Carrier

Gemini™ Select
38RCS025-050, 38RCD025-130
Commercial Air-Cooled Condensing Units
50/60 Hz

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

CONTENTS

SAFETY CONSIDERATIONS

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

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

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

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

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

⚠ DANGER

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

DO NOT VENT refrigerant relief devices within a building. Outlet from rupture disc or relief valve must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE 15 (American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers) (Safety Code for Mechanical Refrigeration). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

PROVIDE adequate ventilation in accordance with ANSI/ASHRAE 15, especially for enclosed and low overhead spaces. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional 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.

DO NOT USE OXYGEN to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

DO NOT USE air to leak test. Use only refrigerant or dry nitrogen.

NEVER EXCEED specified test pressures. VERIFY the allowable test pressure by checking the instruction literature and the design pressures on the equipment nameplate.

DO NOT VALVE OFF any safety device.

BE SURE that all pressure relief devices are properly installed and functioning before operating any machine.

RISK OF INJURY OR DEATH by electrocution. High voltage is present on motor leads even though the motor is not running when a solid state or inside-delta mechanical starter is used. Open the power supply disconnect before touching motor leads or terminals.

⚠ 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

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

Electrical shock can cause personal injury and death. For High Efficiency Variable Condenser Fan units, after unit power is disconnected, wait at least 10 minutes for the VFD (variable frequency drive) capacitors to discharge before opening drive.

⚠ 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

R-32 refrigerant systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

⚠ CAUTION

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

⚠ CAUTION

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 EN61000-2/3 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 condenser fans require specific rotation. For non-Greenspeed units, test condenser fan(s) first to ensure proper phasing. Swap any two incoming power leads to correct condenser fan rotation before starting any other motors. For Greenspeed units, check to ensure the supply power phase rotation is clockwise A-B-C (L1-L2-L3).

A2L Refrigerant Safety Measures

QUALIFICATION OF WORKERS

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

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

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

SAFETY CHECKS

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

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

   Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
6. Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
7. The following checks to the air-conditioning equipment shall also apply when using A2L refrigerants:
   a. The chilled water circuit shall be checked for the presence of A2L refrigerant via the vent, drain, or pipe plug ports at the inlet and outlet water piping connections.
   b. Markings to the equipment shall continue to be visible and legible. Markings and signs that are illegible shall be corrected.
   c. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance that may corrode refrigerant-containing components, unless the components are constructed of materials that are inherently resistant to being corroded or are suitably protected against being corroded.
   d. Upon completing equipment work, check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

COMPONENT REPAIR

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

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

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

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

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

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

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

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

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

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

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

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

NOTE: Examples of leak detection fluids are

- bubble method,
- fluorescent method agents.

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

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to "Refrigeration Circuit" on page 156.

GENERAL

This publication contains Controls, Operation, Start-Up, Service, and Troubleshooting information for the 38RCS025-050 and 38RCD025-130 air cooled condensing units with an option for Greenspeed® Intelligence and electronic controls. Condensing units are designed to work with R-32 refrigerant. Units are shipped with a nitrogen holding charge to assure the system is sealed and dry. The condensers are equipped with the Carrier Controller controls and optional variable speed fans.

Conventions Used in This Manual

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

CONTROLS

The 38RC Air Cooled Condensing Units contain the Carrier Controller electronic control system that controls and monitors all operations of the unit. 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 1 lists power schematics by unit size.

Table 1 — Control and Power Drawings

UNIT	DESCRIPTION	LOCATION
38RC025-060	Power Schematic	Fig. 1, page 6
	Control Power Schematic	Fig. 2, page 7
	Control Schematic	Fig. 3, page 8
	Communication Diagram	Fig. 4, page 9
38RC070-130	AquaSnap without Greenspeed	Fig. 5, page 10
	AquaSnap with Greenspeed	Fig. 6, page 11
	Control Power Schematic	Fig. 7, page 12
	Control Schematic	Fig. 8, page 13
	Communication Schematic	Fig. 9, page 14

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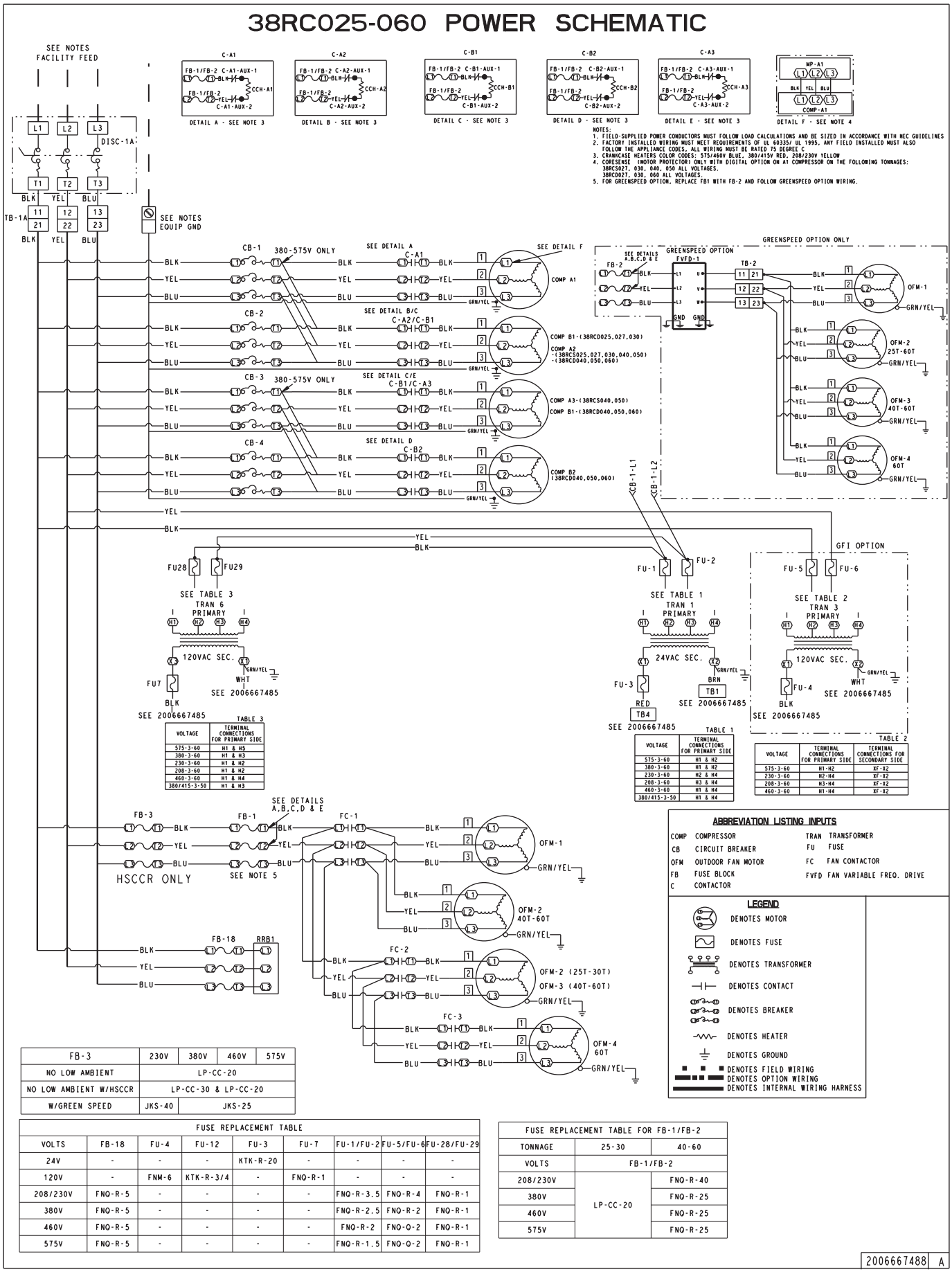


FB-3	230V	380V	460V	575V
NO LOW AMBIENT	LP-CC-20			
NO LOW AMBIENT W/HSCCR	LP-CC-30 & LP-CC-20			
W/GREEN SPEED	JKS-40	JKS-25		

FUSE REPLACEMENT TABLE								
VOLTS	FB-18	FU-4	FU-12	FU-3	FU-7	FU-1/FU-2	FU-5/FU-6	FU-28/FU-29
24V	-	-	-	KTK-R-20	-	-	-	-
120V	-	FNM-6	KTK-R-3/4	-	FNQ-R-1	-	-	-
208/230V	FNQ-R-5	-	-	-	-	FNQ-R-3.5	FNQ-R-4	FNQ-R-1
380V	FNQ-R-5	-	-	-	-	FNQ-R-2.5	FNQ-R-2	FNQ-R-1
460V	FNQ-R-5	-	-	-	-	FNQ-R-2	FNQ-Q-2	FNQ-R-1
575V	FNQ-R-5	-	-	-	-	FNQ-R-1.5	FNQ-Q-2	FNQ-R-1

FUSE REPLACEMENT TABLE FOR FB-1/FB-2		
TONNAGE	25-30	40-60
VOLTS	FB-1/FB-2	
208/230V	LP-CC-20	FNQ-R-40
380V		FNQ-R-25
460V		FNQ-R-25
575V		FNQ-R-25

