm
Free (aggressive) Carbon Dioxide (CO_2)[b]	Less than 5 ppm
Total Hardness (dH)	4.0 – 8.5
Nitrate (NO_3)	Less than 100 ppm
Iron (Fe)	Less than 0.2 ppm
Aluminum (Al)	Less than 0.2 ppm
Manganese (Mn)	Less than 0.1 ppm

NOTE(S):

a. Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within the ranges shown.
The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0 pH, the water is considered to be acidic. Above 7.0 pH, water is considered to be basic. Neutral water contains a pH of 7.0.

b. Dissolved carbon dioxide can either be calculated from the pH and total alkalinity values (shown below) or measured on the site using a test kit. Dissolved Carbon Dioxide, PPM = TA x 2[(6.3-pH)/0.3] where TA = Total Alkalinity, PPM as $CaCO_3$.

Oil Charge

⚠ CAUTION

The compressor in an R-32 refrigerant system uses a polyol ester (POE) oil. This is extremely hygroscopic, meaning it absorbs water readily. Take all necessary precautions to avoid exposure of the oil to the atmosphere. Failure to do so could result in possible equipment damage.

Puron refrigerant systems use a polyolester (POE) oil. See Table 59.

Table 59 — Compressor Oils

30MP UNIT SIZE	OIL
017-046	Copeland NXG5020
051-080	Danfoss 185SL

NOTE: Use only Carrier approved compressor oil. Oil should be visible in compressor oil sight glass. An acceptable oil level is from 1/8 to 3/8 of sight glass. All compressors must be off when checking oil level.

Recommended oil level adjustment method is as follows:

ADD OIL

Additional oil may be required in 30MPA units. Refer to Tables 37 and 38 provide an estimate of the amount of oil required, based on the line length and the recommended pipe sizes. The actual circuit oil charge will depend on the application piping. The guidelines listed are estimates and will likely need adjusting depending on the number of traps in the application and the pipe sizes utilized.

No attempt should be made to increase the oil level in the sight-glass above the 3/4 full level. A high oil level is not sustainable in the compressor and the extra oil will be pumped out into the system causing a reduction in system efficiency and a higher-than-normal oil circulation rate.

Add oil to suction line Schrader valve on tandem compressors sets and the compressor Schrader on the trios. When oil can be seen at the bottom of the sight glass, add oil in 5 oz increments which is approximately 1/8 in oil level. Run all compressors for 20 minutes then shut off to check oil level. Repeat procedure until acceptable oil level is present.

Do not reuse oil that has been drained out, or oil that has been exposed to atmosphere.

REMOVING OIL

If the oil level is determined to be too high, oil can be removed from the Schrader fitting on the compressors for the single and trio compressor circuits See Fig. 69 and 70. Remove oil from the Schrader fitting on the oil equalizer tube for the tandem compressor circuits.

If the complete oil charge must be removed, an oil dip tube assembly is required. The oil dip tube assembly is inserted into the compressor oil sight glass assembly. Oil dip tube assemblies are available through Carrier Replacement Components. Leaving the oil dip tube assembly in place is not recommended.

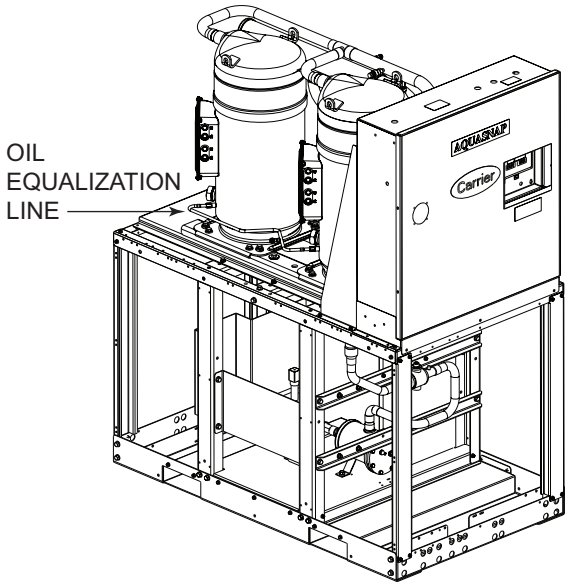


Fig. 69 — Typical Tandem Compressor Assembly

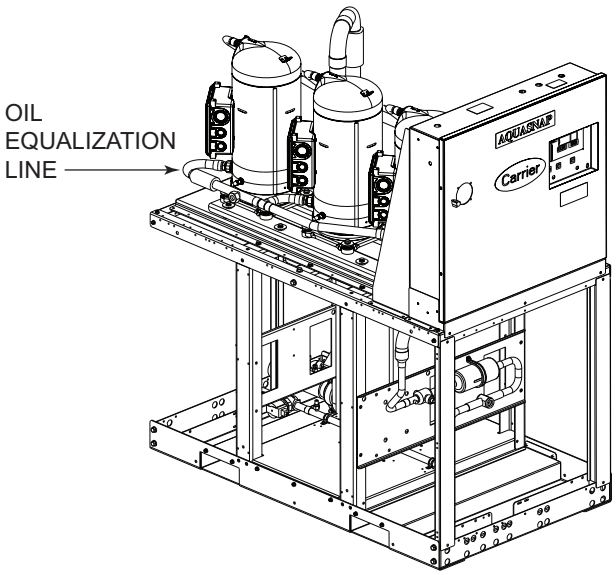


Fig. 70 — Typical Trio Compressor Assembly

Check Refrigerant Feed Components

FILTER DRIER

The function of the filter drier is to maintain a clean, dry system. The moisture indicator (described below) indicates any need to change the filter drier. The filter drier is a sealed-type drier for 30MP017-046 and removable core for 30MP051-080. When the drier needs to be changed, the entire filter drier must be replaced for 30MP017-046 units.

MOISTURE-LIQUID INDICATOR

The indicator is located immediately ahead of the TXV to provide an indication of the refrigerant moisture content. It also provides a sight glass for refrigerant liquid. Clear flow of liquid refrigerant (*at full unit loading*) indicates sufficient charge in the system. Bubbles in the sight glass (*at full unit loading*) indicate an undercharged system or the presence of noncondensables. Moisture in the system, measured in parts per million (ppm), changes the color of the indicator as follows:

Green (safe) —Moisture is below 75 ppm

Yellow-Green (caution) — 75 to 150 ppm

Yellow (wet) — above 150 ppm

The unit must be in operation at least 12 hours before the moisture indicator gives an accurate reading, and must be in contact with *liquid* refrigerant. At the first sign of moisture in the system, change the corresponding filter drier.

HOT GAS BYPASS VALVE

On units equipped with the factory-installed hot gas bypass option, a solenoid valve and discharge bypass valve (minimum load valve) are located between the discharge line and the evaporator entering-refrigerant line. The PIC6 controller cycles the solenoid to perform minimum load valve function and the discharge bypass valve modulates to the suction pressure set point of the valve. The bypass valve has an adjustable opening setting between 95 to 115 psig (655 to 793 kPa). The factory setting is 105 psig (724 kPa). The amount of capacity reduction achieved by the hot gas bypass valve is not adjustable.

PRESSURE RELIEF DEVICES

All units have one pressure relief device per circuit located in the liquid line which relieves at 210°F (100°C).

The 30MPW unit does not have a condenser pressure relief valve because the brazed-plate condenser is not considered a pressure vessel, as defined in ANSI/ASHRAE 15 (American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers) safety code requirements.

For 30MPA condenserless units, pressure relief devices designed to relieve at the pressure determined in local codes, must be field-supplied and installed in the discharge line piping in accordance with ANSI/ASHRAE 15 safety code requirements. Additional pressure relief valves, properly selected, must be field-supplied and installed to protect high side equipment and may be required by applicable codes.

All relief valves must be vented directly to the outdoors. *The vent line must not be smaller than the relief valve outlet.* Consult ANSI/ASHRAE 15 for detailed information concerning layout and sizing of relief vent lines.

Check Unit Safeties

HIGH-PRESSURE SWITCH

A high-pressure switch is provided to protect the circuit and refrigeration system from unsafe high pressure conditions. See Table 60 for high-pressure switch setting.

The high-pressure switch is mounted in the discharge line of the circuit. If an unsafe, high-pressure condition should exist, the switch opens and shuts off the unit. The PIC6 controller senses the HPS feedback signal and generates an appropriate alarm. The controller prevents the circuit from restarting until the alert condition is reset. The switch should open at the pressure shown in Table 60.

Clear the alarm using the touchscreen on the PIC6 controller. The unit should restart after the compressor anti-short-cycle delay, built into the unit control module, expires.

Table 60 — Factory Settings High-Pressure Switch (Fixed)

PART NUMBER	CUTOUT		CUT-IN	
	Psig	kPa	Psig	kPa
HK02ZZ001	650	4482	500	3447

PRESSURE TRANSDUCERS

Each unit is equipped with a suction and discharge pressure transducer. These inputs to the controller are not only used to monitor the status of the unit, but also to maintain operation of the chiller within the compressor manufacturer's specified limits. The input to the controller from the suction pressure transducer is also used to protect the compressor from operating at low pressure conditions and low superheat conditions. In some cases, the unit may not be able to run at full capacity. The control module will automatically reduce the capacity of a circuit as needed to maintain specified maximum/minimum operating pressures.

EVAPORATOR FREEZE-UP PROTECTION

⚠ WARNING

On brine units, the anti-freeze solution must be properly mixed to prevent freezing at a temperature of at least 15°F (8.3°C) below the leaving-fluid temperature set point. Failure to provide the proper anti-freeze solution mixture is considered abuse and may impair or otherwise negatively impact the Carrier warranty.

WATER FLOW SWITCH

A factory-installed chilled water flow switch is installed in the leaving fluid piping for all units. For 30MPQ units, the same switch is factory-installed on the condenser water side in addition to the evaporator side. Refer to Fig. 61 on page 80.

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 62 indicates the status of the switch.

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 seconds, 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 seconds.
   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 seconds.
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.

Strainer

Periodic cleaning of the required field-installed strainer is required. Pressure drop across strainer in excess of 3 psi (21 kPa) indicates the need for cleaning. Normal (clean) pressure drop is approximately 1 psi (6.9 kPa). Open the blowdown valve to clean the strainer. If required, shut the chiller down and remove the strainer screen to clean.

Replacing Defective Modules

The PIC6 replacement modules are shown in Table 61. If the PIC6 has been replaced, verify that all configuration data is correct. Check Factory Configuration in Appendix A, Table AH on page 121 to ensure all parameters are correct. In addition, verified any specific time and maintenance schedules.

Refer to the Start-Up Checklist for 30MP Liquid Chillers (completed at time of original start-up) found in the job folder. This information is needed later in this procedure. If the checklist does not exist, fill out the current information in the Configuration mode on a new checklist. Tailor the various options and configurations as needed for this particular installation.

⚠ WARNING

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

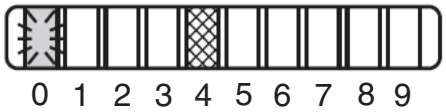
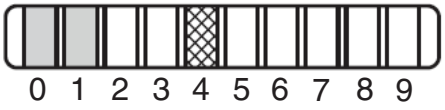
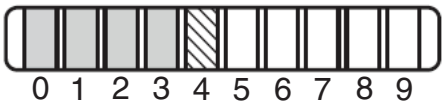
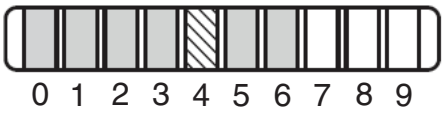
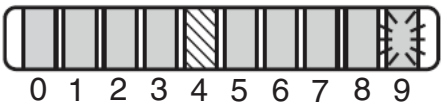
1. Check that all power to unit is off. Carefully disconnect all wires from defective module by unplugging its connectors.
2. Remove the defective module by removing its mounting screws with a Phillips screwdriver, and removing the module from the control box. Save the screws for later use.
3. Verify that the address switches exactly match the settings of the defective module.

   NOTE: Handle boards by mounting standoffs only to avoid electrostatic discharge.
4. Package the defective module in the carton of the new module for return to Carrier.
5. Mount the new module in the unit's control box using a Phillips screwdriver and the screws saved in Step 2.
6. Reinstall all module connectors.
7. Carefully check all wiring connections before restoring power.
8. Verify the ENABLE/OFF/REMOTE CONTROL switch is in the OFF position.
9. Restore control power. Verify that all module red LEDs blink in unison. Verify that all green LEDs are blinking and that the scrolling marquee or Navigator™ display is communicating correctly.
10. Verify all configuration information, settings, set points and schedules. Return the ENABLE/OFF/REMOTE CONTROL switch to its previous position.

Table 61 — Replacement Modules

MODULE	REPLACEMENT PART NO. (with Software)
PIC6 Controller	2005679155
CIOB	00PPG000585700
AUX	CEPL130567-02

Table 62 — 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

MAINTENANCE

Recommended Maintenance Schedule

The following are recommended guidelines. Jobsite conditions may require maintenance tasks be performed more often.

Every month:

- Check water quality. Inspection interval to be determined by site conditions and water quality specialist.
- Check moisture indicating sight glass for possible refrigerant loss and presence of moisture.

Every 3 months (for all machines):

- Check refrigerant charge.
- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary.
- Check chilled water flow switch operation.
- Check compressor oil level.

Every 6 months (for all machines):

- Clean chilled water/condenser water flow switch sensor tip.

Every 12 months (for all machines):

- 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 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. The 30MP017-046 units contain a hermetic filter drier. The 30MP051-080 units contain a replaceable core type filter drier.
- Check chilled water and condenser strainers; clean as needed.
- 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 if necessary.
- Check for excessive condenser approach (Saturated Discharge Pressure–Leaving Condenser Water Temperature) which may indicate fouling. Clean condenser if necessary (30MPW only).

TROUBLESHOOTING

Complete Unit Stoppage and Restart

Possible causes for unit stoppage and reset methods are shown below and in Table 63. Refer to Fig. 1 Component Arrangements (30MP Sizes 017-080) on page 7 for component arrangement and control wiring diagrams.

GENERAL POWER FAILURE

After power is restored, restart is automatic through normal MBB start-up.

UNIT ENABLE-OFF-REMOTE CONTROL SWITCH IS OFF

When the switch is OFF, the unit will stop immediately. Place the switch in the ENABLE position for local switch control or in the REMOTE CONTROL position for control through remote control closure.

CHILLED FLUID PROOF-OF-FLOW SWITCH OPEN

After the problem causing the loss of flow has been corrected, reset is manual by resetting the alarm with the scrolling marquee.

OPEN 24-V CONTROL CIRCUIT BREAKER(S)

Determine the cause of the failure and correct. Reset circuit breaker(s). Restart is automatic after MBB start-up cycle is complete.

COOLING LOAD SATISFIED

Unit shuts down when cooling load has been satisfied. Unit restarts when required to satisfy leaving fluid temperature set point.

THERMISTOR FAILURE

If a thermistor fails in either an open or shorted condition, the unit will be shut down. Replace EWT, or LWT as required. Unit restarts automatically, but must be reset manually by resetting the alarm with the scrolling marquee.

⚠ CAUTION

If unit stoppage occurs more than once as a result of any of the safety devices listed, determine and correct cause before attempting another restart.

ENABLING AND DISABLING COMPRESSORS

Compressors in the 30MP units can be enabled or disabled in the controls. To enable or disable a compressor, toggle the value in the ***Configuration → SERV*** menu for each individual compressor.