Fig. 1 — 38RC025-060 Power Schematic

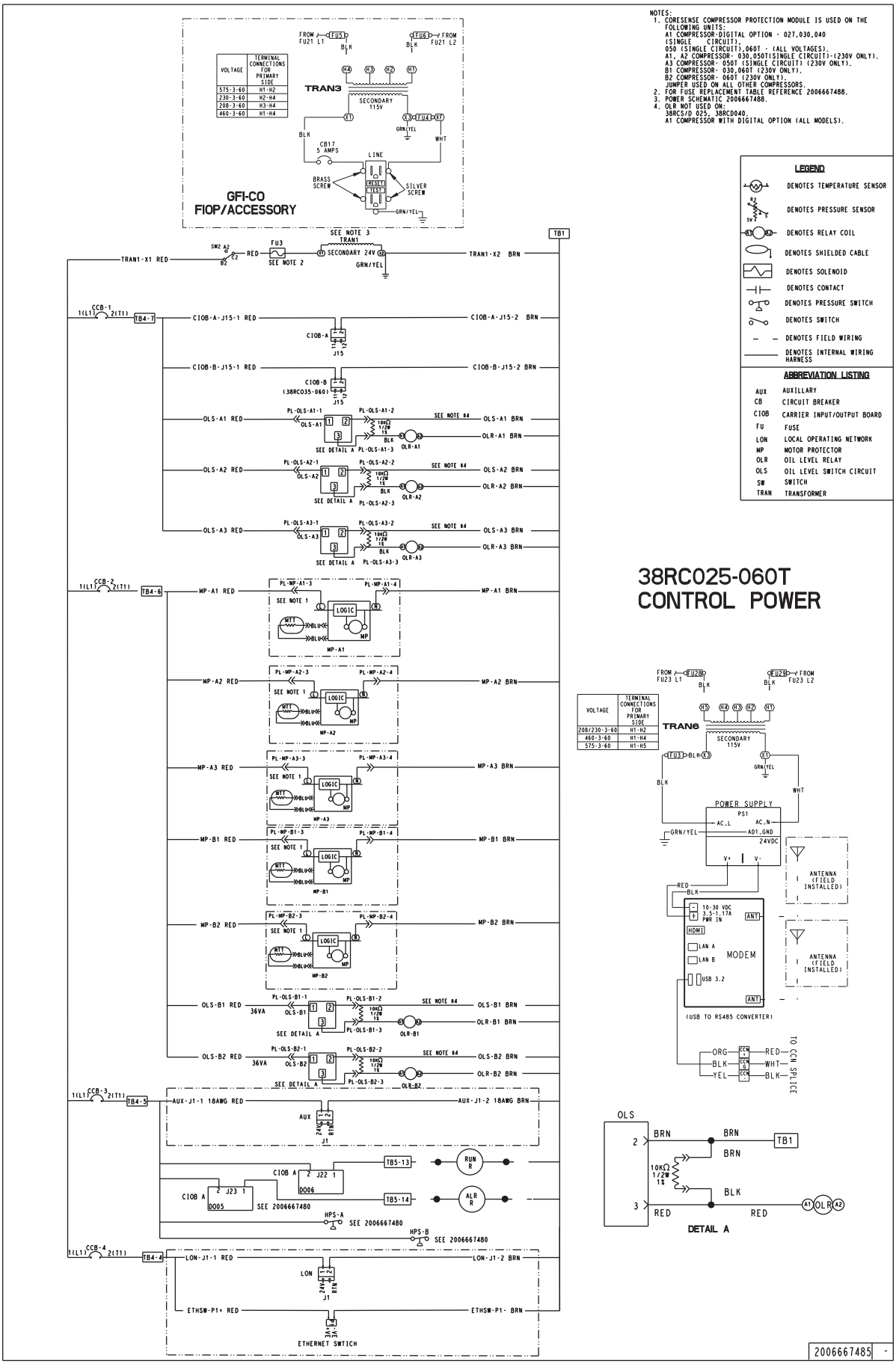


Fig. 2 — 38RC025-060 Control Power Schematic

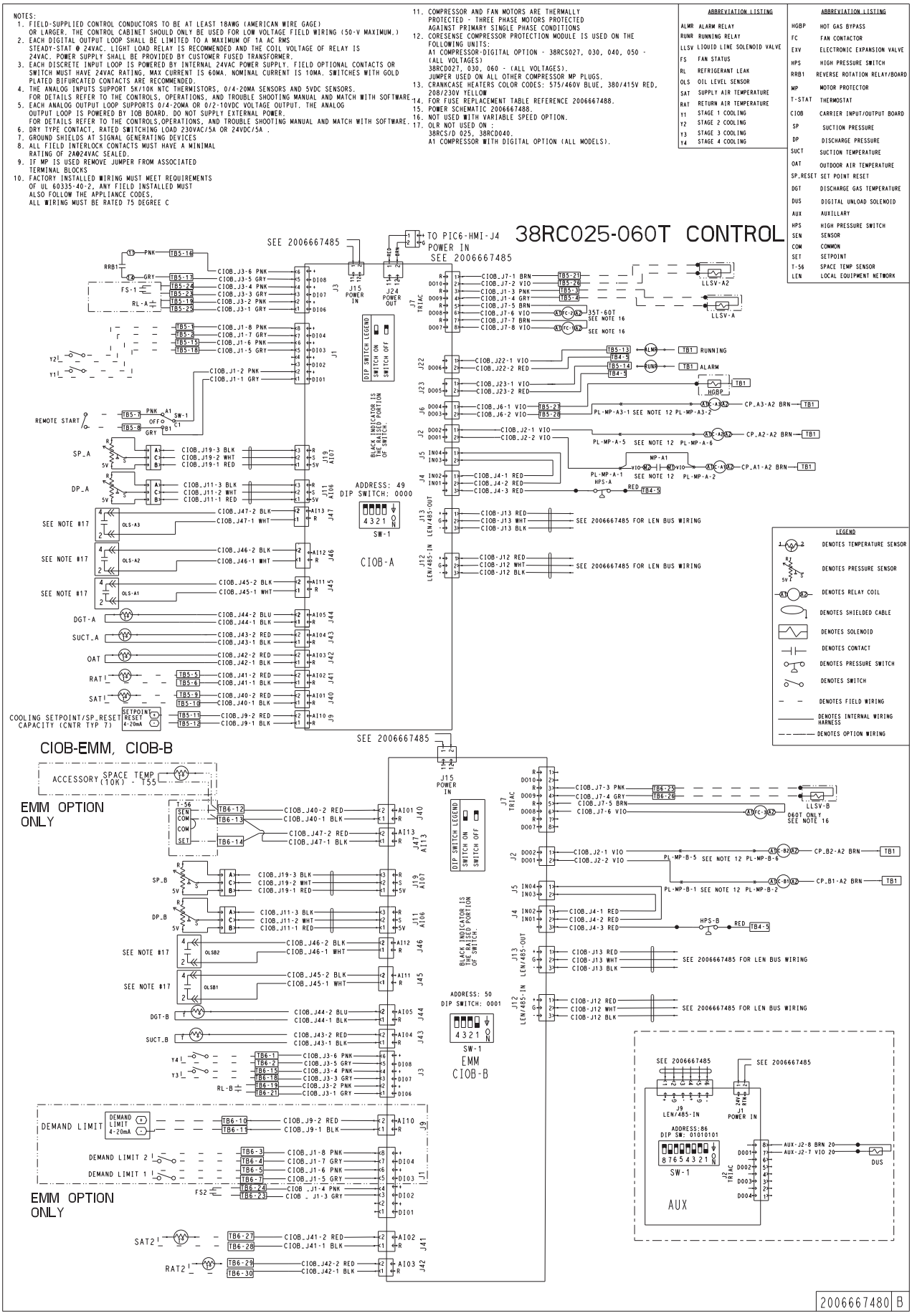


Fig. 3 — 38RC025-060 Control Schematic

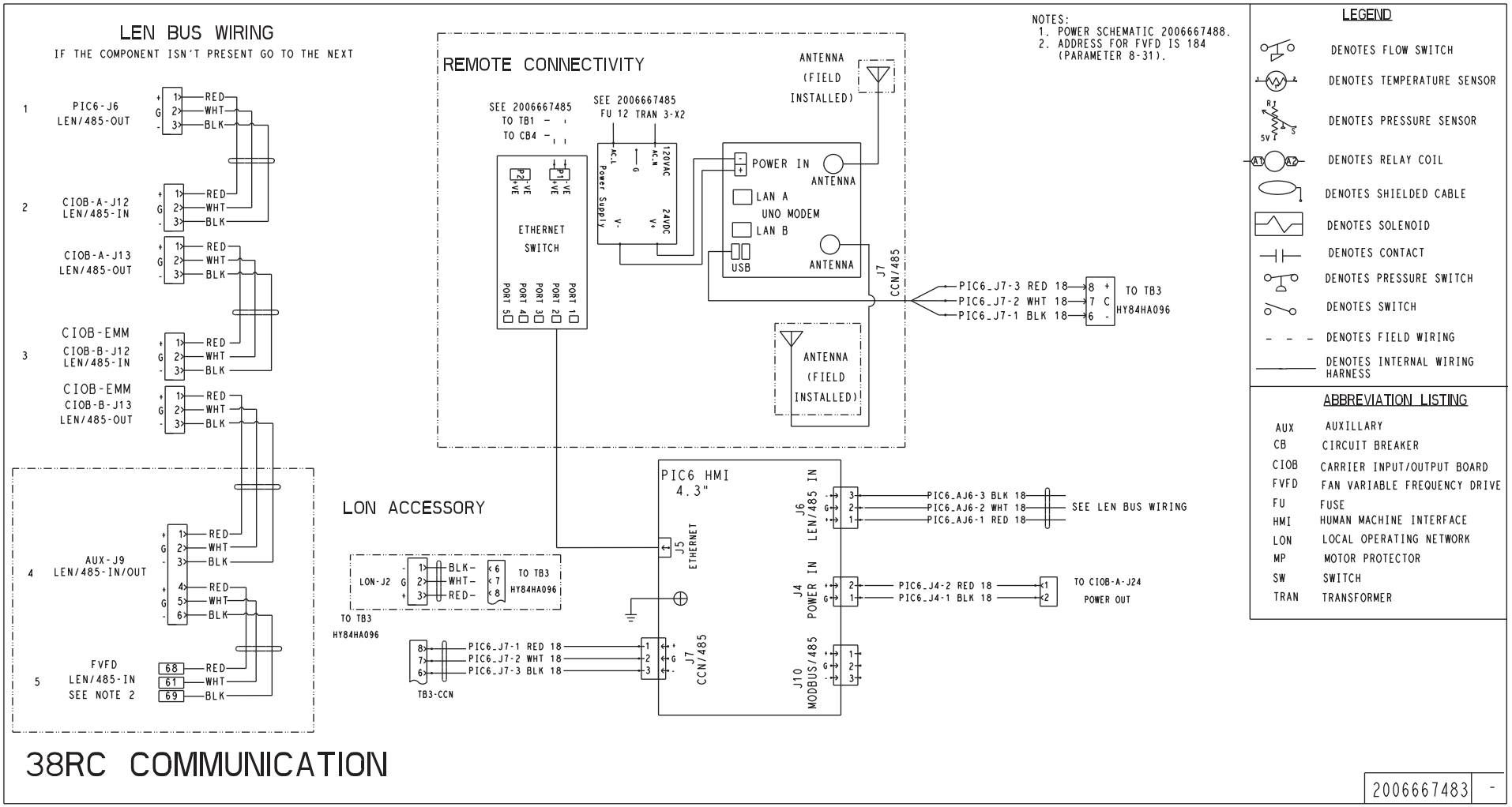
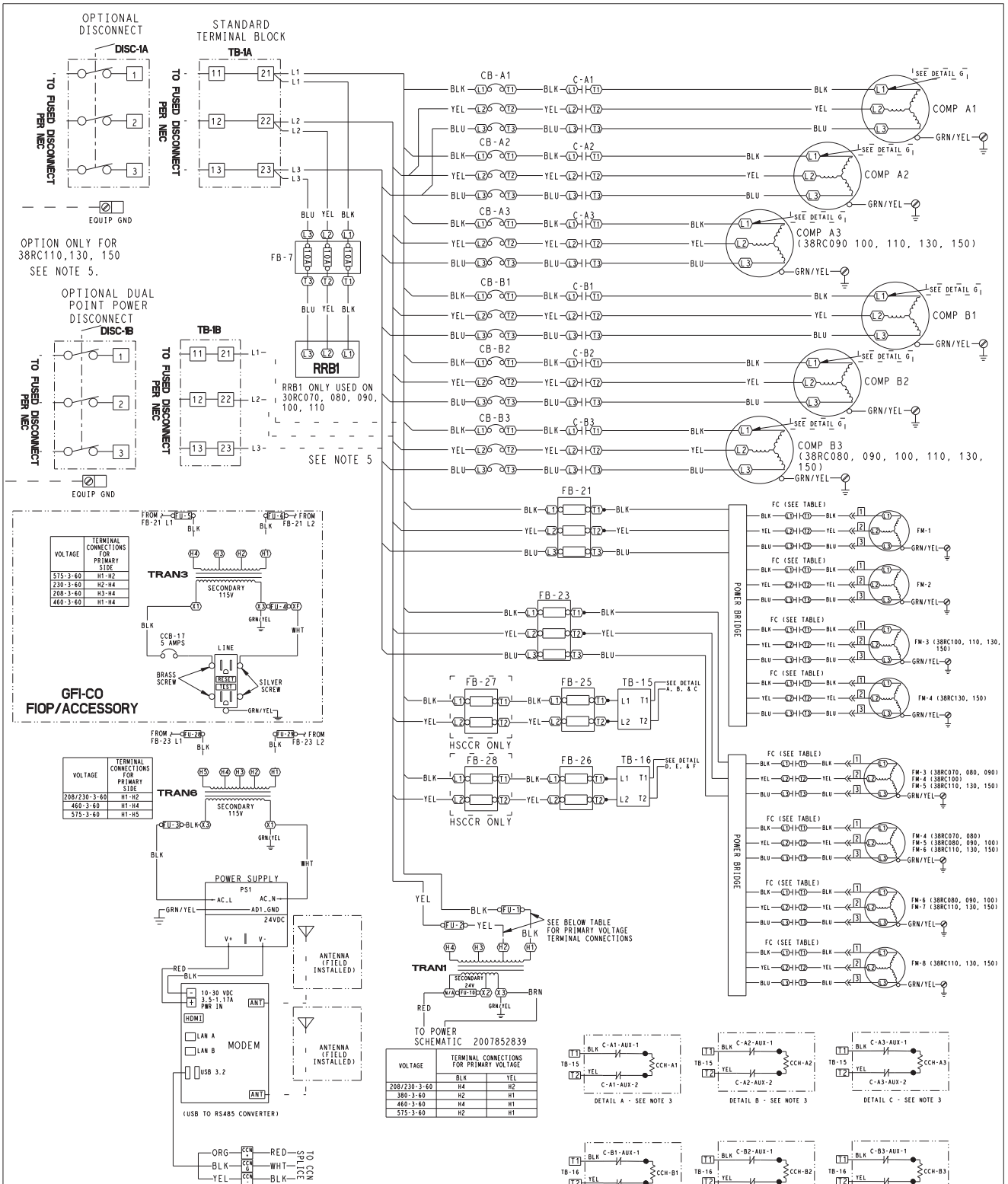


Fig. 4 — 38RC025-060 Communication Diagram



VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY SIDE
575-3-60	H1-H2
230-3-60	H2-H4
208-3-60	H3-H4
460-3-60	H1-H4

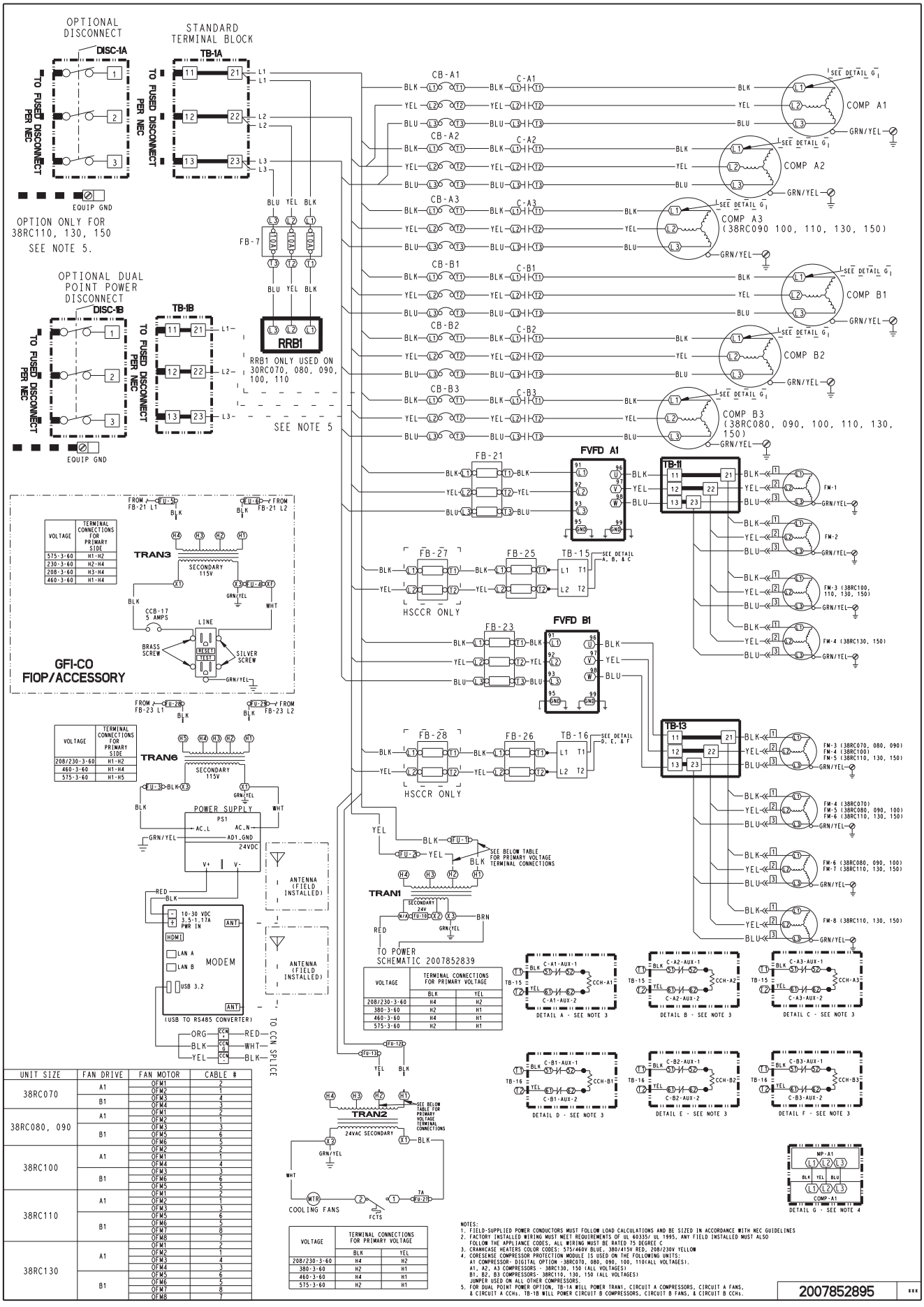
VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY SIDE
208/230-3-60	H1-H2
460-3-60	H1-H4
575-3-60	H1-H5

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY VOLTAGE	
	BLK	YEL
208/230-3-60	H4	H2
380-3-60	H2	H1
460-3-60	H4	H1
575-3-60	H2	H1

UNIT SIZE	CONTROL BOARD	PORT	FAN MOTOR	CONTACTOR	CABLE
38RC070	CIOB-A	J7	OFM2	FC-1	1
			OFM1	FC-2	2
	CIOB-B	J7	OFM4	FC-3	3
		J23	OFM3	FC-4	4
38RC080, 090	CIOB-A	J7	OFM2	FC-1	1
			OFM1	FC-2	2
	CIOB-B	J7	OFM3	FC-3	3
		J23	OFM6	FC-5	5
		J22	OFM5	FC-6	6
38RC100	CIOB-A	J7	OFM2	FC-1	1
			OFM1	FC-2	2
	CIOB-B	J7	OFM4	FC-3	3
		J6	OFM3	FC-4	4
		J23	OFM6	FC-5	5
		J22	OFM5	FC-6	6
38RC110	CIOB-A	J7	OFM2	FC-1	1
			OFM1	FC-2	2
	CIOB-B	J7	OFM3	FC-3	3
		J6	OFM8	FC-4	7
		J23	OFM6	FC-5	5
		J22	OFM5, OFM7	FC-6	6, 8
38RC130	CIOB-A	J7	OFM2	FC-1	1
			OFM1, OFM3	FC-2	2, 4
	CIOB-B	J7	OFM4	FC-3	3
		J6	OFM8	FC-4	7
		J23	OFM6	FC-5	5
		J22	OFM5, OFM7	FC-6	6, 8

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 -38RC070, 080, 090, 100, 110(ALL VOLTAGES).
   A1,A2,A3 COMPRESSORS-38RC130, 150 (ALL VOLTAGES)
   B1,B2,B3 COMPRESSORS-38RC110, 130, 150 (ALL VOLTAGES)
   JUMPER USED ON ALL OTHER COMPRESSORS.
5. FOR DUAL POINT POWER OPTION, TB-1A WILL POWER TRAN1, CIRCUIT A COMPRESSORS, CIRCUIT A FANS, & CIRCUIT A CCHs. TB-1B WILL POWER CIRCUIT B COMPRESSORS, CIRCUIT B FANS, & CIRCUIT B CCHs.

Fig. 5 — 38RC070-130 Aquasnap without Greenspeed



VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY SIDE
575-3-60	H1-H2
230-3-60	H2-H4
208-3-60	H3-H4
460-3-60	H1-H4

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY SIDE
208/230-3-60	H1-H2
460-3-60	H1-H4
575-3-60	H1-H5

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY VOLTAGE	
	BLK	YEL
208/230-3-60	H4	H2
380-3-60	H2	H1
460-3-60	H4	H1
575-3-60	H2	H1

VOLTAGE	TERMINAL CONNECTIONS FOR PRIMARY VOLTAGE	
	BLK	YEL
208/230-3-60	H4	H2
380-3-60	H2	H1
460-3-60	H4	H1
575-3-60	H2	H1

UNIT SIZE	FAN DRIVE	FAN MOTOR	CABLE #
38RC070	A1	OFM1	2
		OFM2	1
		OFM3	4
		OFM4	3
38RC080, 090	A1	OFM1	2
		OFM2	1
	B1	OFM3	3
		OFM5	6
		OFM6	5
38RC100	A1	OFM1	2
		OFM2	1
		OFM4	4
	B1	OFM3	3
		OFM5	6
		OFM6	5
38RC110	A1	OFM1	2
		OFM2	1
		OFM3	3
	B1	OFM5	6
		OFM6	5
		OFM7	8
		OFM8	7
38RC130	A1	OFM1	2
		OFM2	1
		OFM3	4
		OFM4	3
	B1	OFM5	6
		OFM6	5
		OFM7	8
		OFM8	7

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
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4. CORESENSE COMPRESSOR PROTECTION MODULE IS USED ON THE FOLLOWING UNITS:
   A1 COMPRESSOR- DIGITAL OPTION -38RC070, 080, 090, 100, 110(ALL VOLTAGES).
   A1, A2, A3 COMPRESSORS - 38RC130, 150 (ALL VOLTAGES)
   B1, B2, B3 COMPRESSORS- 38RC110, 130, 150 (ALL VOLTAGES)
   JUMPER USED ON ALL OTHER COMPRESSORS.
5. FOR DUAL POINT POWER OPTION, TB-1A WILL POWER TRAN1, CIRCUIT A COMPRESSORS, CIRCUIT A FANS, & CIRCUIT A CCHs. TB-1B WILL POWER CIRCUIT B COMPRESSORS, CIRCUIT B FANS, & CIRCUIT B CCHs.

Fig. 6 — 38RC070-130 Aquasnap with Greenspeed

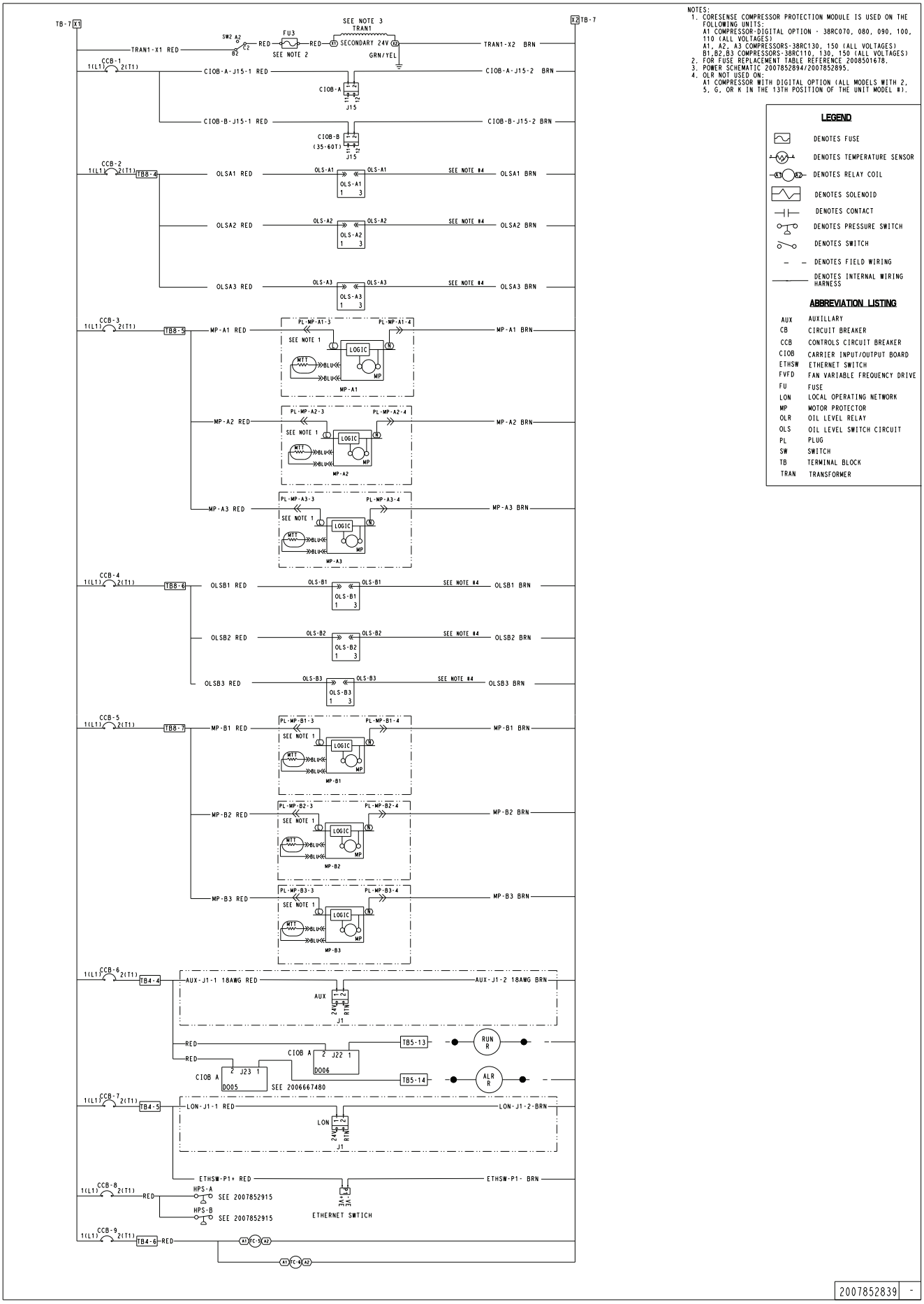


Fig. 7 — 38RC070-130 Control Power

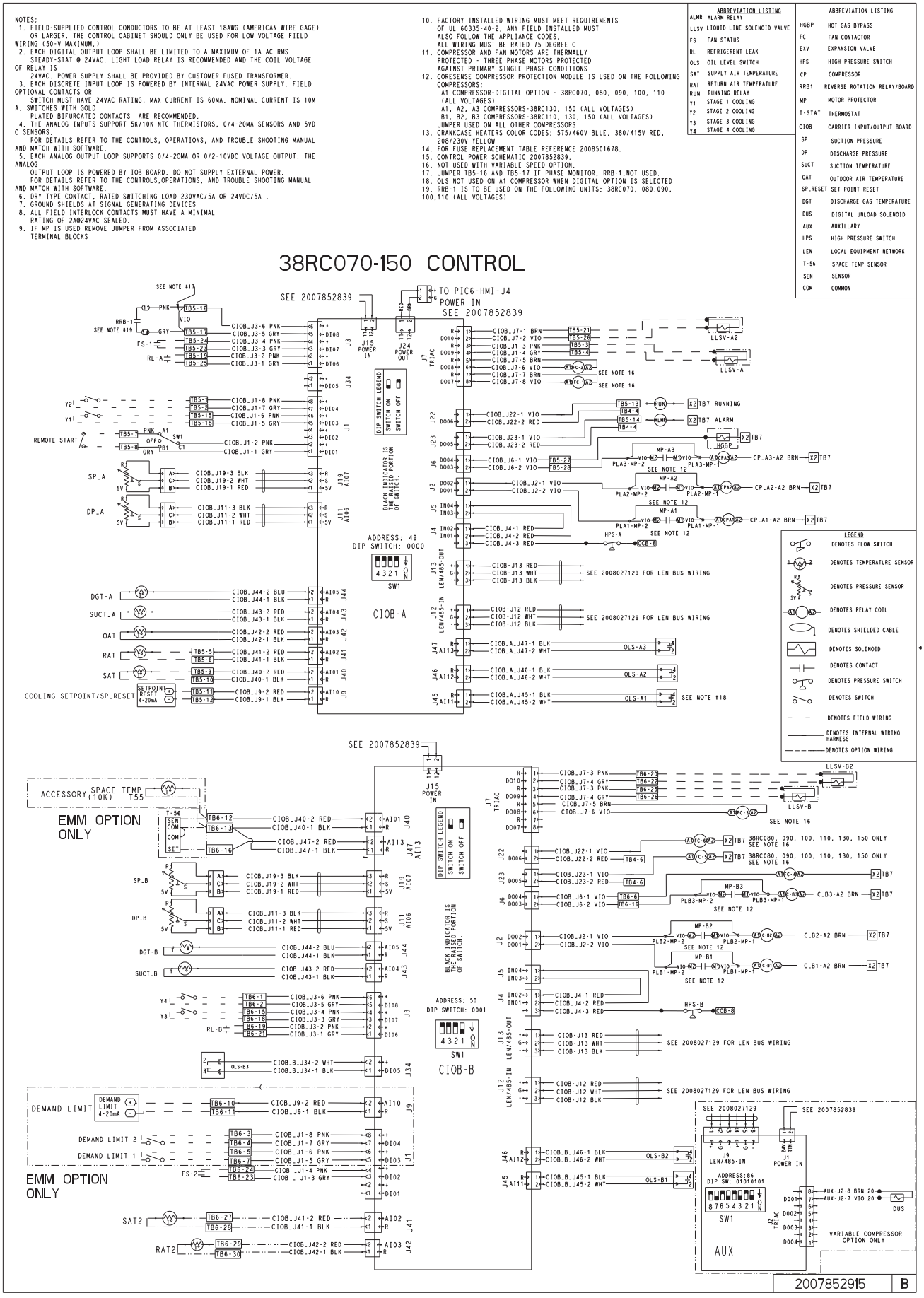


Fig. 8 — 38RC070-130 Control Schematic

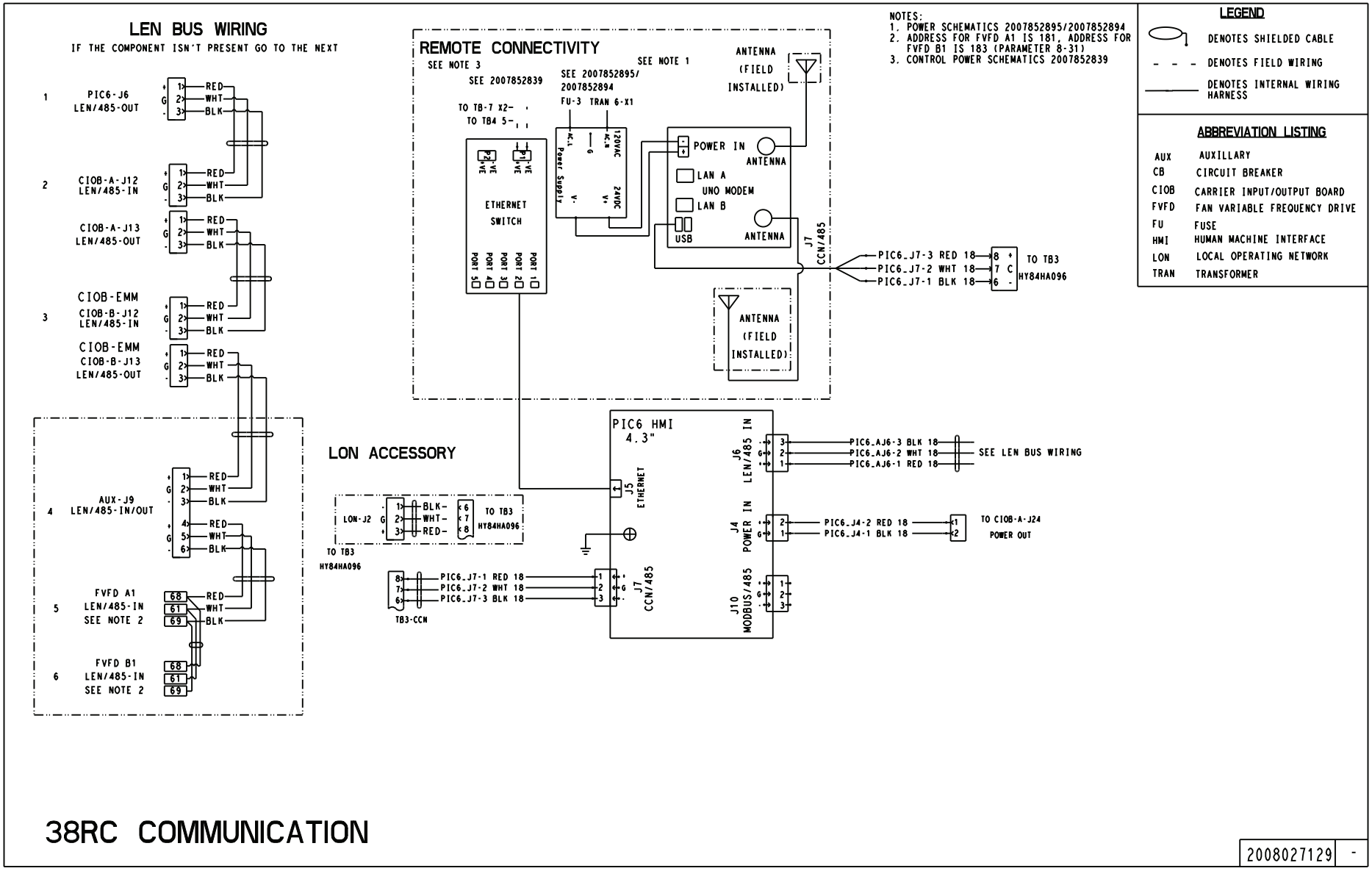


Fig. 9 — 38RC070-130 Communication Schematics

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 24.

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 unit 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. 10-12 for component layout showing the display with field connections.

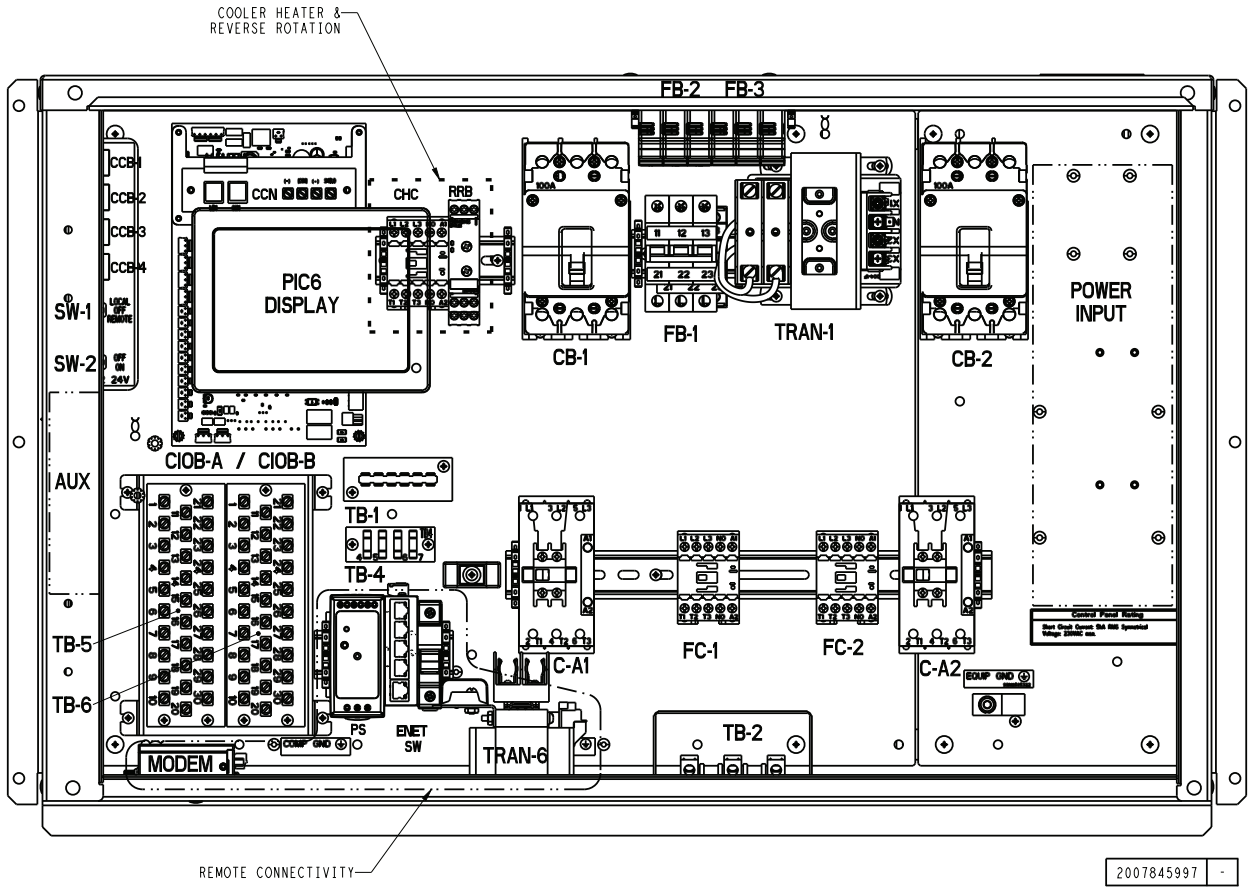


Fig. 10 — Component Layout Drawing (38RC025-030 — Small Main)

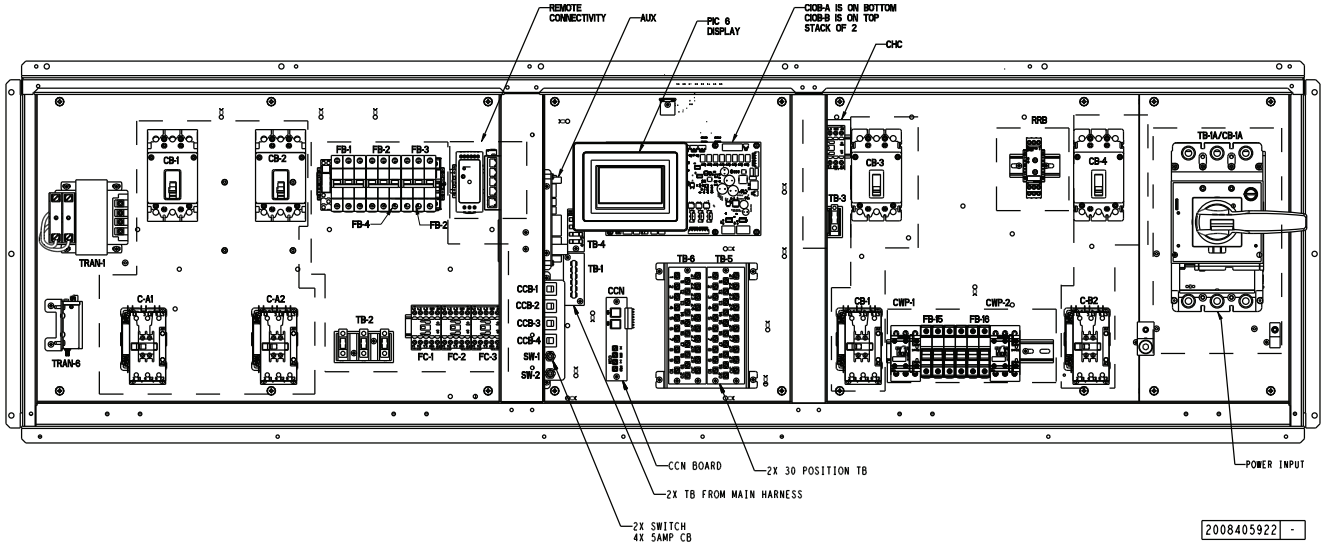


Fig. 11 — Component Layout Drawing (38RC040-060 — Large Main)

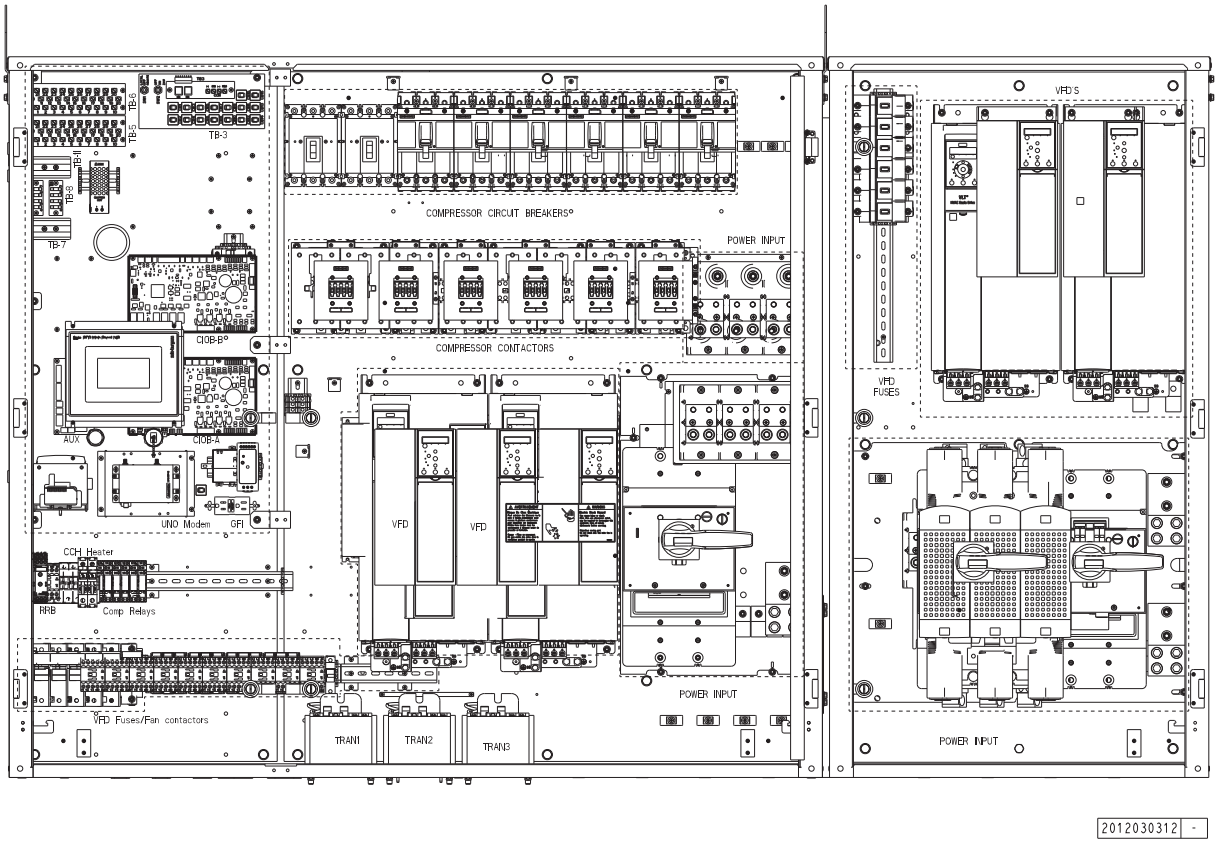


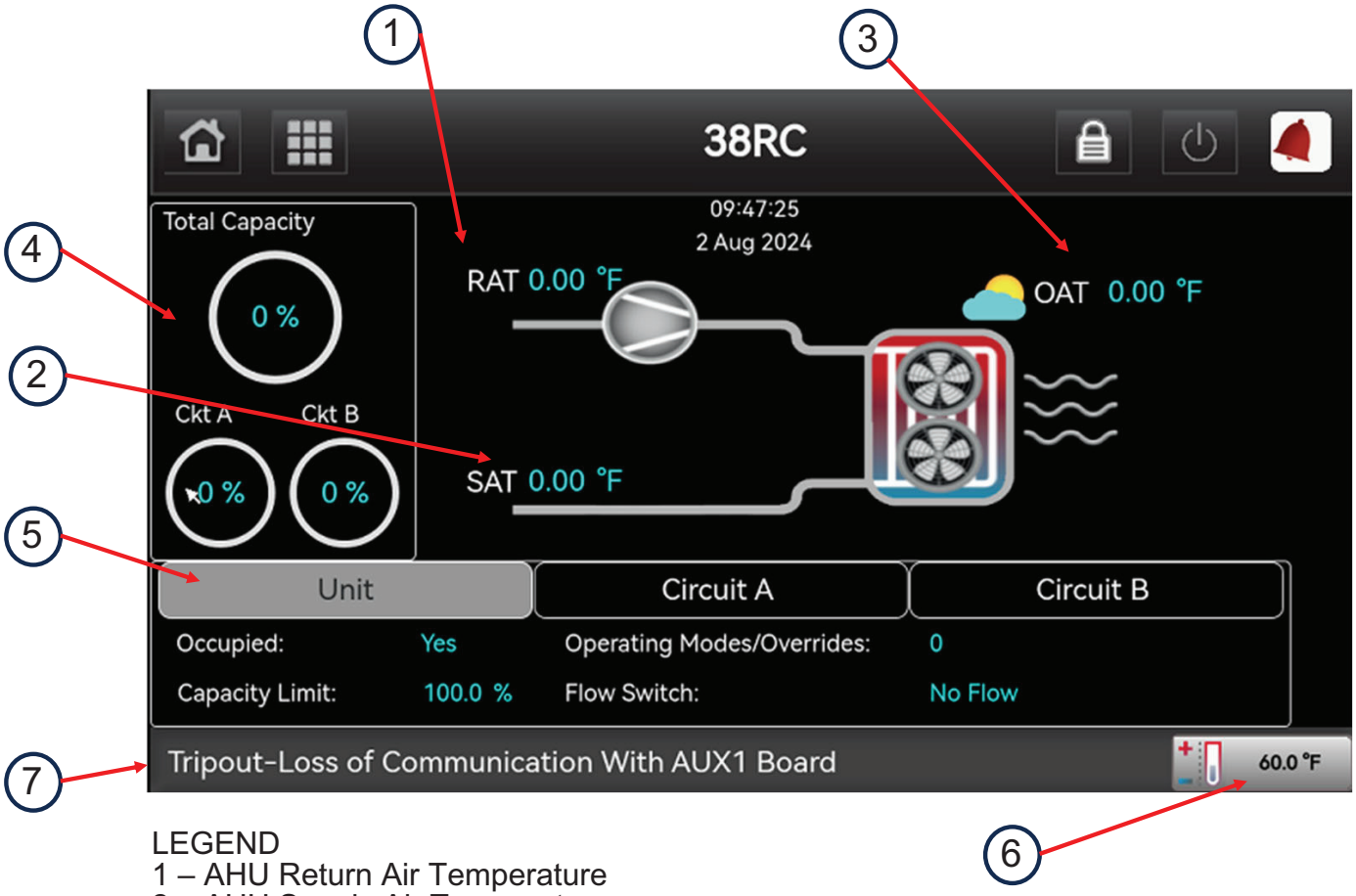
Fig. 12 — Component Layout Drawing (38RC070-130)

Carrier Controller Display User Interface

The Carrier Controller display is the standard user interface on all 38RC Condensing Units. 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

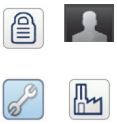
The Home screen provides an overview of system controls, allowing the user to monitor the vapor-refrigeration cycle. The screen indicates the current status of the unit, giving information on the unit capacity, the entering and leaving water temperatures, the active setpoint, and the outside air temperature. See Fig. 13 for a detailed explanation of the home screen, and see Table 2 for a detailed explanation of the buttons on the home screen.