COMPRESSOR DISCHARGE CHECK VALVE

A disk-type check valve in the discharge of the compressor prevents high pressure discharge gas from flowing rapidly back through the compressor at shutdown. This same check valve prevents a high to low side bypass in multiple compressor circuits.

LOW SATURATED SUCTION

Several conditions can lead to low saturated suction alarms and the chiller controls have several override modes built in which will attempt to keep the chiller from shutting down. Low fluid flow, low refrigerant charge and plugged filter driers are the main causes for this condition. To avoid permanent damage and potential freezing of the system, do NOT repeatedly reset these alert and/or alarm conditions without identifying and correcting the cause(s).

COMPRESSOR SAFETIES

The 30MP units with PIC6 controls include a compressor protection board that protects the operation of each of the compressors. Each board senses the presence or absence of current to each compressor.

If there is a command for a compressor to run and there is no current, then one of the following safeties or conditions have turned the compressor off:

Compressor Overcurrent

All compressors have internal line breaks or a motor protection device located in the compressor electrical box.

Compressor Short Circuit

There will not be current if the compressor circuit breaker that provides short circuit protection has tripped.

Compressor Motor Over Temperature

The internal line-break or over temperature switch has opened.

High-Pressure Switch Trip

The high-pressure switch has opened. Refer to Table 60 for the factory settings for the fixed high-pressure switch.

ASTP Protection Trip (30MP017-046 Only)

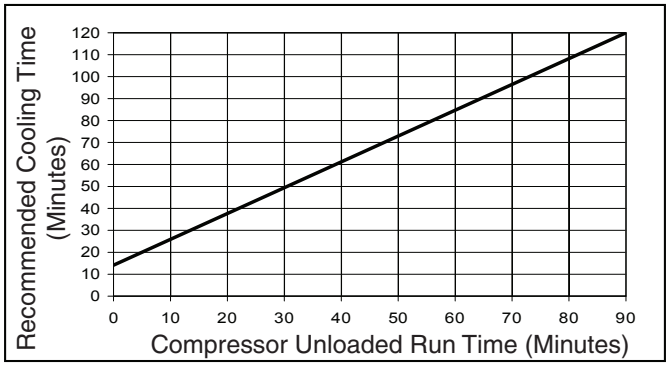
Some Copeland compressors are equipped with advanced scroll temperature protection. A label located above the terminal box identifies models that contain this technology. See Fig. 71. ASTP is a form of internal discharge temperature protection that unloads the scroll compressor when internal temperature reaches approximately 300°F (149°C). At this temperature, an internal bi-metal disk valve opens and causes the scroll elements to separate, which

stops compression. Suction and discharge pressures balance while the motor continues to run. The longer the compressor runs unloaded, the longer it must cool before the bi-metal disk resets. See Fig. 72 for approximate reset times.

Internal Overload

Copeland compressors without an ASTP protection module are protected by a internal overload device. This device senses current and temperature. It will open all phases to the motor when it senses an overload condition. Overload will reset automatically when the compressor has cooled.

Fig. 71 — Advanced Scroll Temperature Protection Label



NOTE: Various factors, including high humidity, high ambient temperature, and the presence of a sound blanket will increase cool-down times.

Fig. 72 — Recommended Minimum Cool Down Time after Compressor Is Stopped (Approximate)

To manually reset ASTP, the compressor should be stopped and allowed to cool. If the compressor is not stopped, the motor will run until the motor protector trips, which occurs up to 90 minutes later. Advanced scroll temperature protection will reset automatically before the motor protector resets, which may take up to 2 hours.

High Discharge Gas Temperature Protection

Units have an additional thermistor located on the discharge line. If discharge temperature exceeds 258°F (125.5°C), the compressor will be shut off.

Alarms will also occur if the current sensor board malfunctions or is not properly connected to its assigned digital input. If the compressor is commanded OFF and the current sensor reads ON, an alert is generated. This will indicate that a compressor contactor has failed closed. In this case, a special mode, Compressor Stuck on Control, will be enabled and all other compressors will be turned off. An alarm will then be enabled to indicate that service is required. Outdoor fans will continue to operate. The condenser output is turned on immediately.

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)***. 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. On the quick test menu, quick test must be enabled prior to testing specific devices. Once testing is complete, disable quick test to allow unit to go back in to a run mode.

NOTE: Quick Test #2 requires a minimum access level of Service.

See the Start-Up Checklist at the end of this document for a list of the parameters in the Quick Test Tables.

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.

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

Table 63 — Troubleshooting

SYMPTOMS	CAUSE	REMEDY
Compressor Cycles Off on Loss of Charge	Loss of charge control. Acting erratically.	Repair leak and recharge.
		Replace control.
	Low refrigerant charge.	Add refrigerant.
	Low suction temperature.	Raise evaporator leaving fluid temperature set point.
Compressor Cycles Off on Out of Range Condition	Thermistor failure.	Replace thermistor.
	System load was reduced faster than controller could remove stages.	Unit will restart after fluid temperature rises back into the control band. Avoid rapidly removing system load or increase loop volume.
	Temperature controller deadband setting is too low.	Raise deadband setting.
Compressor Shuts Down on High-Pressure Control	High-pressure control acting erratically.	Replace control.
	Non-condensables in system.	Purge system.
	Condenser scaled/dirty (30MPW).	Clean condenser.
	Fans in remote condensing unit (30MPA only) not operating.	Repair or replace if defective.
	System overcharged with refrigerant.	Reduce charge.
Unit Operates Too Long or Continuously	Low refrigerant charge.	Add refrigerant.
	Control contacts fused.	Replace control.
	Air in system.	Purge system.
	Partially plugged or plugged expansion valve or filter drier.	Clean or replace as needed.
	Defective insulation.	Replace or repair as needed.
	Service load.	Keep doors and windows closed.
	Damaged compressor.	Check compressor and replace if necessary.
Unusual or Loud System Noises	Piping vibration.	Support piping as required.
		Check for loose pipe connections or damaged compressor
	Expansion valve hissing.	Check refrigerant charge.
		Check for plugged liquid line filter drier.
	Compressor is noisy.	Replace compressor (worn bearings).
		Check for loose compressor holddown bolts.
		Operation outside of compressor operating envelope. Consider head pressure control, clean condenser. Check water flow (evaporator and condenser).
	Compressor not pumping.	Advanced scroll temperature protection is active. Determine high discharge temperature reason.
Compressor Loses Oil	Leak in system.	Repair leak.
	Mechanical damage (Failed seals or broken scrolls).	Replace compressor.
	Oil trapped in line.	Check piping for oil traps.
Hot Liquid Line	Shortage of refrigerant due to leak.	Repair leak and recharge.
Frosted Liquid Line	Restricted filter drier.	Replace filter drier.
Frosted Suction Line	Expansion valve admitting excess refrigerant (NOTE: This is a normal condition for brine applications).	Replace valve if defective.
	Stuck TXV (thermostatic expansion valve).	Replace valve if defective.
Freeze-Up	Improper charging.	Make sure a full quantity of fluid is flowing through the evaporator while charging. Charge with vapor until saturated suction temperature is above 32°F (0°C), then charge with liquid.
	Low Water Flow.	Verify proper flow through evaporator. Check for restrictions in chilled water piping, clean strainer, vent air from system.
	System not properly winterized.	Recommended that system be filled with an appropriate glycol mixture to prevent freezing of heat exchanger.
	Plugged heat exchanger.	40 mesh strainer installed within 10 ft. of unit. Strainer maintenance performed as recommended.
	Sensor accuracy.	Verify thermistors are fully inserted into wells. Verify accuracy of thermistors and transducers as recommended.

Motor Overload Protection (Unit Sizes 017 to 046)

COPELAND[1] COMPRESSOR MODELS WITH ELECTRICAL CODE TF

Models with a "TF" in the electrical code (i.e., YP123K1T-TFD) 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.

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.

Models with a "TE" in the electrical code (i.e., YPD192K1T-TED) 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 will reset it immediately.

⚠ CAUTION

Restoring the compressor sooner may cause a destructive temperature build up in the scrolls.

⚠ 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 fire, resulting in personal injury or death.

⚠ CAUTION

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

⚠ CAUTION

The motor protection system within the compressor is now bypassed. Use this configuration to temporarily test module only.

⚠ CAUTION

Use an ohmmeter with a maximum of 9 volts to check the sensor chain. The sensor chain is sensitive and easily damaged; no attempt should be made to check continuity through it with anything other than an ohmmeter. The application of any external voltage to the sensor chain may cause damage requiring the replacement of the compressor.

⚠ 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.

⚠ 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.

Installing the CoreSense communications module:

1. A new S1-S2 thermistor wiring harness is shipped with the CoreSense kit and must be used. The wiring harness connector block should be fully inserted on the three pins in the orientation shown in Fig. 73 for proper operation.

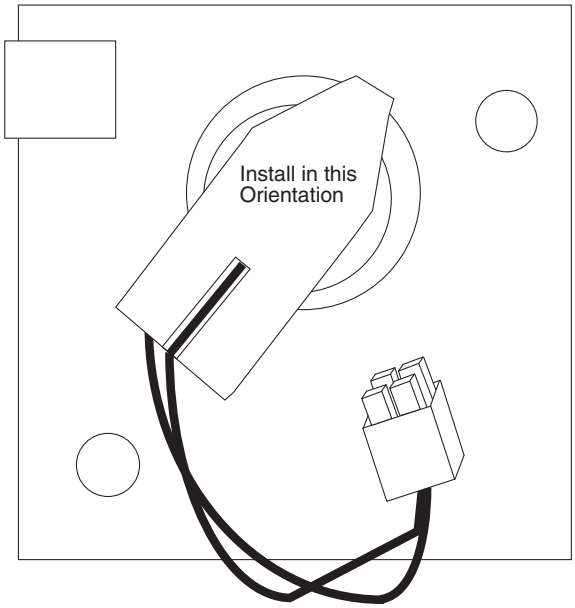


Fig. 73 — Compressor Motor Sensor Harness Installation (under motor protection module)

2. Review the DIP switch settings on the CoreSense module. DIP switch no. 1 should be ON (up position) and all other DIP switches should be OFF (down position). See Table 64.

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

Table 64 — 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

3. Install the CoreSense module in the compressor terminal box as shown in Fig. 74, with the tabs holding the module in place. Route the thermistor wire harness as shown and plug the harness into the 2x2 socket on the CoreSense module.
4. Connect the previously labeled M1, M2, T1, and T2 wires to the appropriate terminals on the CoreSense module.
5. Connect the L1, L2, and L3 phase sensing wires to the L1, L2, and L3 compressor terminal block connections. See the compressor terminal cover diagram for identification of the L1, L2, and L3 terminal block connections.
6. Double-check the installation and make sure all connections are secure. Install the compressor terminal cover.

   The CoreSense retrofit is complete and the system can be put back into service.

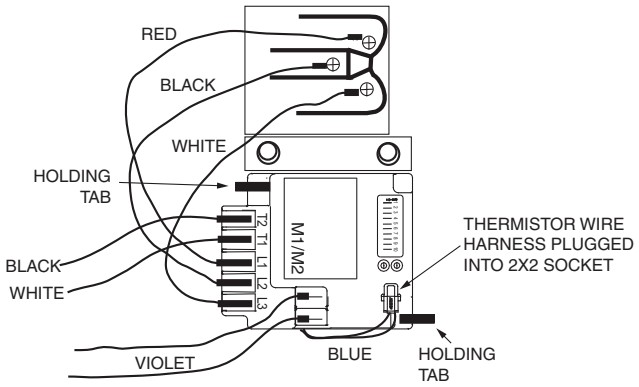


Fig. 74 — CoreSense Communication Module Mounting

CoreSense Communications Module Troubleshooting

Copeland models with a "TE" in the electrical code (i.e., ZP182KCE-**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. 75).

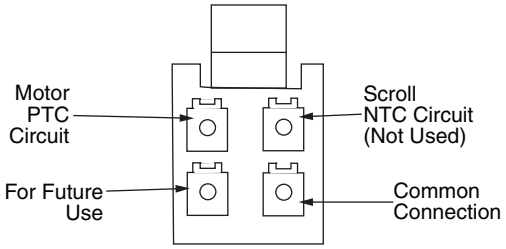


Fig. 75 — CoreSense Communications Motor Thermistor Plug

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 64.

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. 76. The flash code corresponds to the number of LED flashes, followed by a pause, and 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 65 lists the flash code information for Warning and Alert codes along with code reset and troubleshooting information.

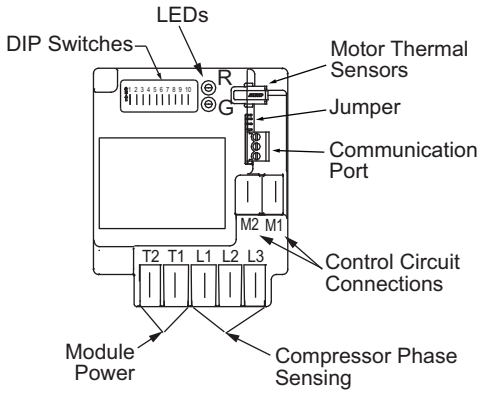


Fig. 76 — CoreSense Communication Motor Protection Wiring

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 chiller controller for longer than 5 minutes. Once communication is re-initiated, the Warning will be cleared. The 30MP 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 30MP 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 ohms. 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 ohms. 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 220 ohms or less than 100 ohms. 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 ohms. 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 ohms. 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 30MP units require the 24-volt module be field installed. Failure to install the 24-volt module will result in a compressor failure alarm.

Table 65 — 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 Chiller 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	30MP 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 ohms. Lockout occurs after 5 alerts.	Thermistor resistance less than 2750 ohms and 30 minutes have elapsed.	1. Check power supply. 2. Check system charge and super-heat. 3. Check compressor contactor.
RED FLASH CODE 2	Open/shorted motor thermistor.	Thermistor resistance greater than 4500 ohms, or less than 100 ohms. Lockout occurs after 6 hours.	Thermistor resistance is between 100 and 2750 ohms 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	30MP 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.

Compressor Protection Module (Unit Sizes 051-080)

Compressor models 240, 295, 300, and 485 are delivered with a pre-installed motor protection module inside the terminal box. (See Fig. 77 and Table 65.) This device provides efficient and reliable protection against overheating and overloading, as well as protection against phase loss/reversal.

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 connected on S1-S2. If any thermistor exceeds its response temperature, its resistance increases above the trip level (4500) and the output relay then trips (i.e., contacts M1-M2 are open). After cooling to below the response temperature (resistance < 2750), a 5-minute time delay is activated.

After this delay has elapsed, the relay is once again pulled in (i.e., contacts M1-M2 are closed). The time delay may be canceled by means of resetting the mains power (L-N disconnect) for approximately 5 sec. A red/green twin LED is visible on the module. A solid green LED denotes a fault-free condition. A blinking red LED indicates an identifiable fault condition. See Fig. 78 for identification of fault by timing of the red LED.

PHASE REVERSAL/LOSS

The circuit should be thoroughly checked in order to determine the cause of the phase problem before re-energizing the control circuit.

The phase sequencing and phase loss monitoring functions are active during a 5-second window, 1 second after compressor start-up (power on L1-L2-L3).

Should one of these parameters be incorrect, the relay would lock out (contacts M1-M2 open). The lockout may be canceled by resetting the mains power (L-N disconnect) for approximately 5 seconds.