LEGEND
1 – AHU Return Air Temperature
2 – AHU Supply Air Temperature
3 – Outside Air Temperature
4 – Unit Capacity
5 – Unit Status
6 – Setpoint Temperature
7 – Unit Operating State

Fig. 13 — Home Screen

Table 2 — Home Screen Buttons

BUTTON	FUNCTION
TOP PANEL	
	Main Menu: Press to access all unit functions. See Main Menu Screen on page 22 for details.
	Login: Press to enter passwords. See page 21 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.
	Start/Stop: Press to access the unit start/stop screen. See page 35 for details on available operating modes.
	Alarm: The alarm icon will display gray when not in alarm, yellow when in alert, and red when in alarm. See page 157 for details on system alarms and alerts.
Top Left Panel — General Navigation	
	Home: Goes back to the home screen (default screen). Button always present.
	Menu: Goes to the Main Menu screen. Button present on the Home Screen only. See page 17.
	Back: 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: Goes to shortcut to Troubleshoot, Quick Test, and SVC Alert Menus
	Select System Menu icon again to remove the drop down menu. This menu is only available if logged in as Service or Factory.
	Login: Goes to the Login screen. Button is only present and active on the home screen. Icon shows: - a closed lock when the user is not logged in - a person's outline when the user is logged in as User - a wrench when user is logged in as Service - a factory icon when user is logged in as Factory See the Login section on page 21.
	Start/Stop: Goes to the Unit 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 35.
	Alarm: 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 157.
Bottom Left Panel — Actions Specific to Current Screen Operation	
	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.

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 3.

Table 3 — 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 FOUND !	
	Your recent changes haven't been saved. Click Okay to continue. Click Cancel to stay in current screen.	
	Warning	
	Set	
	Relinquish	
Trending	Unable to fetch Trend Configuration Parameters	
	Please Select a Maximum of Ten Trends for Display	
	Please select at least 1 point	
	Information	
	Max Zoom-In Reached	
	Please Click on Update Data	
	Maximum Zoom Out Reached	
	End Date should be greater than Start Date	
	Maximum Limit is Set for seven days	
	Alarms not found	
	Alarm	
	Alert	
	RTN	
	Start time is greater than system time	
	End time is greater than system time	
	Out of range	
	Max Range must be greater than Min Range	
	Trend point range is out of bounds	
	Please select not more than 4 points	

Table 3 — 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 unit name	
	Folder already exists for this Unit 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 22. The default password for User level access is 1111. 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. 14 for an example of the user login screen.
- 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 22. 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 22. 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.

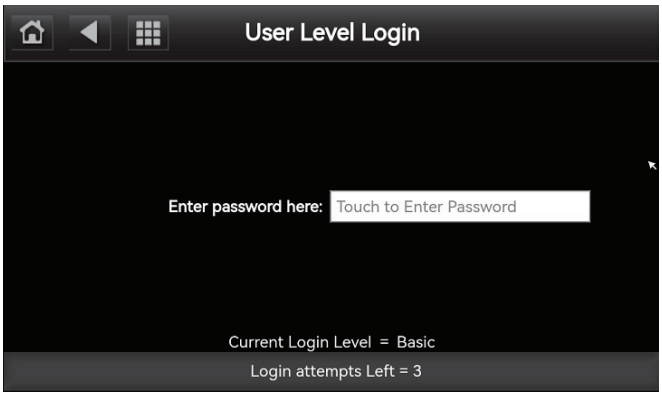


Fig. 14 — User Login Screen

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.

Rolling Password

To access the Rolling Password Login Screen, press the Login button on the Home screen. On the Login Screen, select level of login desired. You can also select units of measurement on this screen. Next select the icon at the bottom left corner. This will take you to the rolling password screen.Rolling password authentication is applicable only for Service and Factory level logins. See Fig. 15-17 for rolling password screen examples.

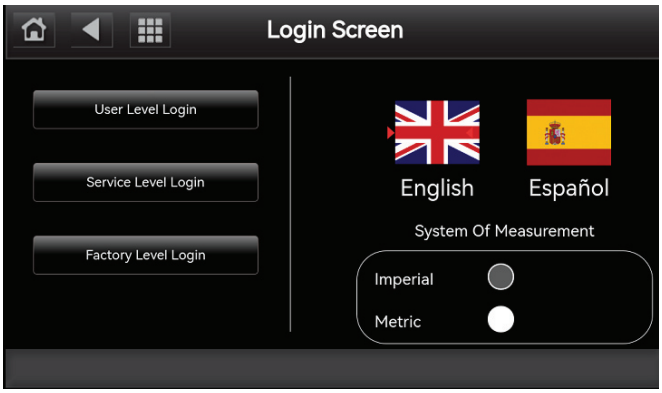


Fig. 15 — Login Screen

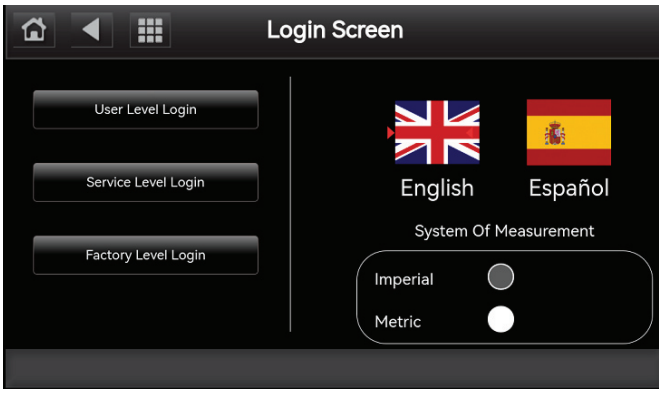


Fig. 16 — Service Login Screen

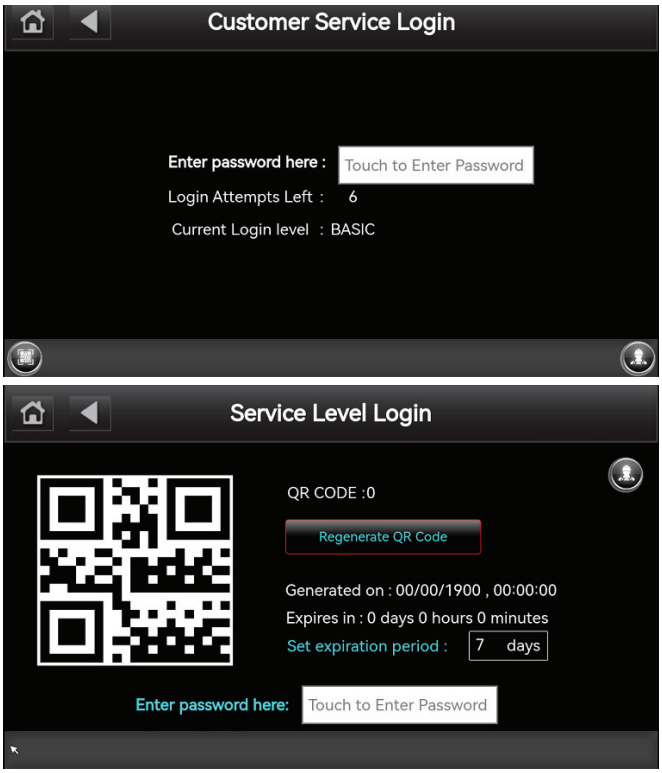


Fig. 17 — Service Login Level Screens

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 the Log-in Screen shown in Fig 15. Two language selections are offered for the Carrier Controller Display: English and Spanish. 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. The language can be changed without being logged in to the controller.

Changing the Units of Measurement

The Login Screen shown in Fig 15 offers two choices for units of measurement: US Imperial or Metric. The factory default is US Imperial. The current selection is denoted by a gray button. To change the measurement system, press the appropriate system on the Login Screen screen, then press any other button or icon on the Login Screen screen. The units can be changed without being logged in to the controller.

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

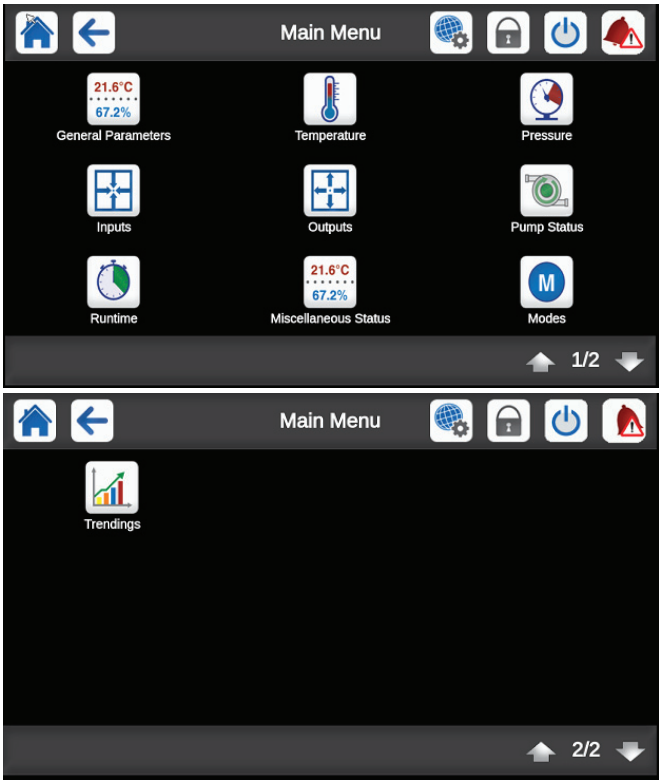


Fig. 18 — Main Menu

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 21.6°C 67.2%.

Figure 19 shows the first page of the Setpoints table if logged in with Service access. Use the arrows at the bottom right corner to navigate the Setpoints table.

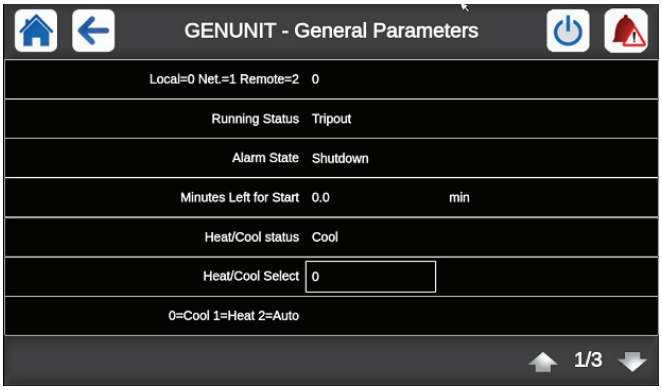


Fig. 19 — General Parameters, Page 1

Points that can be changed with the current level of user access are outlined with a box. For example, to modify the Cooling setpoint 1 parameter, select the current setpoint select value as shown on the Setpoint table and enter the desired parameter.

A data entry screen will be displayed. For alphanumeric responses, such as the password screen, a QWERTY keyboard is displayed; see Fig. 20. 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. 20 — Data Entry Keyboard

If a numeric response is required, either a numeric keypad (Fig. 21) or a force/relinquish keypad (Fig. 22) will be displayed. Use the numeric keypad to enter the value and press the Check Mark button . Once complete, Cancel and Save buttons will appear in the lower left section of the Unit Status Line. To accept the change, press the Save button . To cancel, press the Cancel button . The force/relinquish keypad allows a technician to force (or override) a status parameter by pressing the Flash button or to automate (or release) a status parameter by pressing the crossed-out Flash button .

Fig. 21 — Numeric Keypad

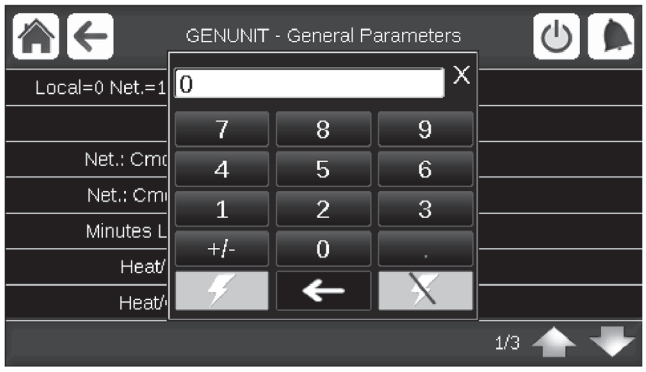


Fig. 22 — Force/Relinquish Keypad

OPTIONS2 TABLE

This table contains configuration settings for the unit. Select ***Main Menu → Configuration Menu → Options 2 Configuration*** to access the table (Fig. 23).

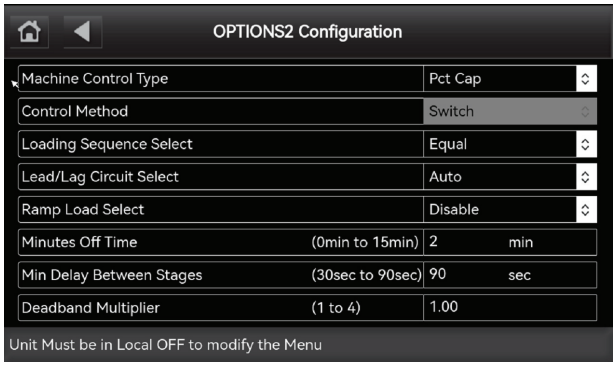


Fig. 23 — Options2 Configuration

Press the field corresponding to the parameter to be modified and make the necessary changes. When all necessary changes have been made, press the Save button to confirm or the Cancel button to cancel changes. For a complete list of general parameters, see page 31.

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. 24.

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. 25.

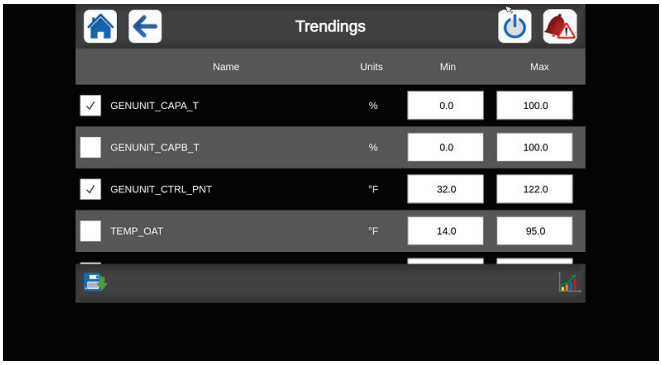


Fig. 24 — Trendings Display Screen

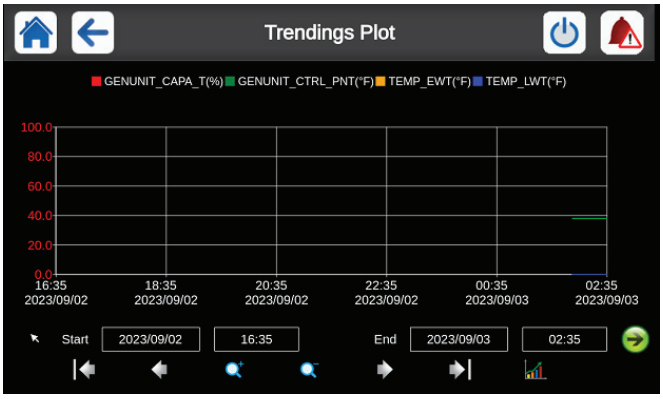


Fig. 25 — Trendings Configuration Screen

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.

MENU ARCHITECTURE

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 179 and 194, respectively.

SETTING TIME AND DATE

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

WEB AND NETWORK INTERFACE

The Carrier Controller control can be configured to allow access via a standard, java-enabled web browser or over a network. See Appendix H for the "Carrier Controller Web and Network Interface Parameters" on page 210 for detailed information on setting up and accessing the Carrier Controller via the web or network interface. See Table 4 for 4.3 in. screen port connections and Fig. 26 for interface and connectors.