IMPORTANT: Use an ohmmeter with a maximum of 9 volts to check the sensor chain. The sensor chain is sensitive and easily damaged; no attempt should be made to check continuity through it with anything other than an ohmmeter. The application of any external voltage to the sensor chain may cause damage requiring the replacement of the compressor.

MOTOR PROTECTOR PTC KEY VALUES	
Normal PTC Resistance:	250 to 2250 Ohms
Trip Resistance:	>4500 Ohm ± 20%
Reset Resistance:	<2750 Ohm ± 20%

The compressor protection model includes a status LED to help with troubleshooting. See Fig. 79 for blink sequence for specific error codes.

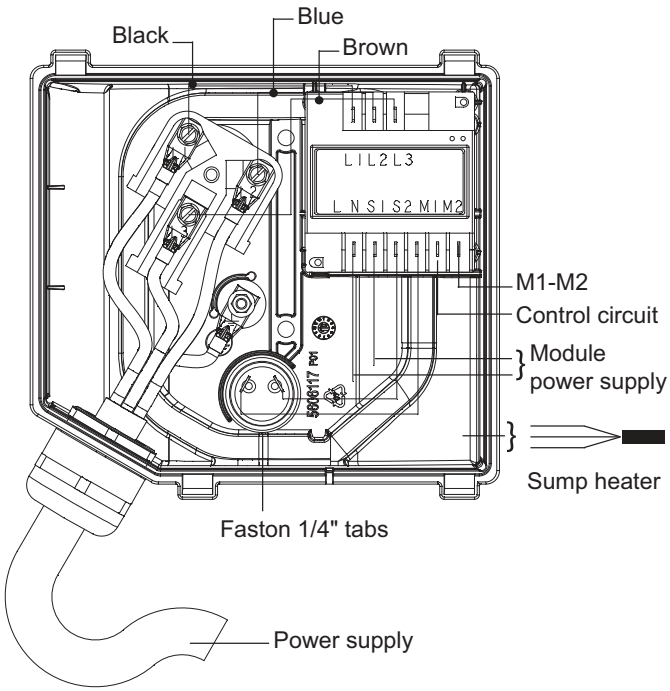


Fig. 77 — Compressor Protection Module (Unit Sizes 051-080)

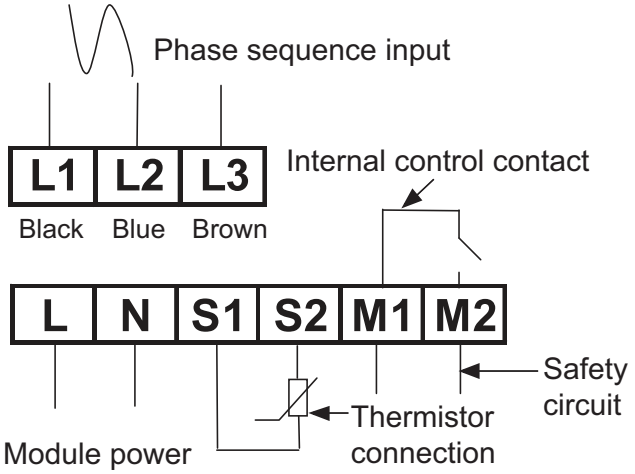


Fig. 78 — Compressor Protection Module — Fault Identification

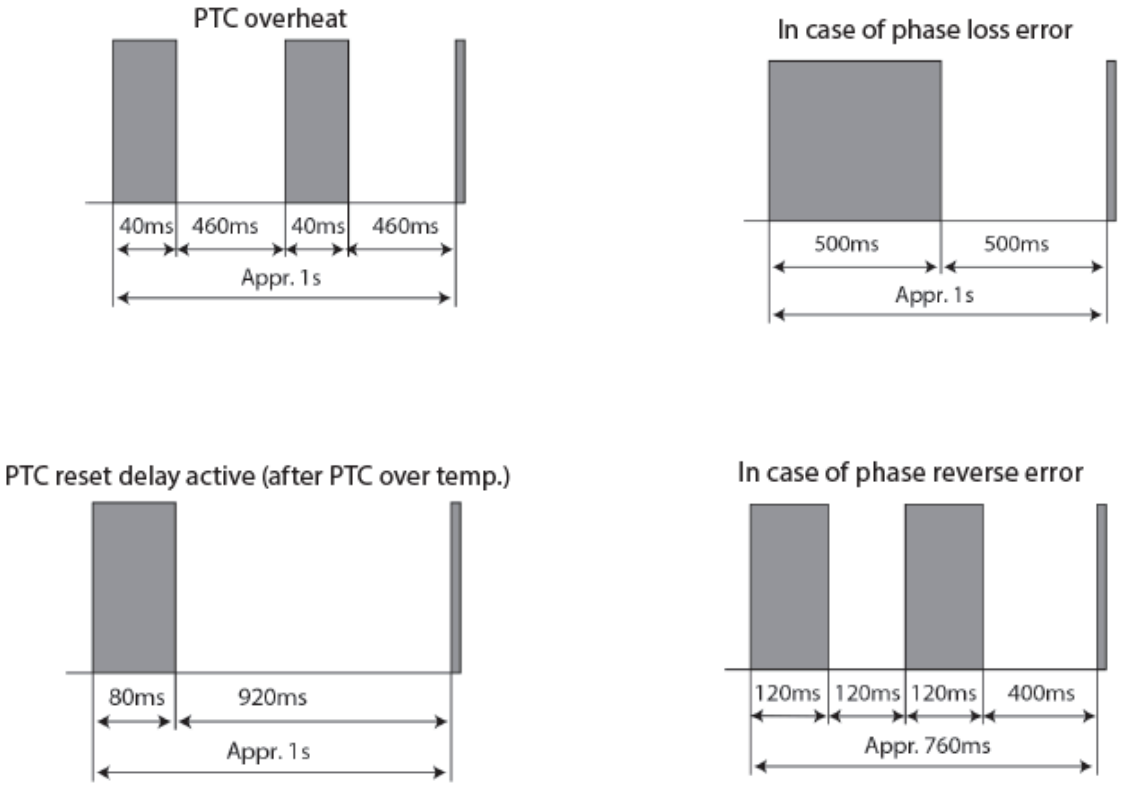


Fig. 79 — Compressor Protection Module Fault Identification

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 Tables 66-69.

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 67 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 66 for lists of alarms by code.

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 66 — Alarm Reference Lists By Code

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
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.	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
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
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_II_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 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
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 effected 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				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 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
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: a. If the circuit is stopped an alarm shall be tripped. b. 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 (82kPa) then: a. 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. b. 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 effected 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				
4901	Loss of communication with CIOB Board Number A	Tested when the unit is On or Off. 1. If communication with the CIOB board Number A is lost then the alarm shall be tripped. 2. If communication with the CIOB board Number B is lost then the alarm shall be tripped. 3. Alarm shall be tripped after 4seconds.	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				
4601	Loss of communication with AUX1 Board	Tested when the unit is On or Off and only: a. Digital compressor for all units. b. 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	
10001	Water Exchanger Freeze Protection	Tested only 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 the conditions for alarm trip are true. If the cooler pump is not operating then cooler pump no. 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) or 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.	1. 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 2. If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, consider setting Glycol in Loop ***(Main Menu → Configuration Menu → Service Configuration)*** to Yes to utilize a lower freeze point, 32°F (0°C). Further lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type ***(Main Menu → Configuration Menu → Factory Configuration)*** 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 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	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. 1. 1. If the circuit is running AND the Saturated Suction Temperature (SST) is 6 ^F or more below the freeze point: a. 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. b. AND if SST is below –22°F (–30°C) for more than 8 sec then the circuit alarm shall be tripped. 2. 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. NOTE: See Override no. 29 circuit A, no. 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. NOTE: See Override no. 34 circuit A, no. 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).	1. 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 2. If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, consider setting the Glycol in Loop ***(Main Menu → Configuration Menu → Service Configuration)*** to Yes to utilize a lower freeze point, 32°F (0°C). Further lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type ***(Main Menu → Configuration Menu → Factory Configuration)*** 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 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
10014	Cooler Interlock Failure	1. Tested only when the unit is On. a. If the interlock switch fails to close within the Off to On delay **(m_state=ON)** then the alarm shall be tripped. b. 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. c. 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. 2. Tested only when the unit is OFF. These conditions are checked only when unit does not embed factory pumps. a. 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 commanded OFF for more than 1 minute then the alarm shall be tripped. b. 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. 3. If the freeze protection alarm is active, the water pump remains on in order to try to save the water exchanger. 4. If unit embeds factory pump and flow switch (Low Brine), following condition is checked: 5. If **pump_loc** is enabled, flow switch is open but delta pressure is above 30kPa, 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 is configured or if the unit used a dual pump and one of them is 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 SIOBBJ1-DI02)
10015	Condenser Flow Switch Failure	Condenser flow switch opened and unit is 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 24 h. Otherwise, reset should be manual.	If this condition is encountered, then check the following items for faults: - flow switch operation - flow switch wiring

Table 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	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. 1. In Quick test: a. If during the rotation test of compressor (see “Quick Test (Service Test)” on page 89), 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. 2. In normal operation: a. Between 1 min. 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 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. b. 2 min. after the start of the compressor, the discharge pressure shall have increased by 3 psig and the delta pressure shall have reached at least 29 psig. c. 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)				
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. f **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 section 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.
90nn	Primary/Secondary Configuration Error	Tested when the unit is On and Off. 1. 1. If the unit is primary **(ms_sel = primary)** and is in Primary operating type and a primary/secondary configuration error **(ms_error)** is detected then the alert shall be tripped. 2. 2. If the unit is secondary **(ms_sel = secondary)** and is in CCN operating type and a primary/secondary configuration error **(ms_erro**r, 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
8000	Initial factory configuration required.	Tested when the unit is On and Off. If the factory configuration 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 configuration parameters to 0.	Automatic	If this condition is encountered, then check the following item for faults: - Set proper configuration in Factory Configuration Table.

Table 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
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.
10037	Circuit A Repeated High Discharge Gas Overrides	Tested only when the circuit is On. 1. 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. 2. 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 dirty or plugged, inaccurate discharge transducer.
10038	Circuit B Repeated High Discharge Gas Overrides				
10040	Circuit A Repeated Low Suction Temp Overrides	Tested only when the circuit is On. 1. 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. 2. 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	1. 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 2. If the Leaving Water Setpoint is above 40°F (4.4°C) and there is glycol in the loop, consider setting the Glycol in Loop ***(Main Menu → Configuration Menu → Service Configuration)*** to Yes to utilize a lower freeze point, 32°F (0°C). Further lowering of the freeze point can be accomplished by setting the Exchanger Fluid Type ***(Main Menu → Configuration Menu → Factory Configuration)*** 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				
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.	1. Unit Shutdown. 2. 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 at CIOB - Faulty entering or leaving water temperature sensors. - Evaporator nozzles for proper water temperature sensor locations.

Table 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
130nn	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. a. Refrigerant charge is low **(charge_c = enable and charge_m = low).** b. Scheduled Service Maintenance is near (regarding maintenance period set in MAINTCFG). 2. F-Gas Scheduled Check is near (regarding maintenance period set in MAINTCFG). 3. If any of the following is true then, an alarm shall be tripped. a. Scheduled Service Maintenance is reached. b. 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. a. 13001: Circuit A Loss of charge (refer to control capacity, low refrigerant charge override). b. 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**. a. 13004: Maintenance servicing required. b. 13005: F-Gas Scheduled Check required.	Servicing action required (the scheduled date has been reached).
10063	Circuit A High Pressure Switch Failure	1. If CIOB board no. 1 DI-09 input for compressor A1 and A2 is opened then A1 and A2 compressors are stopped, the alarm shall be tripped immediately. 2. If CIOB board no. 2 DI-09 input for compressor B1 and B2 is opened then B1 and B2 compressor is stopped, the alarm shall be tripped immediately. 3. If alarm HP and just after Alarm low voltage **OR** during alarm low voltage or just after, reset alarm HP is automatic. Alarm HP automatically resets 8 sec before and 8 sec after alarm low voltage because Alarm HP is not a real HP alarm but is due to low voltage.	1. If the alarm is tripped then the circuit shall stop immediately. 2. Alarm Icon shall blink. Alarm relay shall be energized.	Manual.	Switch fault.
10064	Circuit B High Pressure Switch Failure				
10210	Compressor Running Outside MAP - Circuit A	See Map protection: 1. Low SDT permanent limit. 2. P ratio limit 60" line.	1. The circuit shall be stopped. 2. Alarm lion 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 - Circuit B				
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.
57020	Main EXV stepper motor Failure- Circuit 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. Check connection on EXV.
57021	Main EXV Stepper Motor Failure - Circuit B				

Table 66 — Alarm Reference Lists By Code (cont)

ALARM CODE	ALARM NAME	CRITERIA FOR TRIP	ACTION TAKEN BY CONTROL	RESET METHOD	POSSIBLE CAUSES/CORRECTIVE ACTIONS
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 staring. 2. Alarm icon shall be on. Alarm relay shall be energized.	Automatic	If this condition is encountered, then confirm unit configuration.
7003	Illegal voltage configuration	Tested when the unit is On and Off. If voltage **(FACTORY_voltage)** for drive is different than 208/230/380/460, or 575 volts, 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 condensers are enable **(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	
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 17-v.	1. Unit shall be stopped immediately. 2. Alarm icon shall be ON. Alarm relay shall be energized.	The reset shall be automatic if the supply voltage returns above 19-v 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				
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.