Table 4 — Carrier Controller Display Port Connections

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

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

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

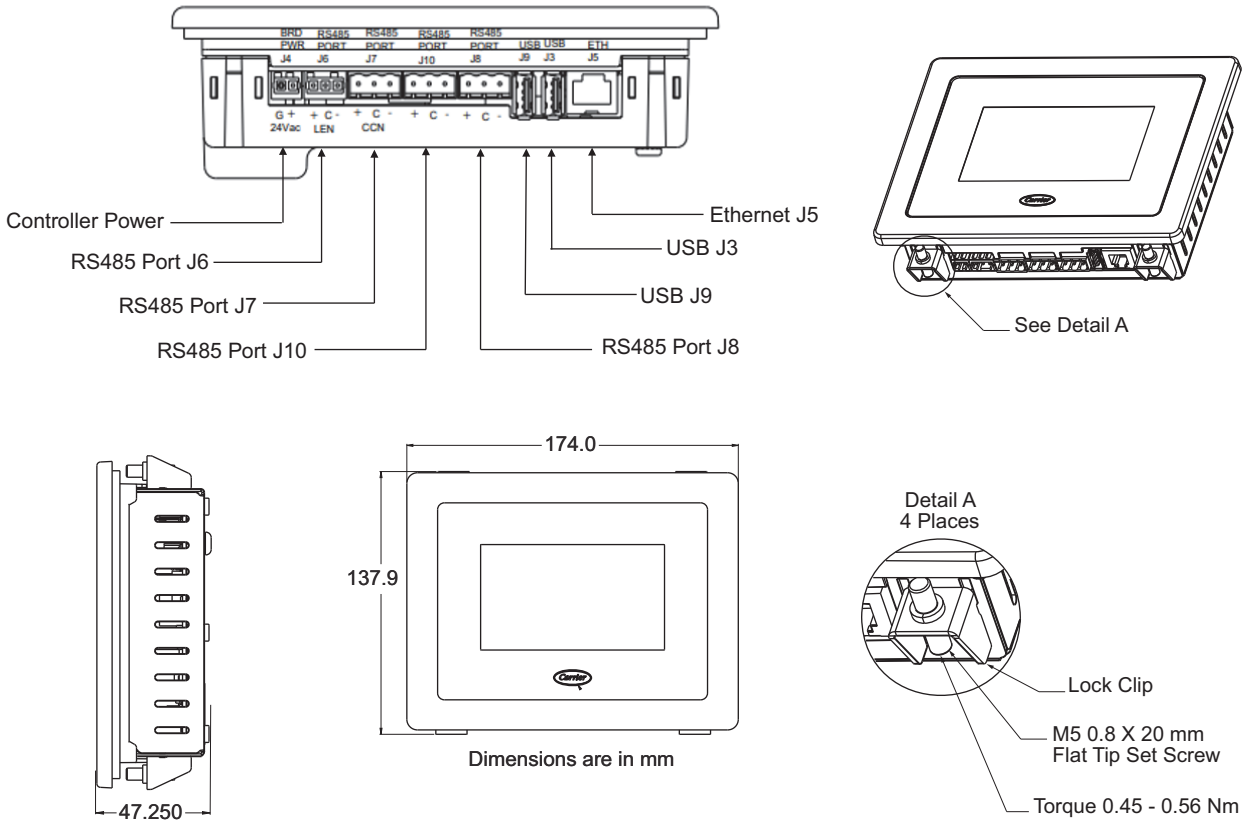


Fig. 26 — Carrier Controller Display Interface and Connectors

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 (Fig. 27). These boards receive inputs from the thermistors, transducers, demand limit switch, dual setpoint switch, remote on/off switch, indoor air flow switch, and high pressure switch. They provide output control to the isolation valves, compressor crankcase heater, 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 5 for CIOB DIP switch settings. See Tables 6 and 7 for a list of inputs and outputs for the 2 CIOBs.

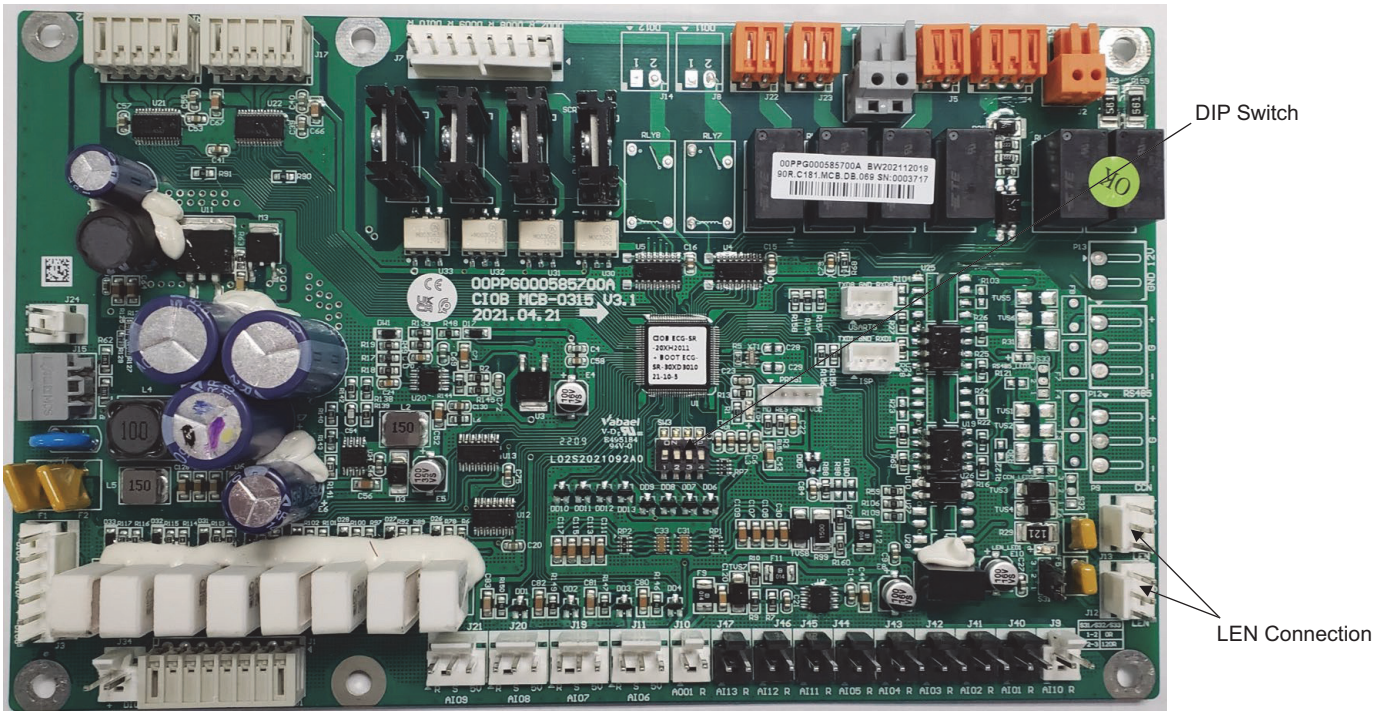


Fig. 27 — CIOB / Energy Management Module

Table 5 — CIOB A and B DIP Switch Settings

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

Table 6 — 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
First Stage of Cooling Y1	DI-03	J1	Dry contact 5V	Y1
Second Stage of Cooling Y2	DI-04	J1	Dry contact 5V	Y2
Refrigerant Leak Alarm Circuit A	DI-06	J3	Dry contact 5V	RLA
Indoor Fan Status 1	DI-07	J3	Dry contact 5V	FS1
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
Supply Air Temperature	AI-01	J40	Thermistor	SAT
Return Air Temperature	AI-02	J41	Thermistor	RAT
Outdoor Air Temperature	AI-03	J42	Thermistor	OAT
Suction Temperature Circuit A	AI-04	J43	Thermistor	SUCT_A
Discharge Gas Temperature A	AI-05	J44	Thermistor	DGT-A
Discharge Pressure Circuit A	AI-06	J11	Pressure	DP_A
Suction Pressure Circuit A	AI-07	J19	Pressure	SP_A
Set Point Reset	AI-10	J9	4-20 mA	SP_RESET
Oil Level Sensor Compressor A1	AI-11	J45	Thermistor	OLSA1
Oil Level Sensor Compressor A2	AI-12	J46	Thermistor	OLSA2
Oil Level Sensor Compressor A3	AI-13	J47	Thermistor	OLSA3
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
Alarm Relay	DO-05	J23	Relay	ALARM
Running Relay	DO-06	J22	Relay	RUN
Fan Contactor 1	DO-07	J7	Triac	FANC_1
Fan Contactor 2	DO-08	J7	Triac	FANC_2
Liquid Line Solenoid Valve A	DO-09	J7	Triac	LLSVA
Liquid Line Service Valve A2	DO-10	J7	Triac	LLSVA2

LEGEND

CCN — Carrier Comfort Network

EMM — Energy Management Module

Table 7 — CIOB-B Inputs and Outputs

POINT DESCRIPTION	I/O POINT NAME	BOARD CONNECTOR	IN/OUT TYPE	CCN POINT NAME
Inputs				
Indoor Fan Status 2	DI-02	J1	Dry contact 5V	FS2
Limit Switch #1	DI-03	J1	Dry contact 5V	LIM_SW1
Limit Switch #2	DI-04	J1	Dry contact 5V	LIM_SW2
Refrigerant Leak Alarm Circuit B	DI-06	J3	Dry contact 5V	RLB
First Stage of Cooling Circuit B	DI-07	J3	Dry contact 5V	Y3
Second Stage of Cooling Circuit B	DI-08	J3	Dry contact 5V	Y4
High Pressure Switch B	DI-09 J4 IN01-02	J4	Safety contact	HP_SW_B
Space Temperature T55 (10K)	AI-01	J40	Thermistor	SPACETMP
Supply Air Temperature AHU2	AI-02	J41	Thermistor	SAT2
Return Air Temperature AHU2	AI-03	J42	Thermistor	RAT2
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
Oil Level Sensor Compressor B1	AI-11	J45	Thermistor	OLSB1
Oil Level Sensor Compressor B2	AI-12	J46	Thermistor	OLSB2
Oil Level Sensor Compressor B3	DI-05	J1	Dry contact 5V	OLSB3
T-56 Space Temperature Slide Adjustment	AI-13	J47	Thermistor	SPTO_RNG
Demand Limit (4-20mA)	AI-10	J9	4-20 mA	LIM_4_20
Outputs				
Compressor B1	DO-01	J2	Relay	CP_B1
Compressor B2	DO-02	J2	Relay	CP_B2
Compressor B3	DO-03	J6	Relay	CP_B3
Fan Contactor 4	DO-04	J6	Relay	FANC_4
Fan Contactor 5	DO-05	J23	Relay	FANC_5
Fan Contactor 6	DO-06	J22	Relay	FANC_6
Fan Contactor 3	DO-08	J7	Triac	FANC_3
Liquid Line Solenoid Valve B	DO-09	J7	Triac	LLSVB
Liquid Line Solenoid Valve B2	DO-10	J7	Triac	LLSVB2

LEGEND

CCN — Carrier Comfort Network

Reverse Rotation Board

Reverse rotation boards are included on all units. The reverse rotation board monitors the 3-phase electrical system to provide phase reversal, phase loss, and under-voltage protection (Fig. 28). 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 8 for a description of LED status and function.

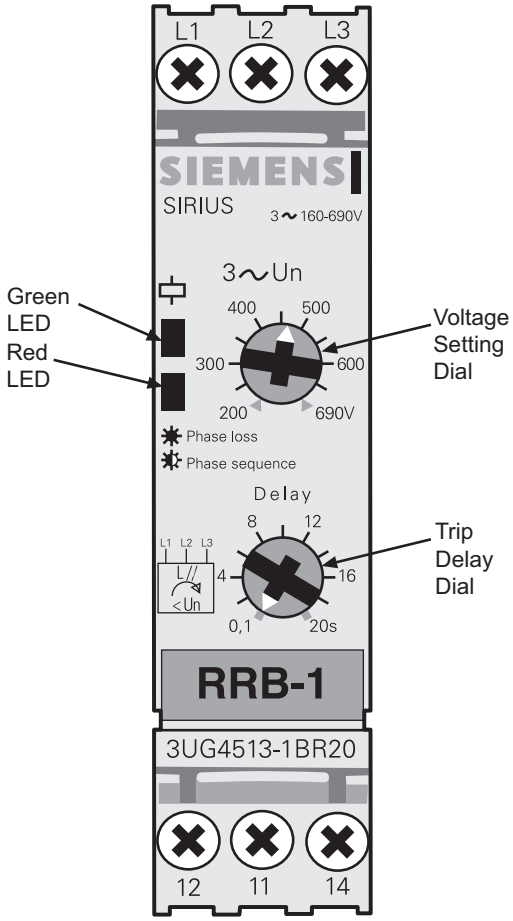


Fig. 28 — Reverse Rotation Board (RRB)

Table 8 — LED Status and Function

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

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

DIAL SETTINGS

The reverse rotation board has 2 dials. The upper dial should be set to match the incoming 3-phase voltage to the unit with no compressors running. This dial must be adjusted for 208/230-v units 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.

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.

Auxiliary Boards

For units with the digital compressor option, the AUX board (address 86) will be installed. The AUX board responds to commands from the Carrier Controller module and sends the Carrier Controller module the results of the channels they monitor via the LEN. See Fig. 29 for an example of the AUX Board. See Table 9 for AUX Board DIP switch settings. See Table 10 for a list of outputs for the AUX 2 board.

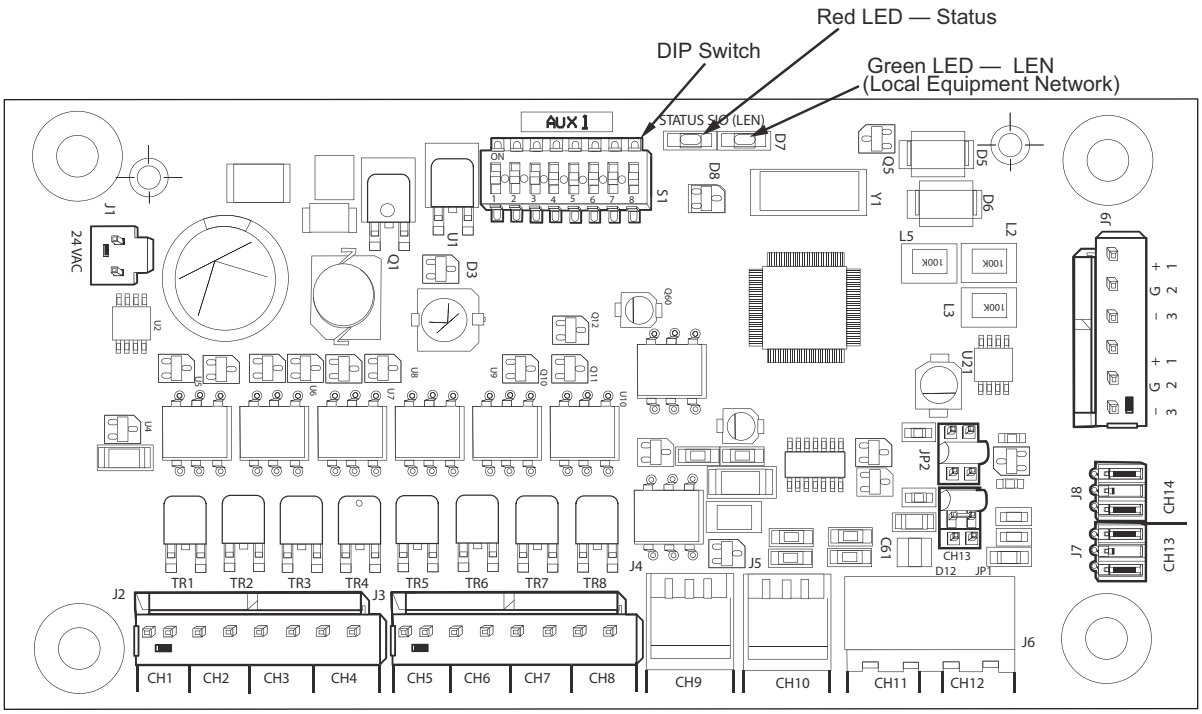


Fig. 29 — AUX Board

Table 9 — 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 10 — AUX 2 Board Configuration

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

LEGEND

CCN — Carrier Comfort Network

Energy Management Module (EMM)

The EMM is available as a factory-installed option or as a field-installed accessory. (Refer to Fig. 27 on page 26.) 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:

- Space Temperature — Used to control unit with Control Type 5. T-56 space temperature accessory allows space temperature adjustment. 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.

The EMM function is controlled through the CIOB-B board and 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.

⚠ 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 38RC 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. 30.) 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.

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 38RC condensing unit 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 for 38RC-025-060, TB5-14 and TB7-X2 for 38RC070-130. Refer to unit wiring diagrams.

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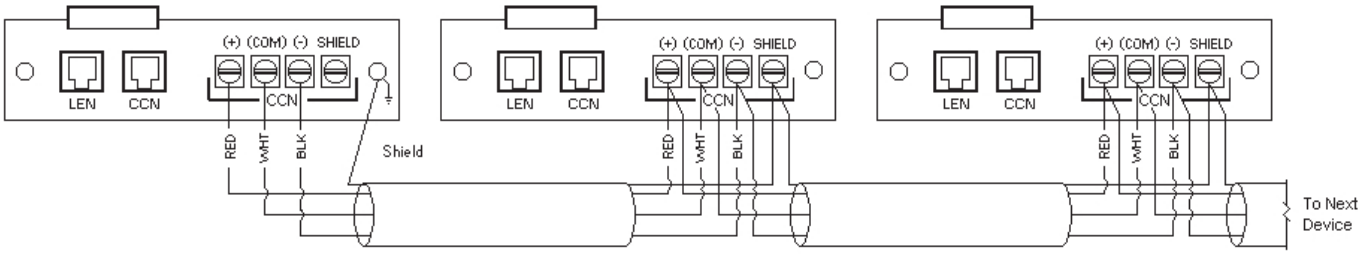


Fig. 30 — Carrier Controller CCN Communication Wiring

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 11 shows the Carrier Controller configuration required to access the unit on the CCN. Figure 31 shows the CCN configuration screen.

Table 11 — Carrier Controller Identification Configuration Table

PATH	DISPLAY NAME	VALUE
Main Menu → Configuration Menu → CCN Configuration	CCN Address	Default = 1
	CCN Bus	Default = 0
	Primary Bus Baud Rate	Default = 9600
	Primary BAS Protocol	Default = None
	Schedule Number	Default = 1

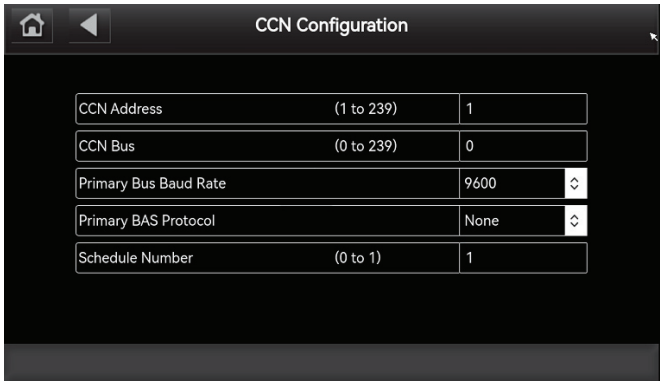


Fig. 31 — CCN Control Identification Screen

Carrier Controller Menu Tables

Carrier Controller operation is controlled by configuration information entered in the configuration tables listed in Tables 12-23. Access to different parameters may be available to all users (BASIC) or password-protected (USER, SERVICE, FACTORY). See Appendix A on page 179 for detailed descriptions of all control tables and parameters.

Table 12 — Main Menu

ITEM	CCN MENU NAME	ACCESS	MENU ICON
1	Configuration Menu	**Service/Factory**	
2	Status Tables	Basic/User/Service/Factory	
3	Set Points	Basic/User/Service/Factory	
4	Maintenance	Service/Factory	
5	Inputs	Basic/User/Service/Factory	
6	Service	Service/Factory	
7	Outputs	Basic/User/Service/Factory	

Table 13 — Configuration Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Options 2 Configuration	Service/Factory	OPTIONS2 Configuration	
2	Reset Configuration	Service/Factory	Reset Configuration	
3	Unit Configuration	Service/Factory	Unit Configuration	
5	Model Number Config	Service/Factory	Model Number Configuration	
6	Options1 Configuration	Service/Factory	OPTIONS1 Configuration	
7	Schedule	See submenus	See submenus	
8	Current Configuration	Basic/User/Service/Factory	CURCONF - Current Configuration	
9	VFD Configuration	Service/Factory	VFD_CONF - VFD Configuration	
10	VFDTest	Service/Factory	VFD Test	
11	FAN_TEST	Service/Factory	FAN_TEST - FAN_TEST	
12	CCN Configuration	Service/Factory	CCN Configuration	
16	Date/Time Configuration	Basic/User/Service/Factory	Date/Time Configuration	
17	HMI Configuration	See submenus	See submenus	

Table 14 — Schedule Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Local Schedule	Service/Factory	LOCALOCC-Schedule Menu	
2	Holiday Schedule	Service/Factory	Holiday Schedule	

Table 15 — HMI Configuration Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	BACnet Configuration	Service/Factory	HMI Configuration	
2	MODBUS Slave Config	Service/Factory	MODBUS Slave Config	
3	MODBUS Mast Config	Service/Factory	MODBUS Mast Config	
4	Network Wizard	See submenus	See submenus	

Table 16 — Network Wizard Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Network Interfaces	See submenus	See submenus	
2	Domain Name System	Service/Factory	DNS IP	
3	Network Diag	See submenus	See submenus	

Table 17 — Network Interfaces Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Network Wizard - eth0	Service/Factory	Network Wizard - eth0	
2	Network Wizard - eth1	Service/Factory	Network Wizard - eth1	
3	Wi+Fi	Service/Factory	Wi+Fi	

Table 18 — Network Diag Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Cloud Test	Service/Factory	Cloud Test	
2	Ping Test	Service/Factory	Ping Test	

Table 19 — Status Tables Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	General Unit Parameters	Basic/User/Service/Factory	General Unit Parameters	
2	Unit Parameters	Basic/User/Service/Factory	Unit Parameters	
3	Circuit A Parameters	Basic/User/Service/Factory	CIRCA_AN - Circuit A Parameters	
5	Circuit B Parameters	Basic/User/Service/Factory	CIRCB_AN - Circuit B Parameters	
6	System Information	Basic/User/Service/Factory	System Information	
7	Oil Sensor Info	Basic/User/Service/Factory	Low Oil Level Switch Sensor Status	
8	LLSV Status	Basic/User/Service/Factory	Liquid Line Solenoid Valve Status	

Table 20 — Maintenance Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Run Test	Service/Factory	RUNTEST - Run Test	
2	Test Mode	Service/Factory	Test Mode	
3	Current Operating Modes	Service/Factory	CURRMODS - Current Operating Modes	
5	Compressor Start Hour	Service/Factory	STARTHOUR - Compressor Start Hour	
6	USB Logs Export	Service/Factory	USB Logs Export	

Table 21 — Inputs Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Inputs Status	Basic/User/Service/Factory	INPUTS - Input Status	
2	Temperatures	See submenus	See submenus	
3	Pressures	Basic/User/Service/Factory	RFGPRESS - RFG Pressure	

Table 22 — Temperatures Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Air Temps	Basic/User/Service/Factory	AIRTEMP - Air Temps	
2	Refrigerant Temps	Basic/User/Service/Factory	RFGTEMP - Refrigerant Temps	

Table 23 — Outputs Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	General Outputs	Basic/User/Service/Factory	GENOP - General Outputs	
2	Outputs Circuit A	Basic/User/Service/Factory	CIRA - Outputs Circuit A	
3	Outputs Circuit B	Basic/User/Service/Factory	CIRB - Outputs Circuit B	

Machine Control Methods

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

- Local On
- Clock On
- Network
- Remote

The Carrier Controller Start/Stop button is used to select one of the above control types; see Fig. 32. 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. 32 for details. In addition, when the unit is Off, the Local control type can be turned to "Local On" or "Clock On." 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. 32 — 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.

CLOCK ON (LOCAL SCHEDULE)

With this mode selected, the unit is under local control and will be allowed to start if Local Schedule (***Configuration Menu → Schedule Menu → Local Schedule***) indicates the current time is within an occupied period. Otherwise, the unit will remain off. See Example Configuring Schedules on page 38 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.

For this option to function properly, set the correct time, day, and date. See the section Time, Day, and Date on page 69. The time clock is programmed in a 24-hour format, 00.00 to 23.59. If configured, the 38RC controls automatically adjust the time for daylight savings time.

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 (TB5-7 and TB5-8) are closed, and SW-1 remains at A1 position. The unit will ignore any network commands except Emergency Stop. Use this method if the unit is to operate the unit 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 unit. 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 unit is allowed to operate and respond to the scheduling configuration and setpoint data.

Table 24 summarizes the available operating types.

Table 24 — 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).
Clock On	Local	The unit is under Local control method and will be allowed to start if the schedule 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.

MACHINE CONTROL METHOD SELECTION

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

Start/Stop Selection Screen

The Carrier Controller Start/Stop button is a hotkey, and when pressed, opens the Start/Stop selection screen. and displays the list of Machine Control Methods if the unit is off (see Fig. 32), or Confirm Stop if the unit is on (see Fig. 33).

Fig. 33 — Confirm Stop

Start a Stopped Machine

If the unit is off, press the Start/Stop button 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, confirm the unit shutdown by pressing Confirm Stop or cancel by pressing the Back button (see Fig. 33).

For Machine Control Method Clock On or Network, press the Confirm Stop button to stop the machine or Back button to cancel (see Fig. 33).

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

MACHINE ON/OFF FUNCTION

The machine operating state can be viewed by going to ***Main Menu → Status Tables → General Unit Parameters → Control Mode***. Table 25 summarizes possible unit states.

Table 25 — 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. Control type and unit state determine the actual running state of the unit.

Table 26 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 unit 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**: Unit occupied state. If the occupancy override input switch is closed, then the unit remains occupied regardless of the setpoint scheduled selection (***Main Menu → General Parameters → Net:Cmd Occupied***).
- **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 26 will determine the actual unit running state.

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

Table 26 — Start/Stop Control

ACTIVE OPERATING TYPE						PARAMETERS STATUS						CONTROL TYPE	UNIT STATE
Local Off	Local On	Clock On	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

Cooling Setpoint Configuration

The supply air setpoint will determine the condenser operating conditions.

COOLING SETPOINT SELECTION

The Control Point (shown in the lower right corner of the Home Screen, or ***Main Menu → Status Tables → General Parameters → Control Point***) represents the supply air 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 130.) 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. To see the Machine Control Method, select the on/off icon on the home screen.

DEFINING SETPOINTS

The cooling setpoints are set via the Setpoint Table (***Main Menu → Setpoints***). Cooling Setpoint 1, Cooling Setpoint 2, Cooling Setpoint 3, and Cooling Setpoint 4 are temperature setpoints that are available as the Current Setpoint for unit operation. These setpoints are limited for proper operation of the system (Fig. 34).

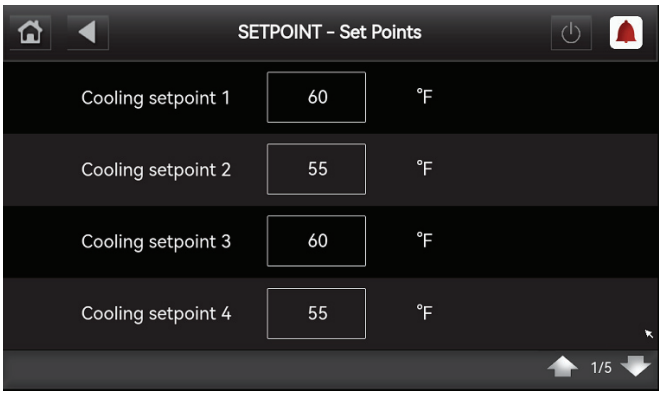


Fig. 34 — Cooling Set Points

DEFINING OCCUPANCY SCHEDULE

Time Schedule is available and must be field programmed. Local Schedule (**LOCALOCC**) is used for single setpoint On/Off control. To access the Schedule screens, go to ***Main Menu → Configuration Menu → Schedule Menu***.

To set the occupancy schedule, select **LOCALOCC** 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. 35.

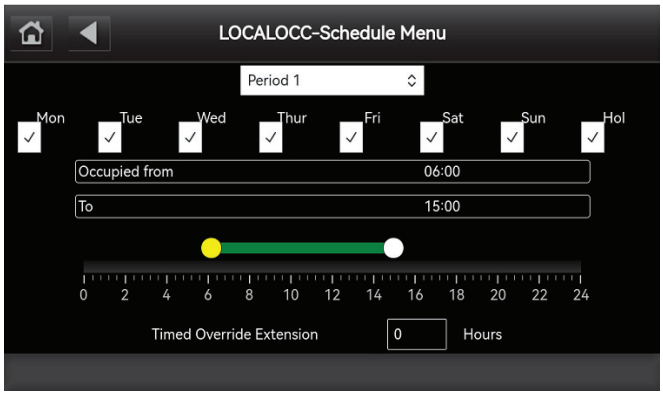


Fig. 35 — Schedule Menu

The schedules consist of 8 user-configurable occupied time periods. See Table 27.

Table 27 — Example Configuring Schedules

ITEM	VALUE	PATH
Period 1		
Occupied from	00:00	***Main Menu → Configuration Menu → Schedule Menu → LOCALOCC → 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 → LOCALOCC → 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 → LOCALOCC → 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 → LOCALOCC → 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	

The control supports time schedules for Clock On, Remote, and Network Control. These time periods can be flagged to be in effect or not in effect on each day of the week. The day begins at 00:00 and ends at 24:00. The machine is in unoccupied mode unless a scheduled time period is in effect. If an occupied period is to extend past midnight, the occupied period must end at 24:00 hours (midnight) and a new occupied period must be programmed to begin at 00:00 hours.

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

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

Holiday Schedule

The unit control allows up to 30 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 → Schedule → Holiday Schedule***. Select one of the 30 available Holiday periods (**HOLDY_01** through **HOLDY_30**) to define the holiday.

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 35). An external CCN device, such as ChillerVu™, controls the On/Off state of the machine. Careful evaluation of condensing unit and air handling unit system control is necessary. In the event Local Control is established, be sure that all 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 unit. The unit Occupied status (***Main Menu → Status Tables → 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 unit control applications, the secondary unit must be enabled using the Network control option.

HIGH PRESSURE SWITCH (HPS)

Each circuit is protected with a high pressure switch to prevent excessive condensing pressure. See the section Sensor Locations on page 42 for locations.

The high pressure switch, P/N HK02ZZ005, opens at 650±10 psig (4482±69 kPa) at operating temperatures and closes at 500±15 psig (3447± 03 kPa) for 38RCD025-060.

The high pressure switch, P/N HK01XZ640, opens at 641±10 psig (4500±69kPa) and closes at 493±30 psi (3400±200kPa) for 38RCD070-130.

PRESSURE TRANSDUCERS

Each refrigerant circuit is equipped with a suction and discharge pressure transducer. The suction pressure transducers have a green body with a pressure range of –6.7 to 420 psig (–46 to 2896 kPa) while the discharge transducers have a black body with a pressure range of 14.5 to 667 psig (100 to 4599 kPa). These inputs connect to the CIOB and are used to monitor the status of the unit and to ensure the unit operates within the compressor envelope. The transducers are used to protect the compressor from operating at too low or too high of a pressure condition. In some cases, the unit may not be able to run at full capacity. The Carrier controller will automatically reduce the capacity of a circuit as needed to maintain specified maximum/minimum operating pressures. Table 28 summarizes pressure transducer characteristics.

Table 28 — Pressure Transducer Identification

TRANSDUCER	CARRIER PART NUMBER	BODY COLOR	PRESSURE RANGE, psi (kPa)
Discharge	00PPG000568300	Black	14.5 to 667 (100 to 4599)
Suction	00PSN500569700	Green	–6.7 to 420 (–46 to 2896)

THERMISTORS

The electronic control uses 3 to 7 thermistors to sense temperatures for controlling unit operation. See Table 29. These sensors are outlined in the following sections. Three different thermistor curves are utilized depending on the thermistor and the configuration of the input. The three different types are 5k, 10k and 100k thermistors.

Table 29 — Thermistors

WIRING DIAGRAM DESIGNATION	THERMISTOR	FIELD CONNECTION	CONTROLLER CONNECTION	REFERENCE VOLTAGE	RESISTANCE [kOHMS]	COMMENTS
SAT	Supply Air Temperature	TB5-9,10	CIOB-A, J40	5.0 VDC	10	Control Type 1,3,8,9
RAT	Return Air Temperature	TB5-5,6	CIOB-A, J41	5.0 VDC	10	Control Type 1,3,8,9
OAT	Outdoor Air Temperature	Factory	CIOB-A, J42	5.0 VDC	5	
SUCT A	Suction Temperature Circuit A	Factory	CIOB-A, J43	5.0 VDC	5	
DGT A	Discharge Gas Temperature A	Factory	CIOB-A, J44	5.0 VDC	100	
SPACE TEMP	Space Temperature T-55/T56	TB6-12,13	CIOB-B, J40	5.0 VDC	10	Control Type 5
SAT2	Supply Air Temperature AHU2	TB6-27,28	CIOB-B, J41	5.0 VDC	10	Control Type 8
RAT2	Return Air Temperature AHU2	TB6-29,30	CIOB-B, J42	5.0 VDC	10	Control Type 8
SUCT B	Suction Temperature Circuit B	Factory	CIOB-B, J43	5.0 VDC	5	Dual Circuit Unit
DGT B	Discharge Gas Temperature B	Factory	CIOB-B, J44	5.0 VDC	100	Dual Circuit Unit

Return Air Temperature (RAT)

A return air temperature sensor (Part No. 33ZCSENSAT) is required for certain control types discussed in the section Capacity Control, beginning on page 71. The sensor is field-installed in the indoor unit and wired to TB5 to measure the air temperature entering the evaporator coil. Sensor wiring should not be in conduit with other control voltages, or erroneous or erratic readings may result. The sensor should be located directly in front of the evaporator coil after an outside air intake. See Fig. 36.

The RAT sensor consists of a thermistor encased within a stainless steel probe. See Fig. 37. The sensor probe is 6 in. nominal length with 114 in. (2.9 m) of unshielded, 2-conductor, 18 AWG twisted-pair cables. The sensor temperature range is –40 to 245°F (–40 to 118°C) with a nominal resistance of 10,000 ohms at 77°F (25°C). The sensor has an accuracy of ±0.36°F (±0.2°C). Refer to the 38RC Installation Instructions for information on wiring.

In lieu of wiring a sensor to the 38RC controls, the MAT/RAT sensor reading can be broadcast to the unit. It is recommended that the broadcast frequency be at least once every 30 seconds. If a broadcast is not received for 3 minutes a thermistor failure alert will be generated. The broadcast should write to the CCN point, RETURN_T. Even though the MAT/RAT temperature is being broadcast, a thermistor type ***Configuration → OPT1 → RAT.T*** (RAT Thermistor Type) must be set to 5k or 10k. RAT = None indicates no thermistor is installed. If the value is set to None, the controller will not accept the broadcast value.

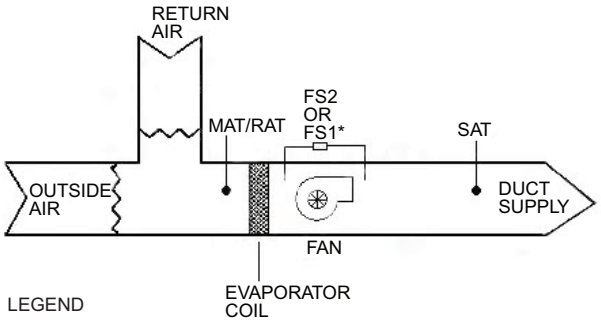


Fig. 36 — Mixed Air Temperature (MAT)/Return Air Temperature (RAT), Supply Air Temperature (SAT) and Fan Status Switch Sensor Layout

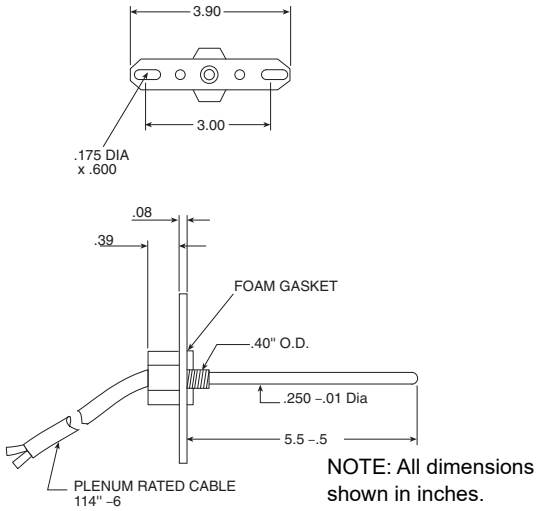


Fig. 37 — 33ZCSENSAT Sensor

Supply Air Temperature (SAT)

A supply air temperature sensor is required for certain control types discussed in the section Capacity Control, beginning on page 71. The sensor is field-installed in the indoor unit and wired to TB5 to measure the air temperature leaving the evaporator coil. Sensor wiring should not be in conduit with other control voltages, or erroneous or erratic readings may result.