LEGEND

CCN — Carrier Comfort Network
CSB — Current Sensor Board
CSM — Chiller System Manager
CIOB — Standard Input/Output Board
EMM — Energy Management Module
EWT — Entering Fluid Temperature
EXV — Electronic Expansion Valve
LCW — Leaving Chilled Water
LWT — Leaving Fluid Temperature
RGT — Return Gas Temperature
SCT — Saturated Condenser Temperature
TXV — Thermostatic Expansion Valve
WSM — Water System Manager

Table 67 — Alarm Reference Lists, By Name

DESCRIPTION	NAME	ALARM CODE	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 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 Running Outside MAP - Circuit A	RUN_OUT_MAP_A_F	10210	P-210
Compressor Running Outside MAP - Circuit B	RUN_OUT_MAP_B_F	10211	P-211
Condenser Entering Fluid Thermistor Failure	COND_EWT_F	15006	th-06
Condenser Flow Switch Failure	CONDENSER_LOCK_F	10015	P-15
Condenser Leaving Fluid Thermistor Failure	COND_LWT_F	15007	th-07
Condenser Pump Default	COND_PUMP_F	10073	
Condenser Water Exchanger Temperature Sensors Swapped	COND_SENSORS_SWAP_F	10098	P-98
Cooler Interlock Failure	COOLER_LOCK_F	10014	
Current Phase Reversal	REV_ROT_BOARD_F	10053	P-53
Illegal Configuration	ILL_FACT_CONF_F	7001	
Initial Factory Configuration 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	
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	th-21
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	

Table 68 — Black Box Function Recorded Parameters

POINT NAME	DESCRIPTION
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
ALM	Alarm State
CAPA_T	Capacity Running Circuit A
CAPB_T	Capacity Running Circuit B
CEWT	Condenser Entering Temperature
CLWT	Condenser Leaving Temperature
CNFS	Condenser Water Flow Switch
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
CPUMP	Condenser Pump
CTRL_PNT	Control Point
CWP1	Water Pump Interlock 1
CWP2	Water Pump Interlock 2
DEM_LIM	Demand Limit
EWT	Cooler Entering Temperature
EXV_A	EXV Position A
EXV_B	EXV Position B
FANC_1	Fan Contactor 1
FANC_2	Fan Contactor 2
FANC_3	Fan Contactor 3
FLOW_SW	Flow Switch
HEAD_ACT	Head Pressure Actuator A
HEATCOOL	Heat Cool Status
HGBP_V	Hot Gas ByPass Valve
HP_SW_A	High Pressure Switch A
HP_SW_B	High Pressure Switch B
LWT	Cooler Leaving Temperature
Mod_CPA1	Digital Modulation CPA1
mstslv	Unit is Primary or Secondary
OAT	Outdoor Air Temperature
ov_exv_a	EXV Override A
ov_exv_b	EXV Override B
over_cap	Override Capacity
PUMP_1	Pump #1 Command
PUMP_2	Pump #2 Command
SCT_A	Saturated Condensing Temperature A
SCT_B	Saturated Condensing Temperature B
SH_A	Superheat Temperature A
SH_B	Superheat Temperature B
smz	Load/Unload Factor
SST_A	Saturated Suction Temperature A
SST_B	Saturated Suction Temperature B
Status	Status of the unit
SUCT_A	Suction Temperature A
SUCT_B	Suction Temperature B
VFAN	Varifan Speed
zm	Current Z Multiplier Val

Table 69 — Black Box Function Recorded 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

APPENDIX A — Carrier Controller Display Tables

Table A — Main Menu

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICONS
1	GENUNIT	ALL	General Parameters	
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	

Table B — Alarms

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

Table C — System

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICONS
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	

Table D — Login

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

APPENDIX A — Carrier Controller Display Tables (cont)

Table E — Configuration

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICONS
1	GENCONF	USER	General Configuration	
2	PUMPCONF	USER	Pump Configuration	
3	HEADCONF	USER	Head Pressure Configuration	
4	HCCONFIG	USER	Heat/Cool Configuration	
5	RESETCFG	USER	Reset Configuration	
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	

Table F — Maintenance

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICONS
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	

Table G — Network

ITEM NUMBER	MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICONS
1	MODBUSRS	USER	Modbus RTU Config.	
2	MODBUSIP	USER	Modbus TCP/IP Config.	
3	BACNET	USER	BACnet Parameters	
4	EMAILCFG	USER	Email Configuration	

Table H — General Configuration
HMI Menu Path — //MAINMENU/CONFIG/GENCONF

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	lead_cir	0 to 2	0	—	Circuit Priority Sequence	0	2
2	—	—	—	—	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

Table I — Pump Configuration
HMI Menu Path — //MAINMENU/CONFIG/PUMPCONF

ITEM NUMBER	POINT NAME	STATUS	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

Table J — Head Pressure Configuration
HMI Menu Path — //MAINMENU/CONFIG/HEADCONFIG

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	—	—	—	—	PID Used:	—	—
2	crt_pg	–20 to 20	0	—	Current Prop PID Gain	–20	20
3	crt_ig	–5 to 5	0	—	Current Int PID Gain	–5	5
4	crt_dg	–20 to 20	0	—	Current Deri PID Gain	–20	20
5	—	—	—	—	PID Sets:	—	—
6	—	—	—	—	Available if cap < 40%	—	—
7	pgl	–20 to 20	1	—	Low Prop PID Gain	–20	20
8	igl	–5 to 5	0	—	Low Int PID Gain	–5	5
9	dgl	–20 to 20	0	—	Low Deri PID Gain	–20	20
10	—	—	—	—	Available if 40 < cap < 62	—	—
11	pgm	–20 to 20	1.1	—	Medium Prop PID Gain	–20	20
12	igm	–5 to 5	0.1	—	Medium Int PID Gain	–5	5
13	dgm	–20 to 20	0	—	Medium Deri PID Gain	–20	20
14	—	—	—	—	Available if cap > 62%	—	—
15	pgh	–20 to 20	1.2	—	High Prop PID Gain	–20	20
16	igh	–5 to 5	0.2	—	High Int PID Gain	–5	5
17	dgh	–20 to 20	0	—	High Deri PID Gain	–20	20
18	—	—	—	—	—	—	—
19	min_sp	0 to 100	7	—	Min Valve Opening	0	100
20	max_sp	0 to 100	100	—	Max Valve Opening	0	100
21	SW_DB	0 to 10	2	^F	SW Deadband	0	10

Table K — Heat/Cool Configuration
HMI Menu Path — //MAINMENU/CONFIG/HCCONFIG

ITEM NUMBER	POINT NAME	STATUS	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

Table L — Reset Configuration
HMI Menu Path — //MAINMENU/CONFIG/RESETCFG

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	—	—	—	—	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	—	—	—	—	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

APPENDIX A — Carrier Controller Display Tables (cont)

Table M — User Configuration
HMI Menu Path — //MAINMENU/CONFIG/USERCONF

ITEM NUMBER	POINT NAME	STATUS	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

Table N — General Unit Parameters
HMI Menu Path — //MAINMENU/GENUNIT

ITEM NUMBER	POINT NAME	STATUS	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	CHARS8	0	—	Running Status	—	—		
3	ALM	CHARS8	0	—	Alarm State	—	—		
4	min_left	0 to 0	0	min	Minutes Left for Start	0	0		
5	HEATCOOL	CHARS8	0	—	Heat/Cool Status	—	—		
6	HC_SEL	0 to 2	0	—	Heat/Cool Select	0	2	X	X
7	—	—	—	—	0=Cool 1=Heat 2=Auto	—	—		
8	SP_SEL	0 to 2	0	—	Setpoint Select	0	2	X	X
9	—	—	—	—	0=Auto/ 1=Spt1/ 2=Spt2	—	—		
10	SP_OCC	NO_YES	0	—	Setpoint Occupied?	0	1	X	
11	CHIL_S_S	DSABLE_ENABLE	0	—	Net.: Cmd Start/Stop	0	1	X	
12	CHIL_OCC	NO_YES	0	—	Net.: Cmd Occupied	0	1	X	
13	CAP_T	0 to 100	0	%	Percent Total Capacity	0	100		
14	CAPA_T	0 to 100	0	%	Circuit A Total Capacity	0	100		
15	CAPB_T	0 to 100	0	%	Circuit B Total Capacity	0	100		
16	DEM_LIM	0 to 100	0	%	Active Demand Limit Val	0	100	X	
17	SP	0 to 0	0	°F	Current Setpoint	0	0		
18	CTRL_PNT	–4 to 153	0	°F	Control Point	–4	153	X	
19	EMSTOP	DSABLE_ENABLE	0	—	Emergency Stop	0	1	X	
20	LAG_LIM	0 to 100	0	%	Lag Capacity Limit Value	0	100	X	

Table O — Temperature Configuration
HMI Menu Path — //MAINMENU/TEMP

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	EWT	0 to 0	0	°F	Entering Water Temp	0	0		
2	LWT	0 to 0	0	°F	Leaving Water Temp	0	0		
3	OAT	–40 to 302	0	°F	Outdoor Air Temperature	–40	302	X	
4	DLWT	–40 to 302	0	°F	Dual Leaving Water Temp	–40	302	X	
5	SCT_A	0 to 0	0	°F	Saturated Cond Temp Cir A	0	0		
6	SST_A	0 to 0	0	°F	Saturated Suction Temp A	0	0		
7	SUCT_A	0 to 0	0	°F	Suction Temp Circuit A	0	0		
8	DGT_A	0 to 0	0	°F	Discharge Gas Temp A	0	0		
9	SCT_B	0 to 0	0	°F	Saturated Cond Tmp Cir B	0	0		
10	SST_B	0 to 0	0	°F	Saturated Suction Temp B	0	0		
11	SUCT_B	0 to 0	0	°F	Suction Temp Circuit B	0	0		
12	DGT_B	0 to 0	0	°F	Discharge Gas Temp B	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	SPACETMP	0 to 0	0	°F	Space Temperature	0	0		

APPENDIX A — Carrier Controller Display Tables (cont)

Table P — Pressure Configuration
HMI Menu Path — //MAINMENU/PRESSURE

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	DP_A	0 to 0	0	PSI	Discharge Pressure A	0	0		
2	SP_A	0 to 0	0	PSI	Suction Pressure A	0	0		
3	DP_B	0 to 0	0	PSI	Discharge Pressure B	0	0		
4	SP_B	0 to 0	0	PSI	Suction Pressure B	0	0		

Table Q — Inputs
HMI Menu Path — //MAINMENU/INPUTS

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	ONOFF_SW	OPEN_CLOSE	0	—	Remote On/Off Switch	0	1		
2	HC_SW	OPEN_CLOSE	0	—	Remote Heat/Cool Switch	0	1		
3	on_ctrl	CHARS8	0	—	Current Control	—	—		
4	SETP_SW	OPEN_CLOSE	0	—	Second Setpoint Switch	0	1		
5	LIM_SW1	OPEN_CLOSE	0	—	Limit Switch 1	0	1		
6	LIM_SW2	OPEN_CLOSE	0	—	Limit Switch 2	0	1		
7	SP_RESET	4 to 20	4	mA	Setpoint Reset Signal	4	20		
8	FLOW_SW	OPEN_CLOSE	0	—	Flow Switch Interlock	0	1		
9	CNFS	OPEN_CLOSE	0	—	Condenser Water Flow SW	0	1		
10	leak_v1	0 to 0	0	V	Leakage Detection 1	0	0		
11	leak_v2	0 to 0	0	V	Leakage detection 2	0	0		
12	DSHTR_SW	OPEN_CLOSE	0	—	Desuperheater Switch	0	1		
13	HP_SW_A	OPEN_CLOSE	0	—	High Pressure Switch A	0	1		
14	HP_SW_B	OPEN_CLOSE	0	—	High Pressure Switch B	0	1		
15	BOILER	OFF_ON	0	—	Boiler Switch	0	1		
16	CWP1	OPEN_CLOSE	0	—	Water Pump Interlock 1	0	1		
17	CWP2	OPEN_CLOSE	0	—	Water Pump Interlock 2	0	1		
18	REV_ROT	OPEN_CLOSE	0	—	Phase Reversal	0	1		
19	LIM_4_20	4 to 20	4	mA	Capacity Limit Control	4	20		
20	ICE_SW	OPEN_CLOSE	0	—	Ice Done Storage Switch	0	1		
21	CSP_IN	4 to 20	4	mA	4_20mA Cooling Setpoint	4	20		

Table R — Outputs
HMI Menu Path — //MAINMENU/OUTPUTS

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	CP_A1	OFF_ON	0	—	Compressor A1	0	1		
2	CP_A2	OFF_ON	0	—	Compressor A2	0	1		
3	CP_A3	OFF_ON	0	—	Compressor A3	0	1		
4	DUS	OFF_ON	0	—	Digital Unload Solenoid	0	1		
5	Mod_CPA1	0 to 100	0	%	Digital Module A1	0	100		
6	HGBP_V	OFF_ON	0	—	Hot Gas ByPass Valve	0	1		
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	%	Variable Fan 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	1		
14	CP_B2	OFF_ON	0	—	Compressor B2	0	1		
15	EXV_B	0 to 0	0	%	EXV Position Circuit B	0	0		
16	EXVNPosB	0 to 0	0	%	EXV Next Position Circuit B	0	0		
17	EXCH_HTR	OFF_ON	0	—	Exchanger Heater	0	1		
18	ALARM	OFF_ON	0	—	Alarm Relay	0	1		
19	RUN	OFF_ON	0	—	Running Relay	0	1		
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 Relay	0	1		

APPENDIX A — Carrier Controller Display Tables (cont)

Table S — Pump Stats
HMI Menu Path — //MAINMENU/PUMPSTAT

ITEM NUMBER	POINT NAME	STATUS	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	

Table T — Runtime Configuration
HMI Menu Path — //MAINMENU/RUNTIME

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

Table U — Modes
HMI Menu Path — //MAINMENU/MODES

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

Table V — Miscellaneous Stats
HMI Menu Path — //MAINMENU/MSC_STAT

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

Table W — EXV Capacity Control Load Facts
HMI Menu Path — //MAINMENU/MAINTMNU/LOADFACT

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

Table X — Driver Controls Maintenance
HMI Menu Path — //MAINMENU/MAINTMNU/DRV_CTRL

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	—	—	—	—	Fan Drive A	—			
2	cmd_rpm1	0 to 0	0	—	Fan Speed Cmd in RPM	0	0		
3	drvpwr_1	0 to 0	0	kW	Fan Drive Power	0	0		
4	drv_I_1	0 to 0	0	A	Fan Drive Current	0	0		
5	drv_V_1	0 to 0	0	V	Fan Drive Voltage	0	0		
6	drv_F_1	0 to 0	0	Hz	Fan Drive Frequency	0	0		
7	drv_S_1	0 to 0	0	rpm	Fan Drive Speed RPM	0	0		
8	drvVer_1	CHAR1	0	—	Fan Drive Version	—	—		
9	—	—	—	—	Set Drive Address	—	—		
10	SET_DRV	NO_YES	0	—	Attach Variable Fan Drive	0	1	X	X

Table Y — Primary/Secondary Main
HMI Menu Path — //MAINMENU/MAINTMNU/M_MSTSLV

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	mstslv	CHARS8	0	—	Unit is Primary or Secondary	—	—		
2	ms_ctrl	CHARS8	0	—	Primary Control Type	—	—		
3	ms_activ	FALSE_TRUE	0	—	Primary/Scd. Control Active	0	1		
4	lead_sel	MASTER_SLAVE	0	—	Lead Unit is the secondary	0	1		
5	slv_stat	0 to 0	0	—	Secondary Chiller State	0	0		
6	slv_capt	0 to 0	0	%	Scd. Chiller Total Cap	0	0		
7	l_strt_d	0 to 0	0	min	Lag Start Delay	0	0		
8	ll_hr_d	0 to 0	0	hours	Lead/lag Hours Delta	0	0		
9	ll_chang	NO_YES	0	—	Lead/lag Changeover?	0	1		
10	ll_pull	NO_YES	0	—	Lead Pulldown?	0	1		
11	ms_error	0 to 0	0	—	Primary/Scd. Error	0	0		
12	cap_max	NO_YES	0	—	Max Available Capacity?	0	1		
13	lagstat	0 to 0	0	—	Slave lagstat	0	0		
14	slav_hr	0 to 0	0	hours	Secondary Operating Hours	0	0		
15	slav_ewt	0 to 0	0	°F	Secondary Entering Fluid	0	0		
16	slav_lwt	0 to 0	0	°F	Secondary Leaving Fluid	0	0		

Table Z — Last Power On Reset
HMI Menu Path — //MAINMENU/MAINTMNU/LAST_POR

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

APPENDIX A — Carrier Controller Display Tables (cont)

Table AA — Protection Limit
HMI Menu Path — //MAINMENU/MAINTMNU/PR_LIMIT

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	—	—	—	—	Circuit A	—			
2	sdtlim_a	0 to 0	0	°F	Discharge A Gas Limit	0	0		
3	sdt3m_a	0 to 0	0	°F	SDT A Average 3 minutes	0	0		
4	sst3m_a	0 to 0	0	°F	SST A Average 3 minutes	0	0		
5	sdt30s_a	0 to 0	0	°F	SDT A Average 30 seconds	0	0		
6	sst30s_a	0 to 0	0	°F	SST A Average 30 seconds	0	0		
7	—	—	—	—	Circuit B	—			
8	sdtlim_b	0 to 0	0	°F	Discharge B Gas Limit	0	0		
9	sdt3m_b	0 to 0	0	°F	SDT B Average 3 minutes	0	0		
10	sst3m_b	0 to 0	0	°F	SST B Average 3 minutes	0	0		
11	sdt30s_b	0 to 0	0	°F	SDT B Average 30 seconds	0	0		
12	sst30s_b	0 to 0	0	°F	SST B Average 30 seconds	0	0		

Table AB — Service Maintenance
HMI Menu Path — //MAINMENU/MAINTMNU/SERMAINT

ITEM NUMBER	POINT NAME	STATUS	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	—	—	—	—	1- Reset All	—			
3	—	—	—	—		—			
4	—	—	—	—	Operation Warnings	—			
5	charge_m	CHARS8	0	—	2-Refrigerant Charge	—	—		
6	blank			—					
7	blank			—	General Servicing Delays				
8	blank			—	4-Next Service Mntn				
9	s_date	CHARS8	0	—	Date of Maintenance	—	—		
10	s_hour	CHARS8	0	—	Hour of Maintenance	—	—		
11	s_days	CHARS8	0	—	Operation Days until Mntn	—	—		
12	—	—	—	—	—				
13	—	—	—	—	—				
14	—	—	—	—	Regulatory Servicing				
15	—	—	—	—	5-F-Gas Check				
16	f_date	CHARS8	0	—	F-Gas seal check remind	—	—		
17	blank			—	6-Leak detector check				
18	l_date	CHARS8	0	—	Leak detector check remind	—	—		

Table AC — Quick Test Menu 1
HMI Menu Path — //MAINMENU/QCK_TST1

ITEM NUMBER	POINT NAME	STATUS	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	1		X
19					–1=Off / 0=CirA / 1=CirB				
20	Q_HGBP	OFF_ON	0	—	Hot Gas Bypass Valve A	0	1		X
21	Q_LLSV_A	OFF_ON	0	—	Solenoid Valve A	0	1		X
22	Q_LLSV_B	OFF_ON	0	—	Solenoid Valve B	0	1		X
23	Q_HEAD_P	0 to 100	0	%	Head Pressure Actuator A	0	100		X

Table AD — Alarm Reset
HMI Menu Path — //MAINMENU/ALARMS/ALARMRST

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	RST_ALM	NO_YES	0	—	Alarm Reset	0	1		X
2	ALM	CHARS8	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		

Table AE — Head Control
HMI Menu Path — //MAINMENU/MAINTMNU/HEADCTRL

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	—	—	—	—	Cir A Head Pressure Ctrl				
2	condsp	0 to 0	0	°F	Computed Cond Setpoint	0	0		
3	fanseq	0 to 0	0	—	Fan Control Sequence	0	0		
4	fan	0 to 0	0	—	Fan Speed	0	0		
5	fan_ov	0 to 0	0	—	Fan Override	0	0		

Table AF — Quick Test Menu 2
HMI Menu Path — //MAINMENU/QCK_TST2

ITEM NUMBER	POINT NAME	STATUS	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

Table AG — System
HMI Menu Path — //MAINMENU/MAINTMNU/SYSVER

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT	CCN FORCE	LEN FORCE
1	sr_cioba	CHARS8	0	—	CIOB A CESR Number	—	—		
2	sr_ciobb	CHARS8	0	—	CIOB B CESR Number	—	—		
3	sr_aux	CHARS20	0	—	AUX CESR Number	—	—		

Table AH — Factory Parameters
HMI Menu Path — //MAINMENU/CONFIG/FACTORY

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	unit_typ	1 to 3	1	—	Unit Type (30RC = 1, 30MPA/W/Q = 3)	1	3
2	unitsize	0 to 0	0	—	Unit Capacity Model	0	0
3	boil_sel	NO_YES	0	—	Boiler Command Select (Not Used for 30MP)	0	1
4	desuper	NO_YES	0	—	Desuperheater Select (Not Used for 30MP)	0	1
5	vfan_sel	NO_YES	0	—	Variable Fan Speed	0	1
6	pump_sel	NO_YES	0	—	Factory Water Pump (Not Used for 30MP)	0	1
7	dual_pmp	NO_YES	0	—	Factory Dual Water Pump (Not Used for 30MP)	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	—	Enable 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 (Enables LLSV for 30MPA or 30MPW/Q with Brine Option)	0	1
15	h_act_en	NO_YES	0	—	Enable Head Press Act A	0	1
16	evap_en	NO_YES	0	—	Enable Evap Isolator Relay	0	1
17	leak_chk	NO_YES	0	—	Leakage Charge Detection (Used for Customer Installed Leak Detector at TB5-23 and 24.)	0	1
18	bac_opt	NO_YES	0	—	Enable BacNet Option	0	1

Table AI — Compressors (Unable) Configuration
HMI Menu Path — //MAINMENU/CONFIG/CP_UNABL

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	—	—	—	—	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

Table AJ — Primary/Secondary Configuration
HMI Menu Path — //MAINMENU/CONFIG/MST_SLV

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	—	—	—	—	Primary/Secondary Control	—	—
2	ms_sel	0 to 2	0	—	Primary/Secondary Select	0	2
3				—	0 = Disable		
4				—	1 = Primary		
5	—	—	—	—	2 = Secondary	—	—
6	ms_ctrl	1 to 3	1	—	Primary Control Type	1	3
7					1 = Local Control		
8					2 = Remote Control		
9					3 = Network Control		
10	slv_addr	1 to 236	2	—	Secondary Address	1	236
11	lead_sel	0 to 2	0	—	Lead Lag Select	0	2
12					0=Always Lead		
13					1=Lag Once Failed Only		
14					2=Lead/Lag Runtime Select		
15	start_dt	3 to 18	4	^F	Start If Error Higher	3	18
16	lag_mini	0 to 150	0	min	Lag Minimum Running Time	0	150
17	lstr_tim	2 to 30	10	min	Lead/Lag Start Timer	2	30
18	ll_bal_d	40 to 400	168	hours	Lead/Lag Balance Delta	40	400
19	lag_pump	0 to 1	0	—	Lag Unit Pump Control	0	1
20					0 = Stop if Unit Stops		
21					1 = Run if Unit Stops		
22	lead_pul	0 to 60	0	min	Lead Pulldown Time	0	60
23	ll_serie	NO_YES	0	—	Chiller In Series	0	1
24	islegacy	NO_YES	0	—	Legacy Compatibility ?	0	1

Table AK — Service Parameters
HMI Menu Path — //MAINMENU/CONFIG/SERVICE1

ITEM NUMBER	POINT NAME	STATUS	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 Protection	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 Setpoint	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	1
14	blank			—	0 Imperial, 1 Metric		
15	oat_en	NO_YES	0	—	Enable oat for MP	0	1

Table AL — Email Configuration
HMI Menu Path — //MAINMENU/CONFIG/EMAILCFG

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	senderP1	CHARS24	0	—	Sender Email Part1	—	—
2	blank			—	@		
3	senderP2	CHARS24	0	—	Sender Email Part2	—	—
4	recip1P1	CHARS24	0	—	Recip1 Email Part1	—	—
5	blank			—	@		
6	recip1P2	CHARS24	0	—	Recip1 Email Part2	—	—
7	recip2P1	CHARS24	0	—	Recip2 Email Part1	—	—
8	blank			—	@		
9	recip2P2	CHARS24	0	—	Recip2 Email Part2	—	—
10	smtpP1	0 to 255	0	—	SMTP IP Address Part 1	0	255
11	smtpP2	0 to 255	0	—	SMTP IP Address Part 2	0	255
12	smtpP3	0 to 255	0	—	SMTP IP Address Part 3	0	255
13	smtpP4	0 to 255	0	—	SMTP IP Address Part 4	0	255
14	accP1	CHARS24	0	—	Account Email Part1	—	—
15	blank			—	@		
16	accP2	CHARS24	0	—	Account Email Part2	—	—
17	accPass	CHARS24	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

Table AM — BACNet Parameters
HMI Menu Path — //MAINMENU/CONFIG/BACNET

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	bacena	0 to 2	0	—	BACnet Enable Option	0	2
2					0 - Disabled		
3					1 - BACnet IP		
4					2 - BACnet MSTP		
5	bacunit	NO_YES	1	—	Metric Units?	0	1
6	network	1 to 40000	1600	—	Network	1	40000
7	udpport	47808 to 47823	47808	—	UDP Port Number	47808	47823
8	bac_id	1 to 4194302	1600001	—	Device Id Manual	1	4194302
9	auid_opt	DSABLE_ENABLE	0	—	Device Id Auto Option	0	1
10	balmena	DSABLE_ENABLE	1	—	Alarm Reporting	0	1
11	mng_occ	NO_YES	0	—	BACnet Manage Occupancy	0	1
12	conifnam	0 to 1	0	—	IP port Interface Name	0	1
13					0 = J5 / J15		
14					1 = J16		
15	mstpaddr	1 to 127	1	—	BACnet MS/TP MAC Address	1	127
16	mstpbaud	0 to 5	2	—	BACnet MS/TP Baud Rate	0	5
17					0 = 9600		
18					1 = 19200		
19					2 = 38400		
20					3 = 57600		
21					4 = 76800		
22					5 = 115200		
23	maxmastr	1 to 127	10	—	BACnet MS/TP Max Master	1	127
24	maxinfof	1 to 255	5	—	MS/TP Max Info Frames	1	255

Table AN — Miscellaneous Service
HMI Menu Path — //MAINMENU/CONFIG/MSC_SERV

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	—	—	—	—	Eco Pump Configuration	—	—
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

Table AO — Option Selection Configuration
HMI Menu Path — //MAINMENU/CONFIG/OPT_SEL

ITEM NUMBER	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	boil_en	NO_YES	0	—	Boiler Enable	0	1

Table AP — Factory Reset 2
HMI Menu Path — //MAINMENU/CONFIG/FACTORY2

ITEM NUMBER	POINT NAME	STATUS	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	CHARS24	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	CHARS24	0	—	EXV B Name	—	—
12	exvmax_b	0 to 15000	0	—	EXV B Maximum Steps Nb	0	15000

Table AQ — Setpoint
HMI Menu Path — //MAINMENU/SETPOINT/SETPOINT

ITEM NUMBER	POINT NAME	STATUS	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 78.8	44	°F	Cooling Ice Setpoint	–20	78.8
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 B — CCN IP POINTS TABLE

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
ewt_opt	T10_GENCONF	GENCONF_ewt_opt	
pump_seq	T10_PUMPCONF	PUMPCONF_pump_seq	
cpmp_seq	T10_PUMPCONF	PUMPCONF_cpmp_seq	
STATUS	T11_GENUNIT	GENUNIT_STATUS	
HEATCOOL	T11_GENUNIT	GENUNIT_HEATCOOL	
HC_SEL	T11_GENUNIT	GENUNIT_HC_SEL	X
SP_SEL	T11_GENUNIT	GENUNIT_SP_SEL	X
SP_OCC	T11_GENUNIT	GENUNIT_SP_OCC	X
CHIL_S_S	T11_GENUNIT	GENUNIT_CHIL_S_S	X
CHIL_OCC	T11_GENUNIT	GENUNIT_CHIL_OCC	X
CAP_T	T11_GENUNIT	GENUNIT_CAP_T	
CAPA_T	T11_GENUNIT	GENUNIT_CAPA_T	
CAPB_T	T11_GENUNIT	GENUNIT_CAPB_T	
DEM_LIM	T11_GENUNIT	GENUNIT_DEM_LIM	X
SP	T11_GENUNIT	GENUNIT_SP	
CTRL_PNT	T11_GENUNIT	GENUNIT_CTRL_PNT	X
EMSTOP	T11_GENUNIT	GENUNIT_EMSTOP	X
LAG_LIM	T11_GENUNIT	GENUNIT_LAG_LIM	X
EWT	T11_TEMP	TEMP_EWT	
LWT	T11_TEMP	TEMP_LWT	
OAT	T11_TEMP	TEMP_OAT	X
DLWT	T11_TEMP	TEMP_DLWT	X
SCT_A	T11_TEMP	TEMP_SCT_A	
SST_A	T11_TEMP	TEMP_SST_A	
SUCT_A	T11_TEMP	TEMP_SUCT_A	
SCT_B	T11_TEMP	TEMP_SCT_B	
SST_B	T11_TEMP	TEMP_SST_B	
SUCT_B	T11_TEMP	TEMP_SUCT_B	
CEWT	T11_TEMP	TEMP_CEWT	
CLWT	T11_TEMP	TEMP_CLWT	
SPACETMP	T11_TEMP	TEMP_SPACETMP	
DP_A	T11_PRESSURE	PRESSURE_DP_A	
SP_A	T11_PRESSURE	PRESSURE_SP_A	
DP_B	T11_PRESSURE	PRESSURE_DP_B	
SP_B	T11_PRESSURE	PRESSURE_SP_B	
ONOFF_SW	T11_INPUTS	INPUTS_ONOFF_SW	
HC_SW	T11_INPUTS	INPUTS_HC_SW	
SETP_SW	T11_INPUTS	INPUTS_SETP_SW	
LIM_SW1	T11_INPUTS	INPUTS_LIM_SW1	
LIM_SW2	T11_INPUTS	INPUTS_LIM_SW2	
SP_RESET	T11_INPUTS	INPUTS_SP_RESET	
FLOW_SW	T11_INPUTS	INPUTS_FLOW_SW	
CNFS	T11_INPUTS	INPUTS_CNFS	
leak_v1	T11_INPUTS	INPUTS_leak_v1	
leak_v2	T11_INPUTS	INPUTS_leak_v2	
DSHTR_SW	T11_INPUTS	INPUTS_DSHTR_SW	
HP_SW_A	T11_INPUTS	INPUTS_HP_SW_A	
HP_SW_B	T11_INPUTS	INPUTS_HP_SW_B	
BOILER	T11_INPUTS	INPUTS_BOILER	
CWP1	T11_INPUTS	INPUTS_CWP1	
CWP2	T11_INPUTS	INPUTS_CWP2	
REV_ROT	T11_INPUTS	INPUTS_REV_ROT	
LIM_4_20	T11_INPUTS	INPUTS_LIM_4_20	
ICE_SW	T11_INPUTS	INPUTS_ICE_SW	
CSP_IN	T11_INPUTS	INPUTS_CSP_IN	
CP_A1	T11_OUTPUTS	OUTPUTS_CP_A1	
CP_A2	T11_OUTPUTS	OUTPUTS_CP_A2	
CP_A3	T11_OUTPUTS	OUTPUTS_CP_A3	
DUS	T11_OUTPUTS	OUTPUTS_DUS	
Mod_CPA1	T11_OUTPUTS	OUTPUTS_Mod_CPA1	
HGBP_V	T11_OUTPUTS	OUTPUTS_HGBP_V	