The sensor must be mounted in the discharge of the unit, downstream of the cooling coil and before any heating coil or heat exchanger if reheat is utilized. See Fig. 36. Be sure the probe tip does not come in contact with any of the unit surfaces.

The SAT sensor (Part No. 33ZCSENSAT) consists of a thermistor encased within a stainless steel probe. See Fig. 37. The SAT sensor probe is 6 in. (150 mm) nominal length with 114 in. (2.9 m) of unshielded, 2-conductor 18 AWG twisted-pair cables. Wiring to the device must be field-supplied. Shielded 2-conductor, 18 AWG twisted-pair cabled is required. The sensor temperature range is –40 to 245°F (–40 to 118°C) and is a Type II thermistor with a nominal resistance of 10,000 ohms at 77°F (25°C). The sensor has an accuracy of ±0.36 °F (±0.2 °C).

As an alternative to a single thermistor, an averaging sensor (Part No. HH79NZ041) can be utilized to provide the supply air temperature to the 38RC controls. See Fig. 38. This sensor consists of 9 individual sensors wired within a 24 ft (7.3 m) flexible copper tube. Wiring to the device must be field supplied. Shielded 2-conductor, 18 AWG twisted-pair cabled is required. The sensor temperature range is –40 to 245°F (–40 to 118°C) and is a Type II thermistor with a nominal resistance of 10,000 ohms at 77°F (25°C). The sensor has an accuracy of ±0.36 °F (± 0.2 °C).

In lieu of wiring a sensor to the 38RC controls, the SAT sensor reading can be broadcast to the unit. It is recommended that the broadcast frequency be at least once every 30 seconds. If a broadcast is not received for 3 minutes a thermistor failure alert will be generated. The broadcast should write to the CCN point, SUPPLY_T. Even though the SAT temperature is being broadcast, a thermistor type ***Configuration → OPT1 → SAT.T*** (SAT Thermistor Type) must be set to 5k or 10k. SAT = None indicates no thermistor is installed. If the value is set to None, the controller will not accept the broadcast value.

Suction Gas Temperature (SGT)

These sensors are factory installed in a friction fit well located in the suction line of each circuit. The sensor is a 5,000Ω at 77°F (25°C) thermistor connected to the main base board. These thermistors are used in the suction superheat calculations.

Outdoor-air Temperature Sensor (OAT)

This sensor is factory installed on a bracket which is inserted through the base pan of the unit on unit sizes 025-060 (see the section Sensor Locations on page 42) or mounted to the back of the control box on the unit sizes 070-130. This sensor is a 5,000Ω thermistor at 77°F (25°C) connected to the main base board.

Discharge Gas Temperature Thermistor (DGT)

The sensor is factory-installed in a friction fit well on the discharge line close to the discharge of the digital compressor. It protects the system from high discharge gas temperature. This sensor is an 100,000Ω at 77°F (25°C) thermistor connected to the CIOB board (see Table 29).

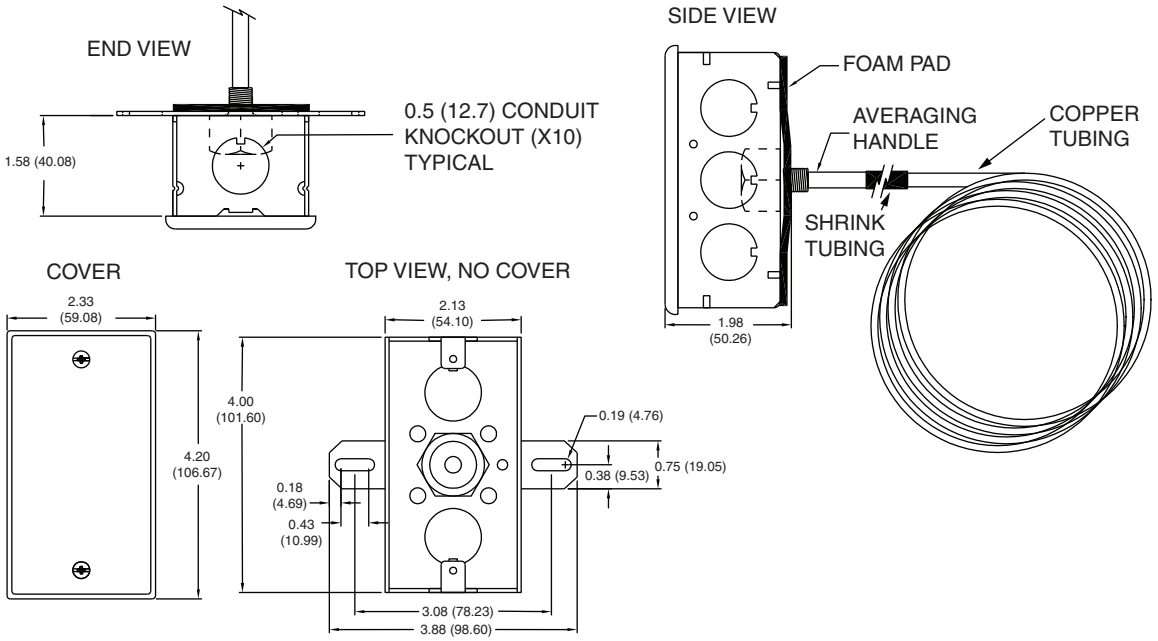


Fig. 38 — HH79NZ041 Averaging Sensor

Space Temperature Sensor (T55, T56)

Space temperature sensors are used to measure the interior temperature of a building.

The following three types of SPT sensors are available:

- Space temperature sensor (33ZCT55SPT) with timed occupancy override button (see Fig. 39)
- Space temperature sensor (33ZCT56SPT) with timed occupancy override button and set point adjustment (see Fig. 40)
- Space temperature sensor (33ZCT59SPT) with occupancy override button, set point adjustment, and Liquid Crystal Display (LCD) (see Fig. 41)

All of the above sensors are 10,000Ω at 77°F (25°C), Type II thermistors and are connected to TB-6. The sensor should be mounted approximately 5 ft (1.5 m) from the floor in an area representing the average temperature in the space. Allow at least 4 ft (1.2 m) between the sensor and any corner. Mount the sensor at least 2 ft (0.6 m) from an open doorway.

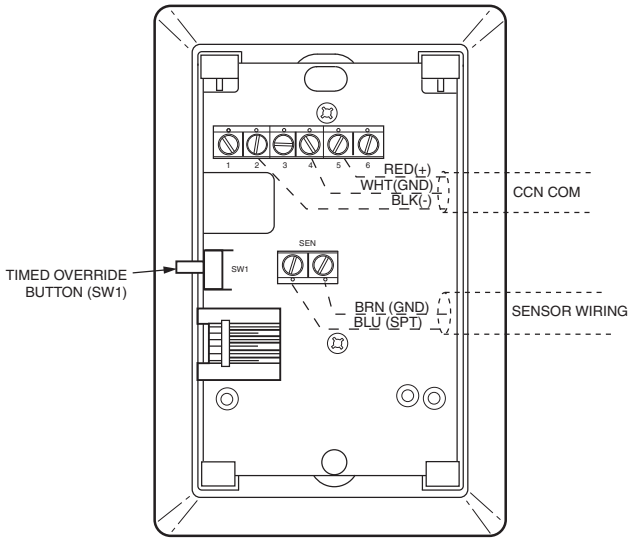


Fig. 39 — Space Temperature Sensor Typical Wiring (33ZCT55SPT)

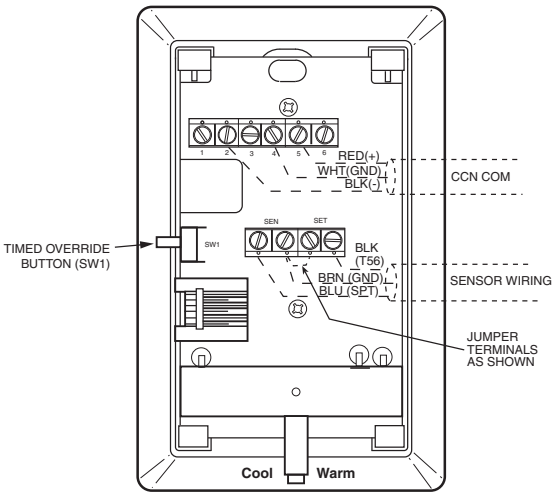


Fig. 40 — Space Temperature Sensor Typical Wiring (33ZCT56SPT)

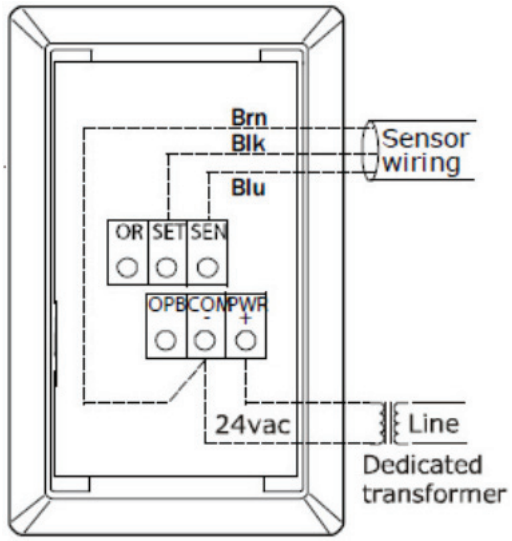


Fig. 41 — Space Temperature Sensor Typical Wiring (33ZCT59SPT)

To connect the space temperature sensor (Fig. 42):

1. Use a 20 gage wire to connect the sensor to the controller. The wire is suitable for distances of up to 500 ft (152 m). Use a three-conductor shielded cable for the sensor and set point adjustment connections. The standard CCN communication cable may be used. If the set point adjustment (slidebar) is not required, then an unshielded, 18 or 20 gage, two-conductor, twisted pair cable may be used. 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 TB6-12 and 13 located in the unit control box. Sensor wiring should not be in conduit with other control voltages, or erroneous or erratic readings may result.
3. Connect the T56 set point adjustment between the SET terminal and TB6-14.

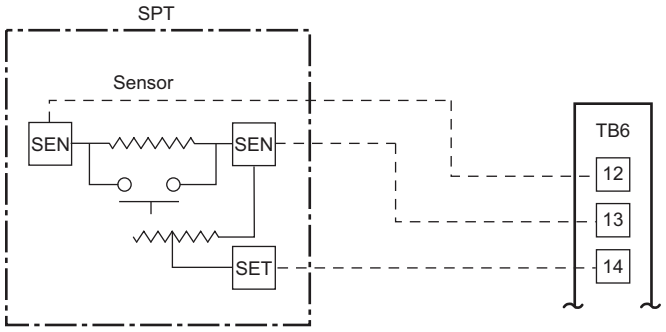


Fig. 42 — Typical SPT Wiring

Units on the CCN can be monitored from the space using the RJ11 connector provided with the space sensor, if desired. To wire the RJ11 connector into the CCN (Fig. 43):

IMPORTANT: The cable selected for the RJ11 connector wiring MUST be identical to the CCN communication bus wire used for the entire network.

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.

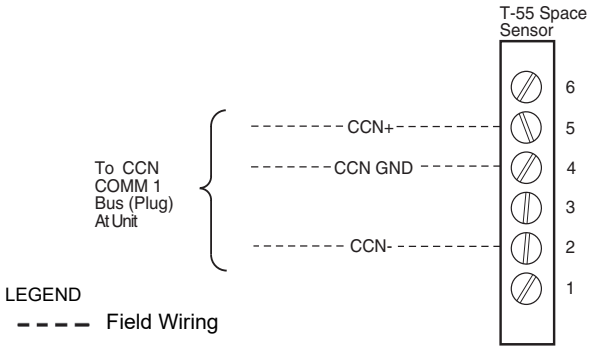


Fig. 43 — CCN Communications Bus Wiring to Optimal Space Sensor RJ11 Connector

In lieu of a single sensor providing space temperature, an averaging sensor array of either 4 or 9 sensors may be employed to provide a space temperature as shown in Fig. 44. With this control scheme, only T55 space temperature sensors (P/N 33ZCT55SPT) can be used. Total sensor wiring must not exceed 1,000 ft (305 m). Do not use T56 space temperature sensors (P/N 33ZCT56SPT) for space temperature averaging because the 5-degree offset function will not work in a multiple sensor application.

NOTE: The Timed Override feature from a space temperature sensor requires a single space temperature sensor connected to the unit. This feature does not function when used with averaging space temperature sensor arrays.

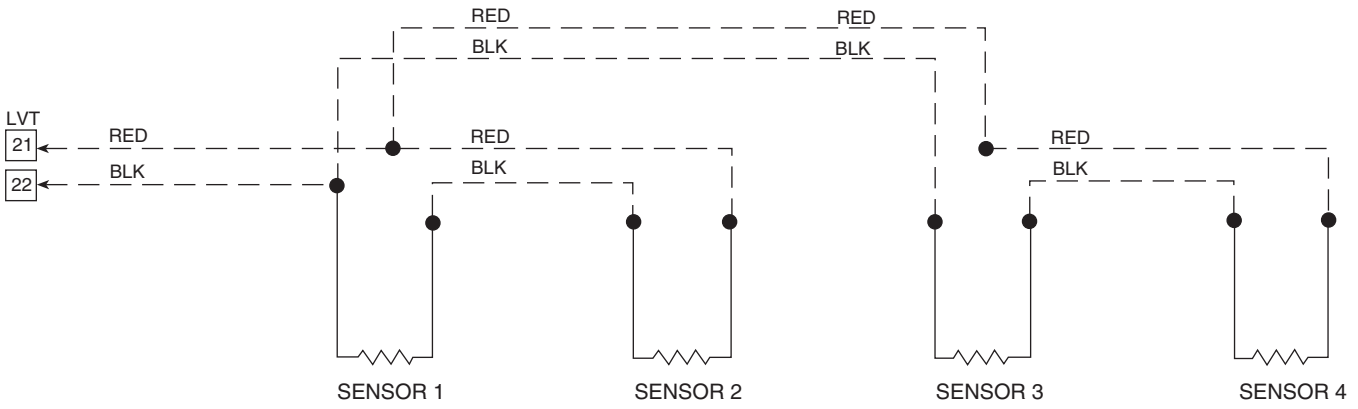
In lieu of wiring a sensor to the 38RC controls, the SPT sensor reading can be broadcast to the unit. It is recommended that the broadcast frequency be at least once every 30 seconds. If a broadcast is not received for 3 minutes a thermistor failure alert will be generated. The broadcast should write to the CCN point, SPT.

THERMOSTAT INPUT

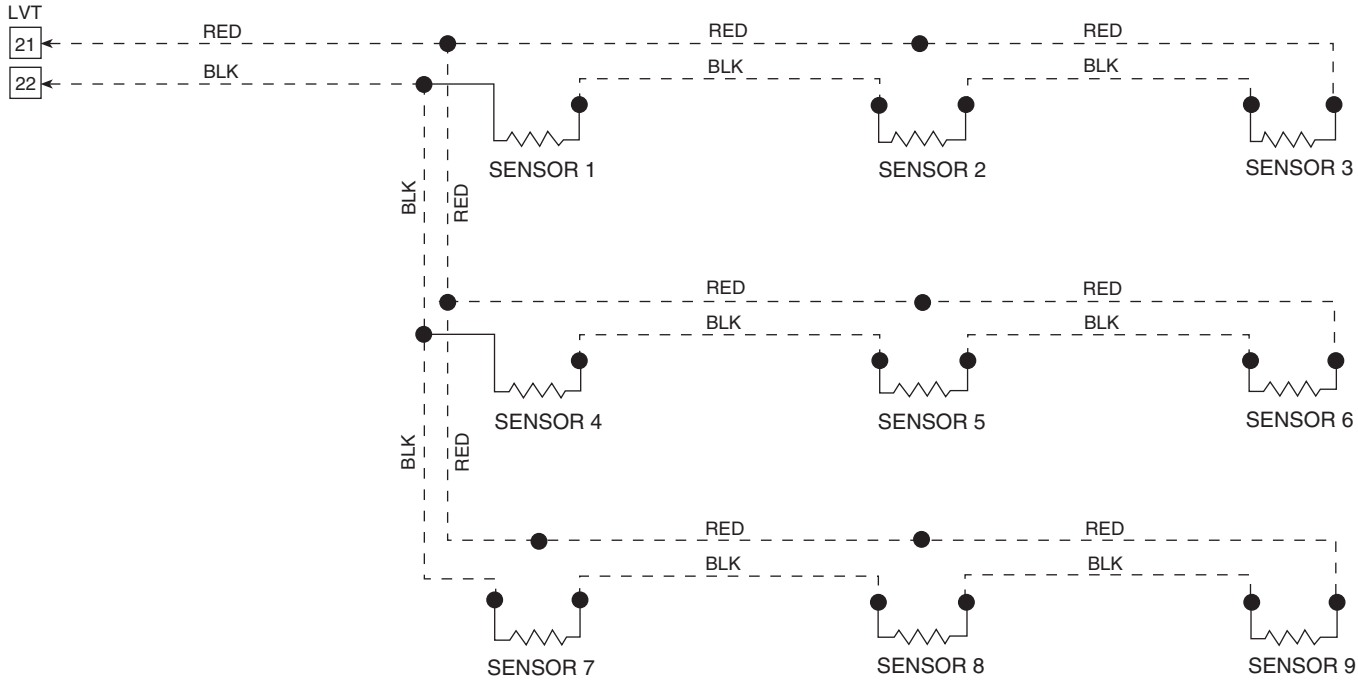
A two-stage thermostat can be used for constant volume applications to provide Y1 and Y2 cooling inputs. A thermostat can also be used in a variable air volume application to determine supply air set point with Y1 and Y2 cooling inputs. For dual circuit machines, two separate systems can be controlled independently from two 2-stage thermostats. Y1 and Y2 cooling inputs control circuit A. Y3 and Y4 cooling inputs control circuit B. Thermostat connections depend on the machine control type which is discussed later in this book.

Sensor Locations

See Fig. 45-55.