APPENDIX B — CCN IP Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
FANC_1	T11_OUTPUTS	OUTPUTS_FANC_1	X
FANC_2	T11_OUTPUTS	OUTPUTS_FANC_2	X
FANC_3	T11_OUTPUTS	OUTPUTS_FANC_3	X
VFAN	T11_OUTPUTS	OUTPUTS_VFAN	
EXV_A	T11_OUTPUTS	OUTPUTS_EXV_A	
EXVNPosA	T11_OUTPUTS	OUTPUTS_EXVNPosA	
CP_B1	T11_OUTPUTS	OUTPUTS_CP_B1	
CP_B2	T11_OUTPUTS	OUTPUTS_CP_B2	
EXV_B	T11_OUTPUTS	OUTPUTS_EXV_B	
EXVNPosB	T11_OUTPUTS	OUTPUTS_EXVNPosB	
EXCH_HTR	T11_OUTPUTS	OUTPUTS_EXCH_HTR	
ALARM	T11_OUTPUTS	OUTPUTS_ALARM	
RUN	T11_OUTPUTS	OUTPUTS_RUN	
LLSV_A	T11_OUTPUTS	OUTPUTS_LLSV_A	
LLSV_B	T11_OUTPUTS	OUTPUTS_LLSV_B	
HEAD_ACT	T11_OUTPUTS	OUTPUTS_HEAD_ACT	
EISOR	T11_OUTPUTS	OUTPUTS_EISOR	
PUMP_1	T11_PUMPSTAT	PUMPSTAT_PUMP_1	X
PUMP_2	T11_PUMPSTAT	PUMPSTAT_PUMP_2	X
ROT_PUMP	T11_PUMPSTAT	PUMPSTAT_ROT_PUMP	X
CPUMP	T11_PUMPSTAT	PUMPSTAT_CPUMP	X
SET_DRV	T12_DRV_CTRL	DRV_CTRL_SET_DRV	X
S_RESET	T12_SERMAINT	SERMAINT_S_RESET	X
QCK_TEST	T12_QCK_TST1	QCK_TEST_QCK_TEST	
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_VFAN	T12_QCK_TST1	QCK_TEST_Q_VFAN	
MOD_EXVA	T12_QCK_TST1	QCK_TEST_MOD_EXVA	
Q_EXVA	T12_QCK_TST1	QCK_TEST_Q_EXVA	
MOD_EXVB	T12_QCK_TST1	QCK_TEST_MOD_EXVB	
Q_EXVB	T12_QCK_TST1	QCK_TEST_Q_EXVB	
Q_PUMP_1	T12_QCK_TST1	QCK_TEST_Q_PUMP_1	
Q_PUMP_2	T12_QCK_TST1	QCK_TEST_Q_PUMP_2	
Q_CPUMP	T12_QCK_TST1	QCK_TEST_Q_CPUMP	
Q_ALARM	T12_QCK_TST1	QCK_TEST_Q_ALARM	
Q_RUN	T12_QCK_TST1	QCK_TEST_Q_RUN	
Q_EX_HTR	T12_QCK_TST1	QCK_TEST_Q_EX_HTR	
Q_BOILER	T12_QCK_TST1	QCK_TEST_Q_BOILER	
HP_TEST	T12_QCK_TST1	QCK_TEST_HP_TEST	
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_HEAD_P	T12_QCK_TST1	QCK_TEST_Q_HEAD_ACT	
RST_ALM	T12_ALARMRST	ALARMRST_RST_ALM	
alarm_1c	T12_ALARMRST	ALARMRST_alarm_1c	
alarm_2c	T12_ALARMRST	ALARMRST_alarm_2c	
alarm_3c	T12_ALARMRST	ALARMRST_alarm_3c	
alarm_4c	T12_ALARMRST	ALARMRST_alarm_4c	
alarm_5c	T12_ALARMRST	ALARMRST_alarm_5c	
alarm_1	T12_ALARMRST	ALARMRST_alarm_1	
alarm_2	T12_ALARMRST	ALARMRST_alarm_2	
alarm_3	T12_ALARMRST	ALARMRST_alarm_3	
alarm_4	T12_ALARMRST	ALARMRST_alarm_4	
alarm_5	T12_ALARMRST	ALARMRST_alarm_5	
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_DUS	T12_QCK_TST2	QCK_TEST_Q_DUS	
f_vfan	T12_LABOONLY	LABOONLY_f_vfan	X
cmd_vf	T12_LABOONLY	LABOONLY_cmd_vf	X

APPENDIX B — CCN IP Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
spt_vf	T12_LABOONLY	LABOONLY_spt_vf	X
f_exv_A	T12_LABOONLY	LABOONLY_f_exv_A	X
cmd_exvA	T12_LABOONLY	LABOONLY_cmd_exvA	X
EX_PREA	T12_LABOONLY	LABOONLY_EX_PREA	X
f_exv_B	T12_LABOONLY	LABOONLY_f_exv_B	X
cmd_exvB	T12_LABOONLY	LABOONLY_cmd_exvB	X
EX_PREB	T12_LABOONLY	LABOONLY_EX_PREB	X
hd_pg	T12_LABOONLY	LABOONLY_hd_pg	X
hd_ig	T12_LABOONLY	LABOONLY_hd_ig	X
hd_dg	T12_LABOONLY	LABOONLY_hd_dg	X
ms_sel	T13_MST_SLV	MST_SLV_ms_sel	
modrt_en	T13_MODBUSRS	MODBUSRS_modrt_en	
LCW_STPT		PROTOCOL_LCW_STPT	X
ALM		UNIT_ALM	
RT_HPSW		RT_HPSW	
LAG_LIM		PROTOCOL_LAG_LIM	X
Q_TSTRQ		PROTOCOL_Q_TSTRQ	
TEST_HP		PROTOCOL_TEST_HP	X
MODBUSEN		PROTOCOL_MODBUSEN	
RUN_TEST		PROTOCOL_RUN_TEST	
LENTSTEN		PROTOCOL_LENTSTEN	
LENTST_S		PROTOCOL_LENTST_S	
RTSTIP1		RUNTEST_IP_ADDR1	X
RTSTIP2		RUNTEST_IP_ADDR2	X
RTSTIP3		RUNTEST_IP_ADDR3	X
RTSTIP4		RUNTEST_IP_ADDR4	X

APPENDIX C — BACNET IP POINTS

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COVInc	PV ACCESS	DESCRIPTION
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_DLWT	TEMP_DLWT	AV	5	–40	302	Type 5	18	RO	Dual Leaving Water Temp
GENUNIT_CTRL_PNT_rd	GENUNIT_CTRL_PNT	AV	6	–4	153	Type 5	1	RO	Control Point
GENUNIT_SP	GENUNIT_SP	AV	7	0	0	Type 6	0	RO	Current Setpoint
GENUNIT_DEM_LIM_rd	GENUNIT_DEM_LIM	AV	8	0	100	Type 6	0	RO	Active Demand Limit Val
GENUNIT_CAP_T	GENUNIT_CAP_T	AV	9	0	100	Type 5	10	RO	Percent Total Capacity
GENUNIT_min_left	GENUNIT_min_left	AV	11	0	0	Type 6	0	RO	Minutes Left for Start
GENUNIT_CHIL_S_S_rd	GENUNIT_CHIL_S_S	BV	12	0	1	Type 4	0	RO	Net.: Cmd Start/Stop
GENUNIT_EMSTOP_rd	GENUNIT_EMSTOP	BV	13	0	1	Type 4	0	RO	Emergency Stop
OUTPUTS_RUN	OUTPUTS_RUN	BV	15	0	0	Type 4	0	RO	Running Relay
INPUTS_ONOFF_SW	INPUTS_ONOFF_SW	BV	16	0	1	Type 4	0	RO	Remote On/Off Switch
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
GENUNIT_CTRL_TYP	GENUNIT_CTRL_TYP	AV	21	0	2	Type 6	0	RO	Local=0 Network=1 Remote=2
GENUNIT_STATUS	UNIT_STATUS	AV	22	0	0	Type 6	0	RO	Running Status
GENUNIT_HC_SEL_rd	GENUNIT_HC_SEL	AV	23	0	2	Type 6	0	RO	Heat/Cool Select
GENUNIT_SP_SEL_rd	GENUNIT_SP_SEL	AV	24	0	2	Type 6	0	RO	Setpoint Select
INPUTS_SETP_SW	INPUTS_SETP_SW	BV	48	0	1	Type 4	0	RO	Second Setpoint Switch
PUMPSTAT_PUMP_1_rd	PUMPSTAT_PUMP_1	BV	50	0	1	Type 4	0	RO	Water Pump no. 1
PUMPSTAT_PUMP_2_rd	PUMPSTAT_PUMP_2	BV	51	0	1	Type 4	0	RO	Water Pump no. 2
INPUTS_FLOW_SW	INPUTS_FLOW_SW	BV	52	0	1	Type 4	0	RO	Flow Switch Interlock
OUTPUTS_EXCH_HTR	OUTPUTS_EXCH_HTR	BV	57	0	0	Type 4	0	RO	Exchanger Heater
GENUNIT_CHIL_OCC_rd	GENUNIT_CHIL_OCC	BV	58	0	1	Type 4	0	RO	Net.: Cmd Occupied
GENUNIT_SP_OCC_rd	GENUNIT_SP_OCC	BV	59	0	1	Type 4	0	RO	Setpoint Occupied?
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_network	BACnet_network	AV	62	1	40000	Type 6	0	RO	Network
BACnet_ident	BACnet_ident	AV	63	1	4194302	Type 6	0	RO	Device Id Actually Used
BACnet_COLOR	BACnet_COLOR	MV	64	0	14	Type 5	0	RO	ALC Color Value
BACnet_PRIME_V	BACnet_PRIME_V	AV	65	0	0	Type 6	0	RO	ALC Prime Value
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.
PUMPCONF_pump_seq	PUMPCONF_pump_seq	AV	73	0	4	Type 6	0	RO	Cooler Pumps Sequence
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_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
RUNTIME_hr_mach	RUNTIME_hr_mach	AV	960	0	0	Type 6	0	RO	Machine Operating Hours
RUNTIME_st_mach	RUNTIME_st_mach	AV	961	0	0	Type 5	1	RO	Machine Starts Number
RUNTIME_hr_pump1	RUNTIME_hr_pump1	AV	962	0	0	Type 6	0	RO	Water Pump no. 1 Hours
RUNTIME_hr_pump2	RUNTIME_hr_pump2	AV	963	0	0	Type 6	0	RO	Water Pump no. 2 Hours
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
ALARMRST_alarm_1c	ALARMRST_alarm_1c	AV	980	0	0	Type 6	0	RO	Current Alarm 1
ALARMRST_alarm_2c	ALARMRST_alarm_2c	AV	981	0	0	Type 6	0	RO	Current Alarm 2
ALARMRST_alarm_3c	ALARMRST_alarm_3c	AV	982	0	0	Type 6	0	RO	Current Alarm 3
ALARMRST_alarm_4c	ALARMRST_alarm_4c	AV	983	0	0	Type 6	0	RO	Current Alarm 4
ALARMRST_alarm_5c	ALARMRST_alarm_5c	AV	984	0	0	Type 6	0	RO	Current Alarm 5
ALARMRST_alarm_1	ALARMRST_alarm_1	AV	985	0	0	Type 6	0	RO	Current Alarm 1 index
ALARMRST_alarm_2	ALARMRST_alarm_2	AV	986	0	0	Type 6	0	RO	Current Alarm 2 index
ALARMRST_alarm_3	ALARMRST_alarm_3	AV	987	0	0	Type 6	0	RO	Current Alarm 3 index
ALARMRST_alarm_4	ALARMRST_alarm_4	AV	988	0	0	Type 6	0	RO	Current Alarm 4 index
ALARMRST_alarm_5	ALARMRST_alarm_5	AV	989	0	0	Type 6	0	RO	Current Alarm 5 index
ALARMRST_ALM	UNIT_ALM	AV	990	0	0	Type 5	1	RO	Alarm State
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

APPENDIX C — BACNet IP Points (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COVInc	PV ACCESS	DESCRIPTION
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
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_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
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
OUTPUTS_VFAN	OUTPUTS_VFAN	AV	1015	0	0	Type 6	0	RO	Variable Fan Speed
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
OUTPUTS_CP_A1	OUTPUTS_CP_A1	BV	1032	0	0	Type 4	0	RO	Compressor A1
OUTPUTS_CP_B1	OUTPUTS_CP_B1	BV	2032	0	0	Type 4	0	RO	Compressor B1
OUTPUTS_CP_A2	OUTPUTS_CP_A2	BV	1033	0	0	Type 4	0	RO	Compressor A2
OUTPUTS_CP_B2	OUTPUTS_CP_B2	BV	2033	0	0	Type 4	0	RO	Compressor B2
OUTPUTS_CP_A3	OUTPUTS_CP_A3	BV	1034	0	0	Type 4	0	RO	Compressor A3
RUNTIME_hr_cp_a1	RUNTIME_hr_cp_a1	AV	1960	0	0	Type 6	0	RO	Compressor A1 Hours
RUNTIME_hr_cp_b1	RUNTIME_hr_cp_b1	AV	2960	0	0	Type 6	0	RO	Compressor B1 Hours
RUNTIME_hr_cp_a2	RUNTIME_hr_cp_a2	AV	1961	0	0	Type 5	0	RO	Compressor A2 Hours
RUNTIME_hr_cp_b2	RUNTIME_hr_cp_b2	AV	2961	0	0	Type 5	0	RO	Compressor B2 Hours
RUNTIME_hr_cp_a3	RUNTIME_hr_cp_a3	AV	1962	0	0	Type 5	0	RO	Compressor A3 Hours
RUNTIME_st_cp_a1	RUNTIME_st_cp_a1	AV	1964	0	0	Type 5	1	RO	Compressor A1 Starts
RUNTIME_st_cp_b1	RUNTIME_st_cp_b1	AV	2964	0	0	Type 5	1	RO	Compressor B1 Starts
RUNTIME_st_cp_a2	RUNTIME_st_cp_a2	AV	1965	0	0	Type 5	0	RO	Compressor A2 Starts
RUNTIME_st_cp_b2	RUNTIME_st_cp_b2	AV	2965	0	0	Type 5	0	RO	Compressor B2 Starts
RUNTIME_st_cp_a3	RUNTIME_st_cp_a3	AV	1966	0	0	Type 5	0	RO	Compressor A3 Starts
PUMPCONF_pump_del	PUMPCONF_pump_del	AV	5001	24	3000	Type 6	0	RO	Pump Auto Rotation Delay
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_loc	PUMPCONF_pump_loc	BV	5004	0	1	Type 4	0	RO	Flow Checked if Pump Off
INPUTS_SP_RESET	INPUTS_SP_RESET	AV	5005	4	20	Type 6	0	RO	Setpoint Reset Signal
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_DSHTR_SW	INPUTS_DSHTR_SW	AV	5008	0	1	Type 6	0	RO	Desuperheater 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
OUTPUTS_ALARM	OUTPUTS_ALARM	BV	5012	0	0	Type 4	0	RO	Alarm Relay
FACTORY_unit_typ	FACTORY_unit_typ	AV	5013	1	3	Type 6	0	RO	Unit Type (WaterCooled=3)
FACTORY_unitsize	FACTORY_unitsize	AV	5014	0	0	Type 6	0	RO	Unit Capacity Model
SETPOINT_ramp_sp	SETPOINT_ramp_sp	AV	5015	0.2	2	Type 6	0	RW	Ramp Loading
SETPOINT_cauto_sp	SETPOINT_cauto_sp	AV	5016	39	122	Type 6	0	RW	Cool Changeover Setpt
SETPOINT_hauto_sp	SETPOINT_hauto_sp	AV	5017	32	115	Type 6	0	RW	Heat Changeover Setpt
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
OPT_SEL_boil_en	OPT_SEL_boil_en	BV	5061	0	1	Type 4	0	RW	Boiler Enable
SETPOINT_min_sct	SETPOINT_min_sct	AV	5064	80	122	Type 6	0	RW	Desuperheater Min Sct
GENUNIT_CTRL_PNT_wr	PROTOCOL_CTRL_PNT	AV	10006	–4	153	Type 2	0	RW	Control Point
GENUNIT_DEM_LIM_wr	PROTOCOL_DEM_LIM	AV	10008	0	100	Type 2	0	RW	Active Demand Limit Val
GENUNIT_CHIL_S_S_wr	PROTOCOL_CHIL_S_S	BV	10012	0	1	Type 1	0	RW	Net.: Cmd Start/Stop
GENUNIT_EMSTOP_wr	PROTOCOL_EMSTOP	BV	10013	0	1	Type 1	0	RW	Emergency Stop
GENUNIT_HC_SEL_wr	PROTOCOL_HC_SEL	AV	10023	0	3	Type 2	0	RW	Heat/Cool Select
GENUNIT_SP_SEL_wr	PROTOCOL_SP_SEL	AV	10024	0	2	Type 2	0	RW	Setpoint Select
PUMPSTAT_PUMP_1_wr	PROTOCOL_PUMP_1	BV	10050	0	1	Type 1	0	RW	Evaporator pump 1
PUMPSTAT_PUMP_2_wr	PROTOCOL_PUMP_2	BV	10051	0	1	Type 1	0	RW	Evaporator pump 2
GENUNIT_CHIL_OCC_wr	PROTOCOL_CHIL_OCC	BV	10058	0	1	Type 1	0	RW	Net.: Cmd Occupied
GENUNIT_SP_OCC_wr	PROTOCOL_SP_OCC	BV	10059	0	1	Type 1	0	RW	Setpoint Occupied?
ALM_COOL_EWT_F	ALM_COOL_EWT_F	BV	115001	0	1	Type 5	0	RO	Water Exchanger Entering Fluid Thermistor Failure

APPENDIX C — BACNet IP Points (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COVInc	PV ACCESS	DESCRIPTION
ALM_COOL_LWT_F	ALM_COOL_LWT_F	BV	115002	0	1	Type 5	0	RO	Water Exchanger Leaving Fluid Thermistor Failure
ALM_OAT_F	ALM_OAT_F	BV	115010	0	1	Type 5	0	RO	OAT Thermistor Failure
ALM_DLWT_F	ALM_DLWT_F	BV	115011	0	1	Type 5	0	RO	Primary/Secondary Common Fluid Thermistor 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
ALM_DGT_A_F	ALM_DGT_A_F	BV	115015	0	1	Type 5	0	RO	Circuit A Discharge Gas 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_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_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_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_COOLER_FREEZE_F	ALM_COOLER_FREEZE_F	BV	110001	0	1	Type 5	0	RO	Water Exchanger Freeze Protection
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_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_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_LOSS_COM_SM_F	ALM_LOSS_COM_SM_F	BV	110029	0	1	Type 5	0	RO	Loss of communication with System Manager
ALM_LOSS_COM_MS_F	ALM_LOSS_COM_MS_F	BV	110030	0	1	Type 5	0	RO	Primary/Secondary communication Failure
ALM_M_S_CONFIG_F	ALM_M_S_CONFIG_F	BV	109001	0	1	Type 5	0	RO	Primary chiller configuration error
ALM_INI_FACT_CONF_F	ALM_INI_FACT_CONF_F	BV	108000	0	1	Type 5	0	RO	Initial factory configuration required
ALM_ILL_FACT_CONF_F	ALM_ILL_FACT_CONF_F	BV	107001	0	1	Type 5	0	RO	Illegal configuration
ALM_NETWORK_EMSTOP_F	ALM_NETWORK_EMSTOP_F	BV	110031	0	1	Type 5	0	RO	Unit is in Network emergency stop.
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_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

APPENDIX C — BACNet IP Points (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COVInc	PV ACCESS	DESCRIPTION
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_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_FAN_VFD_DRIVE_F	ALM_FAN_VFD_DRIVE_F	BV	117001	0	1	Type 5	0	RO	Circuit A VFD Fan Drive Failure
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_HP_SWITCH_A_F	ALM_HP_SWITCH_A_F	BV	110063	0	1	Type 5	0	RO	Circuit A High pressure switch Failure
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_FLUIDE_FAIL	ALM_FLUIDE_FAIL	BV	110099	0	1	Type 5	0	RO	Possible Refrigerant Leakage Failure
ALM_FGAS_NEEDED	ALM_FGAS_NEEDED	BV	113005	0	1	Type 5	0	RO	Fgas check needed, call your maintenance company
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
GENUNIT_HEATCOOL	UNIT_HEATCOOL	AV	77	0	0	Type 6	0	RO	Heat/Cool status
GENCONF_ewt_opt	GENCONF_ewt_opt	BV	5078	0	1	Type 4	0	RO	Entering Fluid Control
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
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_SPACETMP	ALM_SPACETMP	BV	115021	0	1	Type 5	0	RO	Space Temperature Failure
TEMP_SPACETMP	TEMP_SPACETMP	AV	5082	0	0	Type 5	2	RO	Space Temperature
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
PUMPSTAT_CPUMP	PUMPSTAT_CPUMP	BV	5756	0	1	Type 4	0	RO	Condenser Pump Relay
OUTPUTS_LLSV_A	OUTPUTS_LLSV_A	AV	5758	0	1	Type 6	0	RO	Soleniod Valve A
OUTPUTS_LLSV_B	OUTPUTS_LLSV_B	AV	5757	0	1	Type 6	0	RO	Soleniod Valve B
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
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_DUS	OUTPUTS_DUS	AV	5754	0	0	Type 6	0	RO	Digital Unload Solenoid
OUTPUTS_BOILER	OUTPUTS_BOILER	AV	5711	0	1	Type 6	0	RO	Boiler Output
INPUTS_HC_SW	INPUTS_HC_SW	AV	45	0	1	Type 6	0	RO	Remote Heat/Cool Switch
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_REV_ROT	INPUTS_REV_ROT	AV	5761	0	1	Type 6	0	RO	Phase Reversal
INPUTS_ICE_SW	INPUTS_ICE_SW	AV	20	0	1	Type 6	0	RO	Ice Done Storage Switch
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
INPUTS_LIM_4_20	INPUTS_LIM_4_20	AV	5764	4	20	Type 6	0	RO	Capacity Limit Control
OUTPUTS_EISOR	OUTPUTS_EISOR	AV	5765	0	1	Type 6	0	RO	Evaporator Isolator Rly
GENCONF_lim_sel	GENCONF_lim_sel	AV	5003	0	2	Type 6	0	RO	Demand Limit Type Select

APPENDIX C — BACNet IP Points (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COVInc	PV ACCESS	DESCRIPTION
ALM_COND_PUMP_F	ALM_COND_PUMP_F	AV	110073	0	1	Type 6	0	RO	Condenser Pump Default
PROTOCOL_PUMP_C	PROTOCOL_PUMP_C	BV	10053	0	1	Type 1	0	RW	Condenser pump
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
FACTORY_hgbp_sel	FACTORY_hgbp_sel	BV	5770	0	1	Type 4	0	RO	Hot Gas Bypass Selection
SERVICE1_freezesp	SERVICE1_freezesp	AV	5447	-20	34	Type 6	0	RO	Brine Freeze Setpoint
FACTORY_flui_typ	FACTORY_flui_typ	AV	5443	1	3	Type 6	0	RO	Cooler Fluid Type
OUTPUTS_Mod_CPA1	OUTPUTS_Mod_CPA1	AV	5771	0	100	Type 6	0	RO	Digital Module A1
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
HEADCTRL_condsp	HEADCTRL_condsp	AV	5772	0	0	Type 6	0	RO	Computed Cond Setpoint
RESETCFG_spacr_no	RESETCFG_spacr_no	AV	5033	14	125	Type 6	0	RO	Space T No Reset Value
RESETCFG_spacr_fu	RESETCFG_spacr_fu	AV	5034	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
RESETCFG_spahr_fu	RESETCFG_spahr_fu	AV	5043	14	125	Type 6	0	RO	Space T Full Reset Value
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
RESETCFG_oat_crno	RESETCFG_oat_crno	AV	5027	14	125	Type 6	0	RO	OAT No Reset Value
RESETCFG_oat_crfu	RESETCFG_oat_crfu	AV	5028	14	125	Type 6	0	RO	OAT 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_cr_fu	RESETCFG_dt_cr_fu	AV	5030	0	25	Type 6	0	RO	Delta T Full Reset Value
RESETCFG_l_cr_no	RESETCFG_l_cr_no	AV	5031	0	20	Type 6	0	RO	Current No Reset Value
RESETCFG_l_cr_fu	RESETCFG_l_cr_fu	AV	5032	0	20	Type 6	0	RO	Current Full Reset Value
RESETCFG_cr_deg	RESETCFG_cr_deg	AV	5035	–30	30	Type 6	0	RO	Cooling Reset Deg. Value
RESETCFG_oat_hrno	RESETCFG_oat_hrno	AV	5036	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_dt_hr_no	RESETCFG_dt_hr_no	AV	5038	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_l_hr_no	RESETCFG_l_hr_no	AV	5040	0	20	Type 6	0	RO	Current No Reset Value
RESETCFG_l_hr_fu	RESETCFG_l_hr_fu	AV	5041	0	20	Type 6	0	RO	Current Full Reset Value
RESETCFG_hr_deg	RESETCFG_hr_deg	AV	5044	–30	30	Type 6	0	RO	Heating Reset Deg. Value
HEADCTRL_fan	HEADCTRL_fan	AV	5773	0	0	Type 6	0	RO	Fan Speed
MODES_m_ice	MODES_m_ice	BV	5301	0	1	Type 4	0	RO	Ice Mode In Effect
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

APPENDIX D — MODBUS IP POINTS

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	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	Condenser Flow Switch Failure	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	Unit is in Network emergency stop	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 Temperature Sensors Swapped	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

LEGEND

CO — COILS_MEDIA
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APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	Decimal							Min.	Max.	Default
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	F-gas 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
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	38.0000042
0x038C	908	2	SETPOINT_hsp2	Heating Setpoint 2	32bits FLOAT	HR	°F	77	131	100.4
							°C	25.0000032	55.0000056	38.0000042

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APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	Decimal							Min.	Max.	Default
0x038E	910	2	SETPOINT_lim_sp1	Switch Limit Setpoint 1	32bits UINT	HR	%	0	100	100
0x0390	912	2	SETPOINT_lim_sp2	Switch Limit Setpoint 2	32bits UINT	HR	%	0	100	100
0x0392	914	2	SETPOINT_lim_sp3	Switch Limit Setpoint 3	32bits UINT	HR	%	0	100	100
0x0BC2	3010	2	PROTOCOL_CTRL_PNT	Control Point	32bits FLOAT	HR	°F	-4	153	44.6
							°C	-20	67.2222288	7.00000176
0x0BC6	3014	2	PROTOCOL_DEM_LIM	Active Demand Limit Val	32bits UINT	HR	%	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 Unit	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
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

LEGEND

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APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	Decimal							Min.	Max.	Default
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 Setpoint	32bits FLOAT	HR	°F	39	122	75
							°C	3.8888904	50.0000052	23.888892
0x2330	9008	2	SETPOINT_hauto_sp	Heat Changeover Setpoint	32bits FLOAT	HR	°F	32	115	64
							°C	1.2E-06	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	150.000013	-17.777778
0x0008	8	2	TEMP_DLWT	Dual Leaving Water Temp	32bits FLOAT	IR	°F	-40	302	0
							°C	-40.000002	150.000013	-17.777778
0x000A	10	2	GENUNIT_CTRL_PNT	Control Point	32bits FLOAT	IR	°F	-4	153	0
							°C	-20	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	%	0	100	0
0x0010	16	2	GENUNIT_CAP_T	Percent Total Capacity	32bits UINT	IR	%	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

LEGEND

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APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	Decimal							Min.	Max.	Default
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
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

LEGEND

CO — COILS_MEDIA
IR — INPUT_REG_MEDIA
DI — DISCR_INPUT_MEDIA
HR — HOLDING_REG_MEDIA

APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	Decimal							Min.	Max.	Default
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	Variable Fan Speed	32bits FLOAT	IR	%			0
0x04D2	1234	2	GENUNIT_CAPA_T	Circuit A Total Capacity	32bits UINT	IR	%	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	%	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	%	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

LEGEND

CO — COILS_MEDIA
IR — INPUT_REG_MEDIA
DI — DISCR_INPUT_MEDIA
HR — HOLDING_REG_MEDIA

APPENDIX D — MODBUS IP points (cont)

ADDRESS		Reg. N°	PARAMETER	DESCRIPTION	DISPLAY MODE	TYPE	UNIT	VALUE		
Hexadecimal	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	Unit Type (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	%			0
0x2342	9026	2	OUTPUTS_EXV_B	EXV Position Circuit B	32bits FLOAT	IR	%			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	%	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
IR — INPUT_REG_MEDIA
DI — DISCR_INPUT_MEDIA
HR — HOLDING_REG_MEDIA

APPENDIX E — MAINTENANCE SUMMARY AND LOG SHEETS

30MP Weekly Maintenance Log

Plant: _____ Machine Model No. _____

Unit ID: _____

DATE	OIL LEVELS	CHECK ALARMS / FAULTS	OPERATOR INITIALS	REMARK

APPENDIX E — MAINTENANCE SUMMARY AND LOG SHEETS (cont)

30MP Monthly Maintenance Log[a]

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												
	Leak Test	yes/no												
EVAPORATOR	Inspect and Clean Evaporator	yes/no	Every 3 - 5 Years											
	Inspect Cooler Heater	amps												
	Leak Test	yes/no												
	Record Water Pressure Differential (PSI)	PSI												
	Inspect Water Pumps	yes/no												
CONDENSER	Leak Test	yes/no												
	Inspect and Clean Condenser	yes/no												
CONTROLS	General Cleaning and Tightening Connections	yes/no	Annually											
	Check Pressure Transducers	yes/no												
	Confirm Accuracy of Thermistors	yes/no												
STARTER	General Tightening and Cleaning Connections	yes/no	Annually											
	Inspect All Contactors	yes/no												
SYSTEM	Check Refrigerant Charge	yes/no												
	Verify Operation of EXVs and Record Position	0-100%												
	Record System Superheat	°F												

NOTE(S):

a. Equipment failures caused by lack of adherence to the Maintenance Interval Requirements are not covered under warranty.

APPENDIX F — 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. When the interface is used via a PC web browser, the Help menu contains a BACnet Users Guide and ModBus Users Guide. See Fig A.

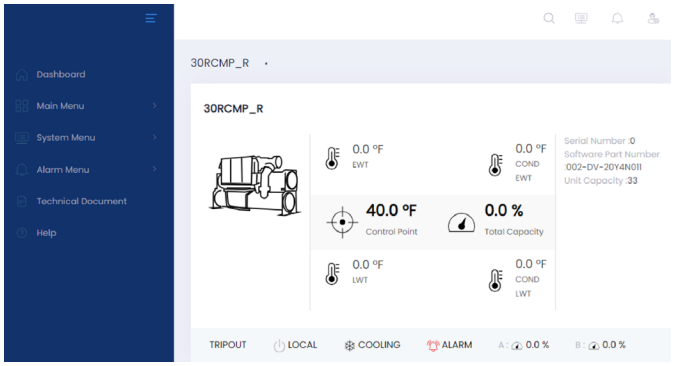


Fig. A — Web User Interface Home Screen

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

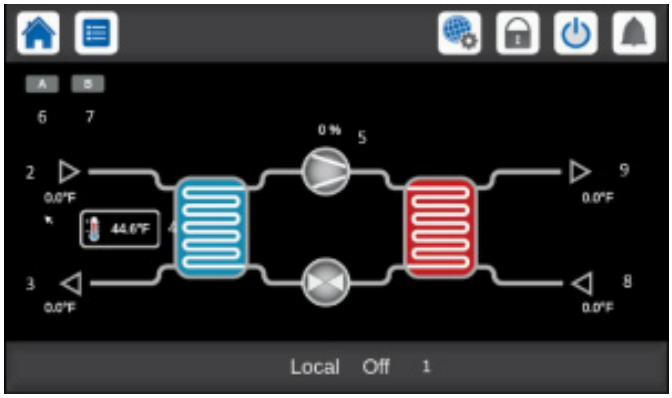
To connect the controller to the web interface, it is necessary to know the IP address of the unit.

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. B.
2. Select the Network button from the System Menu screen. See Fig. C.
3. Verify TCP/IP Address under "IP Network Interface J15 (eth0)." See Fig. D.

   From this screen select the gear icon to edit the screen. See Fig. E.
   - 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.



LEGEND

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

Fig. B — Display Home Screens

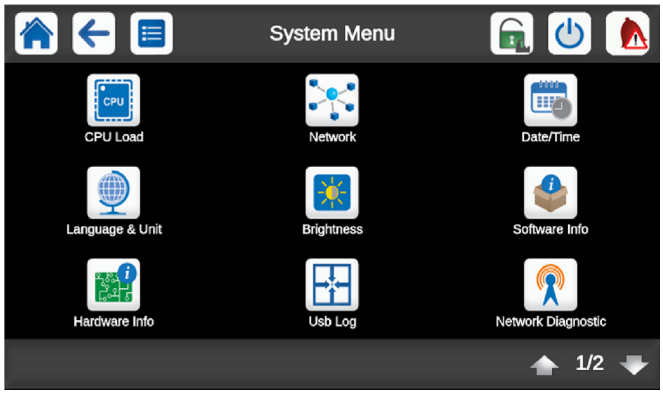


Fig. C — System Menu Screen

Fig. D — Network Screen

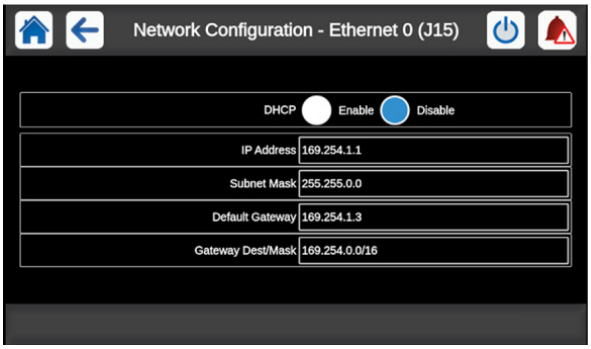


Fig. E — Network Configuration

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. D) 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. F.
2. Once the Properties button is selected the Internet Protocol Properties Window opens. See Fig. G.
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.
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. H, 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.

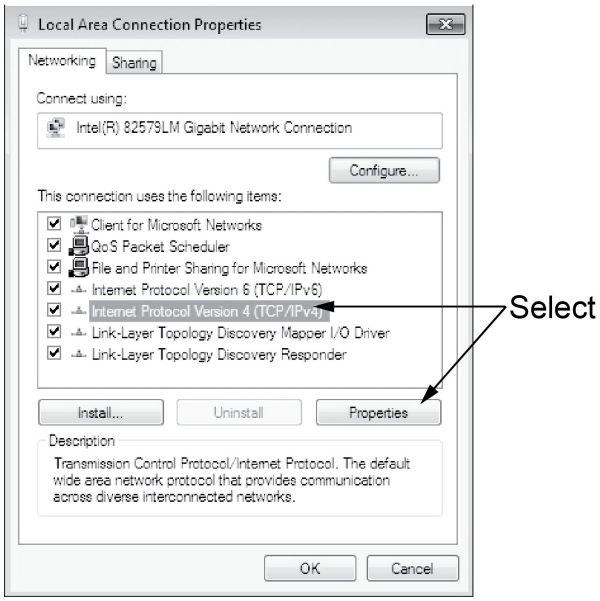


Fig. F — Local Area Connection Properties Screen

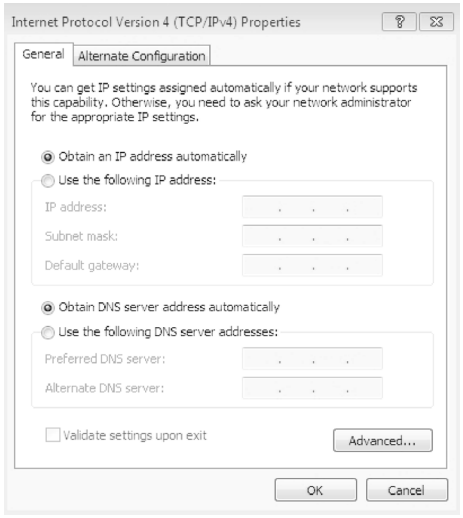


Fig. G — Internet Protocol Properties Screen

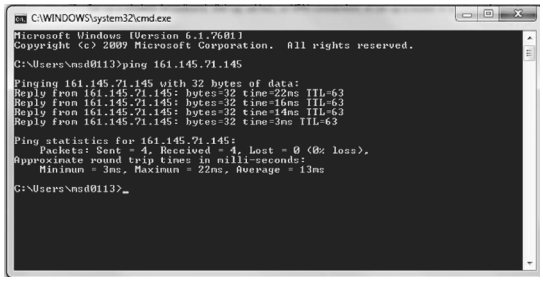
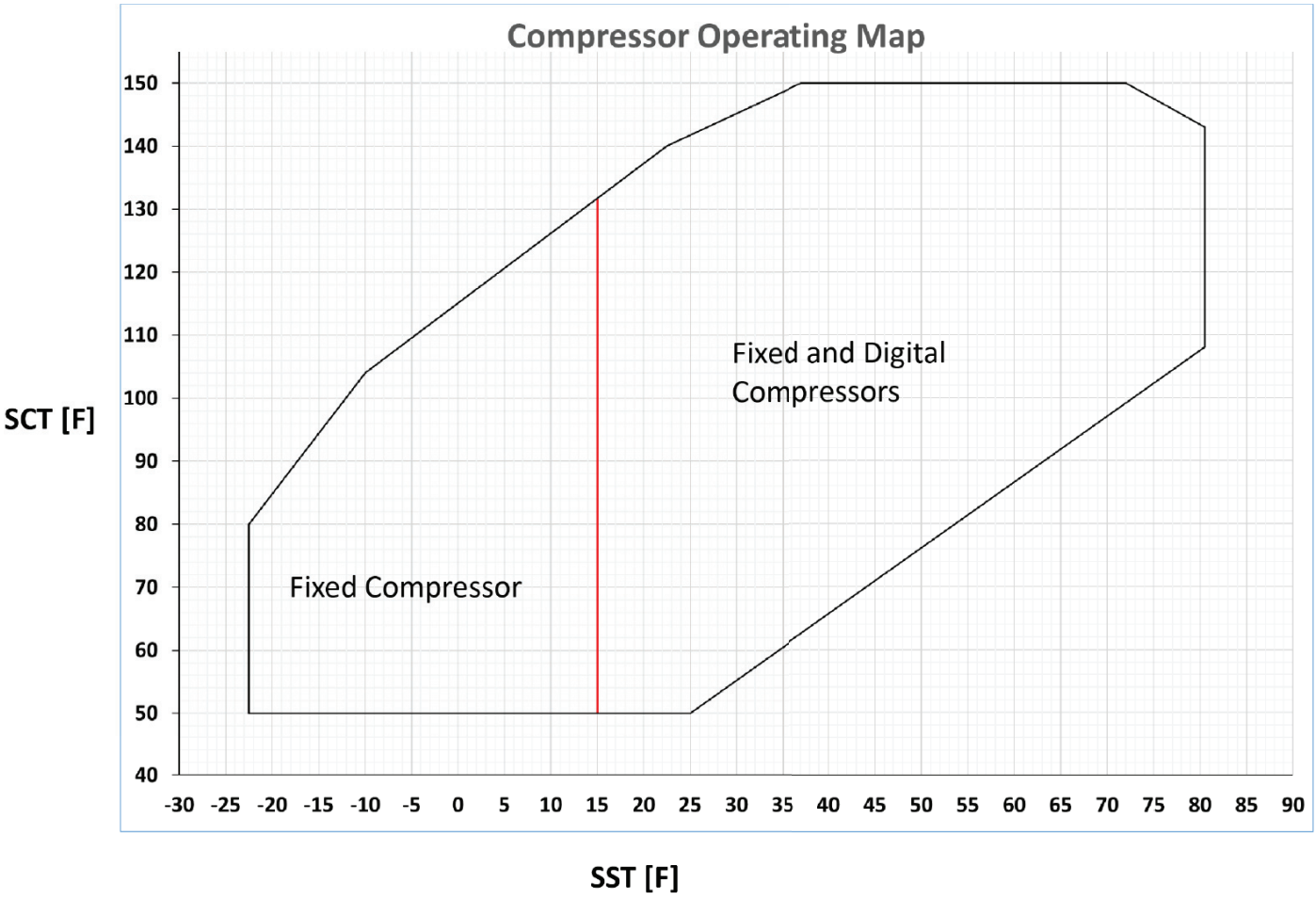


Fig. H — Ping Response Screen

APPENDIX G — COMPRESSOR OPERATING MAP



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Start-Up Checklist for 30MP 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.

I. PROJECT INFORMATION

Job Name: ___ _____

Address _____ _____

City: _____ State:_____ Zip:_____

Installing Contractor:_____ Sales Office:_____

Start-Up Performed By:_____

Unit

Model:_____ Serial:_____

II. 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

III. 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. Evaporator and condenser loops 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. Outdoor piping wrapped with electric heater tape.	☐ Yes	☐ No
10. Are there any VFDs (variable frequency drives) on the chilled water pumps?	☐ Yes	☐ No
a. Primary loop	☐ Yes	☐ No
b. Secondary loop	☐ Yes	☐ No
11. 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 _____

IV. UNIT START-UP (Qualified individuals only. Factory start-up recommended!)

Evaporator

Model _____

Serial _____

Compressors

A1)
Model _____
Serial _____

A3)
Model _____
Serial _____

A2)
Model _____
Serial _____

B1)
Model _____
Serial _____

Condenser

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 30MP Installation Instructions.)		
13. Verify condenser flow rate	☐ Yes	☐ No
Pressure entering condenser _____ psig (kpa)		
Pressure leaving condenser _____ psig (kpa)		
Condenser pressure drop _____ psig (kpa)		
Psig x 2.31 ft/psi = _____ ft of water		
kPa x 0.334 m/psi = _____ m of water		
Condenser flow rate _____ gpm (l/s)		
(See Evaporator Pressure Drop Curve provided in the 30MP Installation Instructions.)		
14. Verify that isolation valves on pumps are properly positioned and locked prior to start-up (slot in-line with piping on both sides of pump).	☐ Yes	☐ No
15. Chilled water flow switch operational.	☐ Yes	☐ No
16. Condenser water flow switch operational.	☐ Yes	☐ No

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

Start and operate machine. Complete the following:

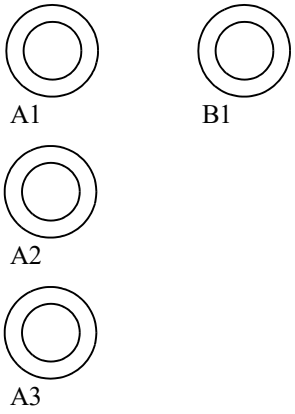
1. Complete component test utilizing Quick Test mode (make sure EXVs are checked after liquid line service valves are opened).
2. For fixed speed units, operate all condenser fans and verify operation and rotation.
3. Check refrigerant and oil charge. Record charge information below.
4. Record compressor 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.

V. Record Configuration Information

PATH	CARRIER CONTROLLER DESCRIPTION	DEFAULT	ENTRY
System Menu → Language and 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)[a]	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[a]	1 (Constant Speed)	
	Flow Delta T Setpoint[a]	9.0°F (–12.8°C)	
	Flow Delta P Setpoint[a]	29.00 psi	
	Pressure Zero Value[a]	–14.50 psi	
	Pump Minimum Speed[a]	60%	
	Pump Min Speed Cap = 0%[a]	60%	
	Pump Maximum Speed[a]	100%	
	Min Water Press Thres[a]	15 psig	
	Water Pump Max Delta P[a]	73 psig	
Main Menu → Configuration Menu → User Configuration	Alarm Relay for Alerts	No	
	Reversed Alarm Relay	0	
	Phase Controller Action[a]	0	
	PC Minimum Fault Time[a]	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)	

NOTE(S):

a. Not applicable to North America units. Leave as Default value.

LEGEND

HSM — Hydronic System Manager
OAT — Outside Air Temperature

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VI. 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[a]	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[a]	0	
	Pump Cycl. Freeze Prot.	No	
	Blackbox in Metric?	Yes	
	Unit Altitude (in meters)	0	
	Leakage Charge Threshold[a]	2.5V	
	Leakage Charge Timer[a]	60 min	
	Free Defr Allowed Period	2 hours	
	OAT Min for Free Defrost	34.7°F (1.5°C)	
	Fast Capacity Recovery	No	
	Glycol in Loop	No	
Main Menu → Configuration Menu → Primary/ Secondary Config	Master/Slave Select	0 (disable)	
	Master Control Type	1 (Local)	
	Slave 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%	

NOTE(S):

a. Not applicable to North America units. Leave as Default value.

LEGEND

LWT — Leaving Water Temperature
OAT — Outdoor Air Temperature
SM — System Manager
Stp — Setpoint

VII. 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	
	Exchanger Heater Output	
	Alarm Relay Status	
	Running Relay Status	
	EXV Position Circuit A	
	EXV Position Circuit B	
Main Menu → Quick Test #2	Total Capacity Output	
	Compressor A1 Output	
	Compressor A2 Output	
	Compressor A3 Output	
	Compressor B1 Output	
	Alert Relay Switch	
	Shutdown Relay Status	

LEGEND

EXV — Electronic Expansion Valve

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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

CONDENSER ENTERING FLUID	CEWT _____	
CONDENSER LEAVING FLUID	CLWT _____	
EVAPORATOR ENTERING FLUID	EWT _____	
EVAPORATOR LEAVING FLUID	LWT _____	
CONTROL POINT	CTPT _____	
CAPACITY	CAP _____	
CHILLED WATER SUP. TEMP	CHWS _____	(Dual Chiller Control Only)

Install a manifold gauge 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 A3	_____	_____	_____
COMPRESSOR B1	_____	_____	_____

COMMENTS:

_____

_____

_____

_____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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