SPACE TEMPERATURE AVERAGING — 4 SENSOR APPLICATION



SPACE TEMPERATURE AVERAGING — 9 SENSOR APPLICATION

LEGEND

– – – – Field Wiring

Fig. 44 — Space Temperature Averaging

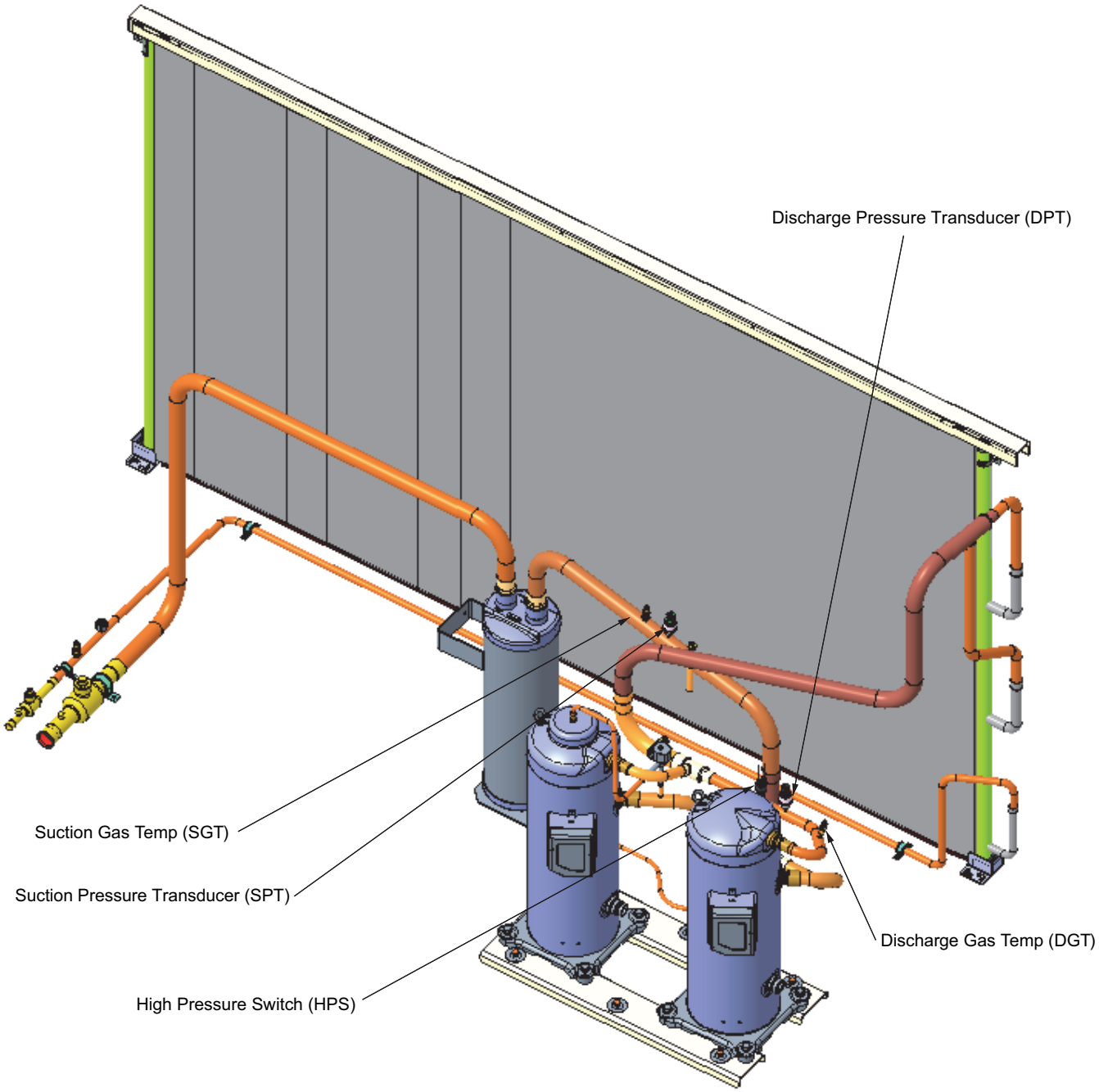


Fig. 45 — 38RCS025, 027, 030 Sensor Locations

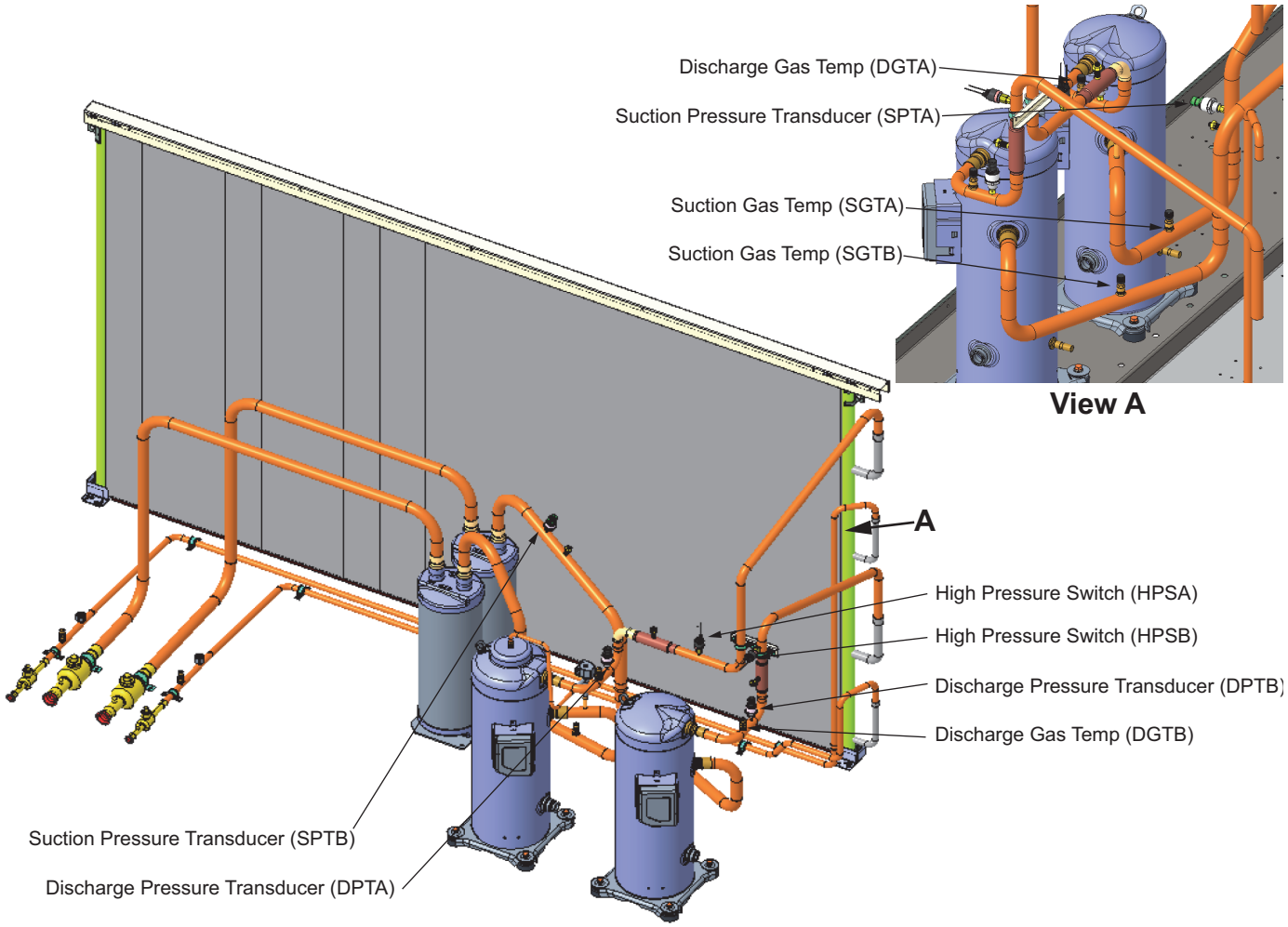


Fig. 46 — 38RCD025, 027, 030 Sensor Locations

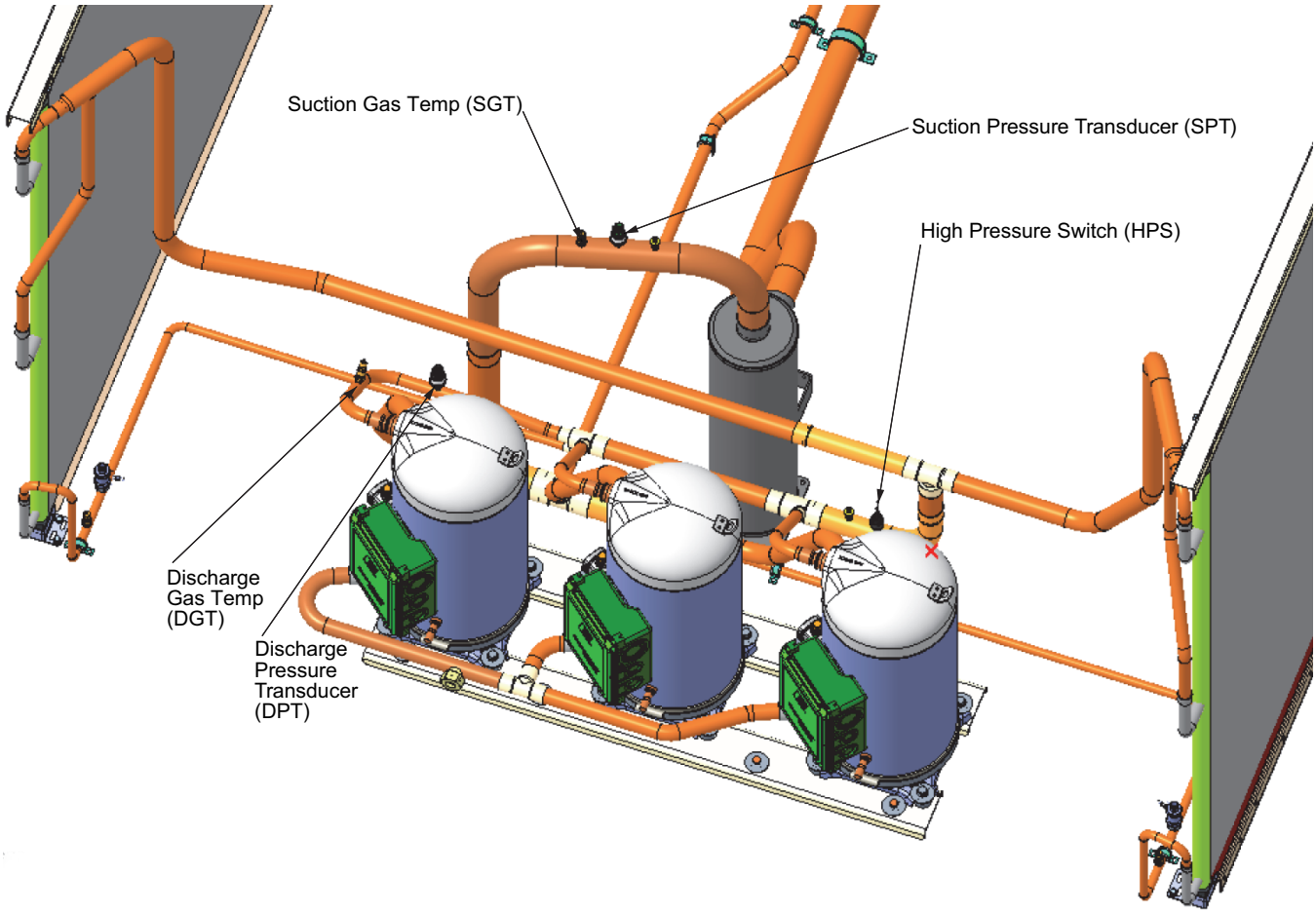


Fig. 47 — 38RCS040, 050 Sensor Locations

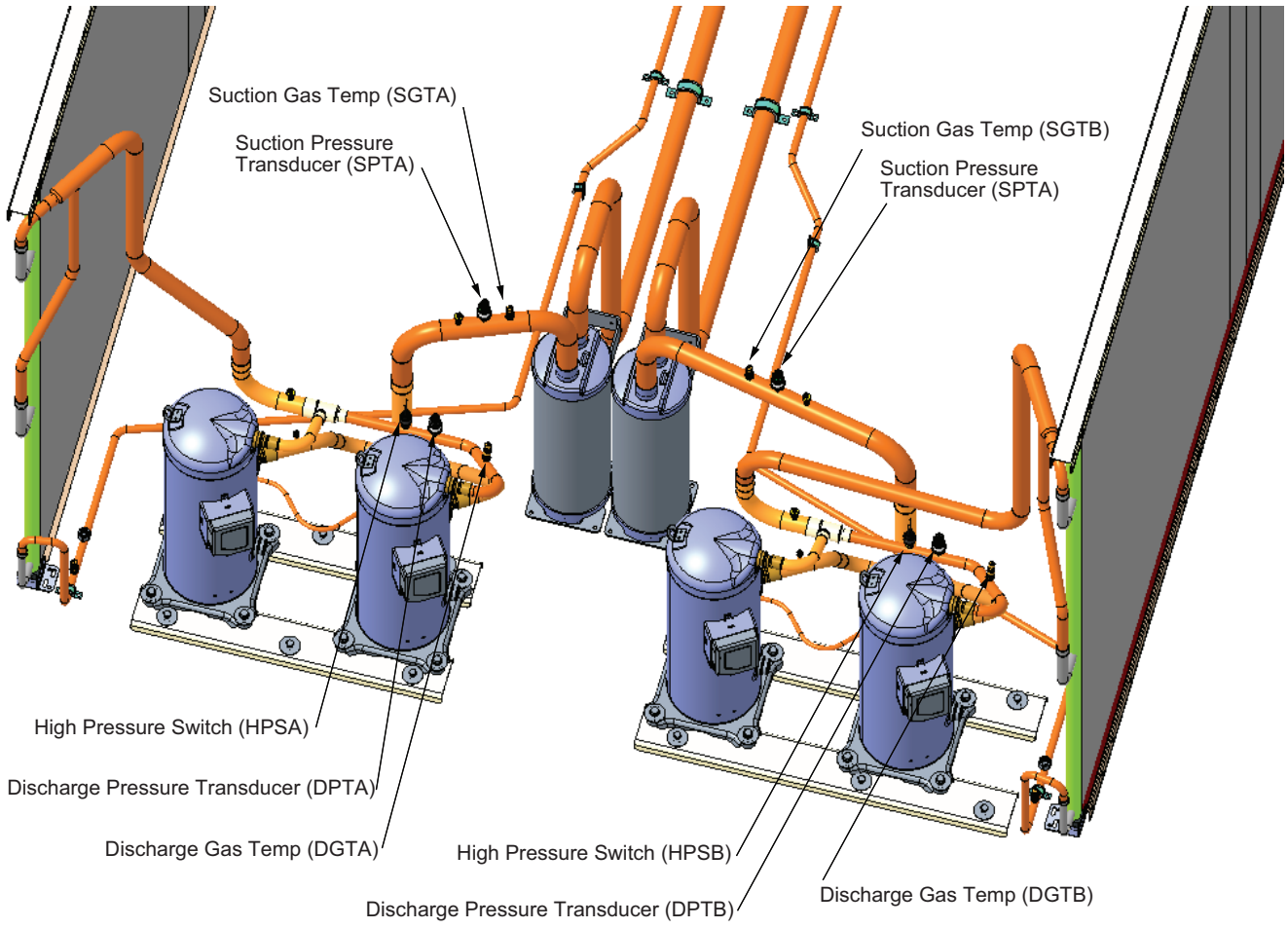


Fig. 48 — 38RCD040, 050, 060 Sensor Locations

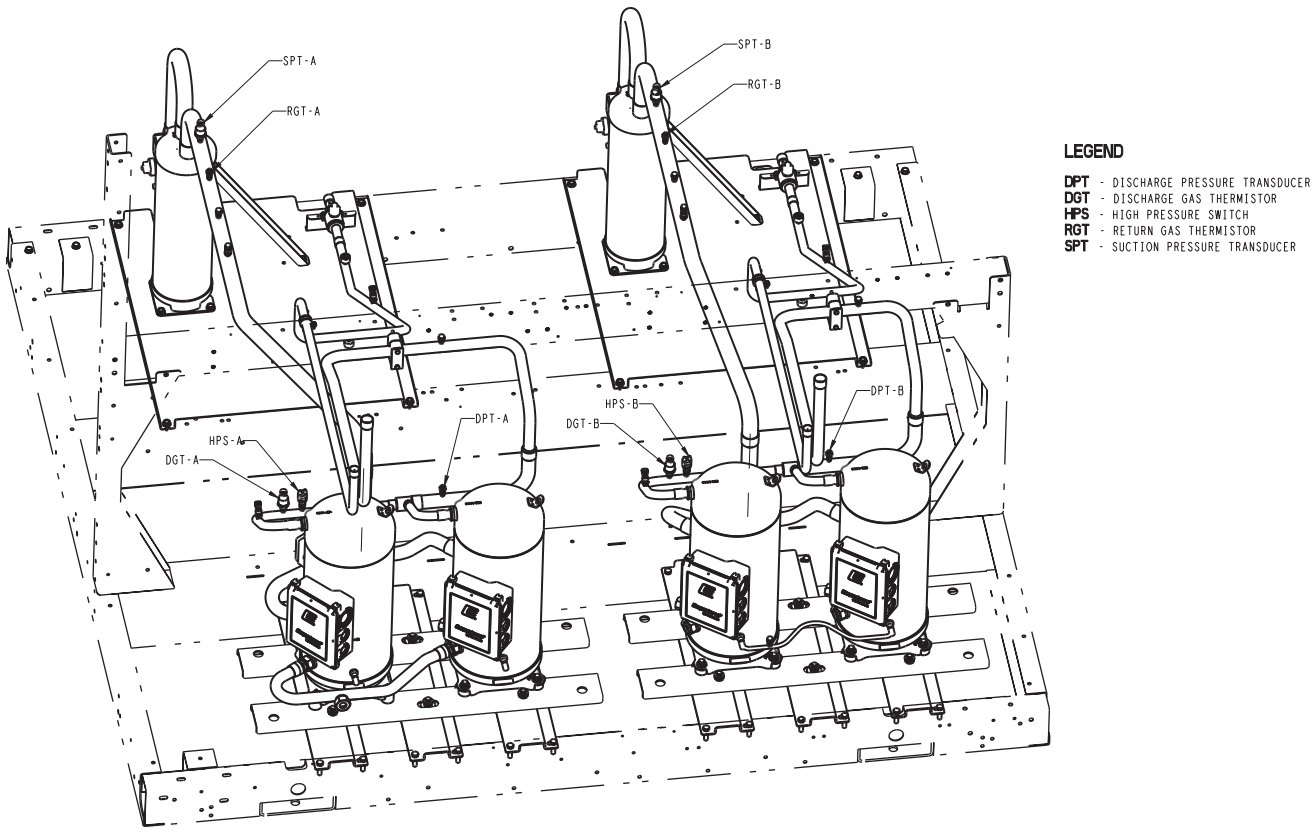


Fig. 49 — 38RCD070 Sensor Locations

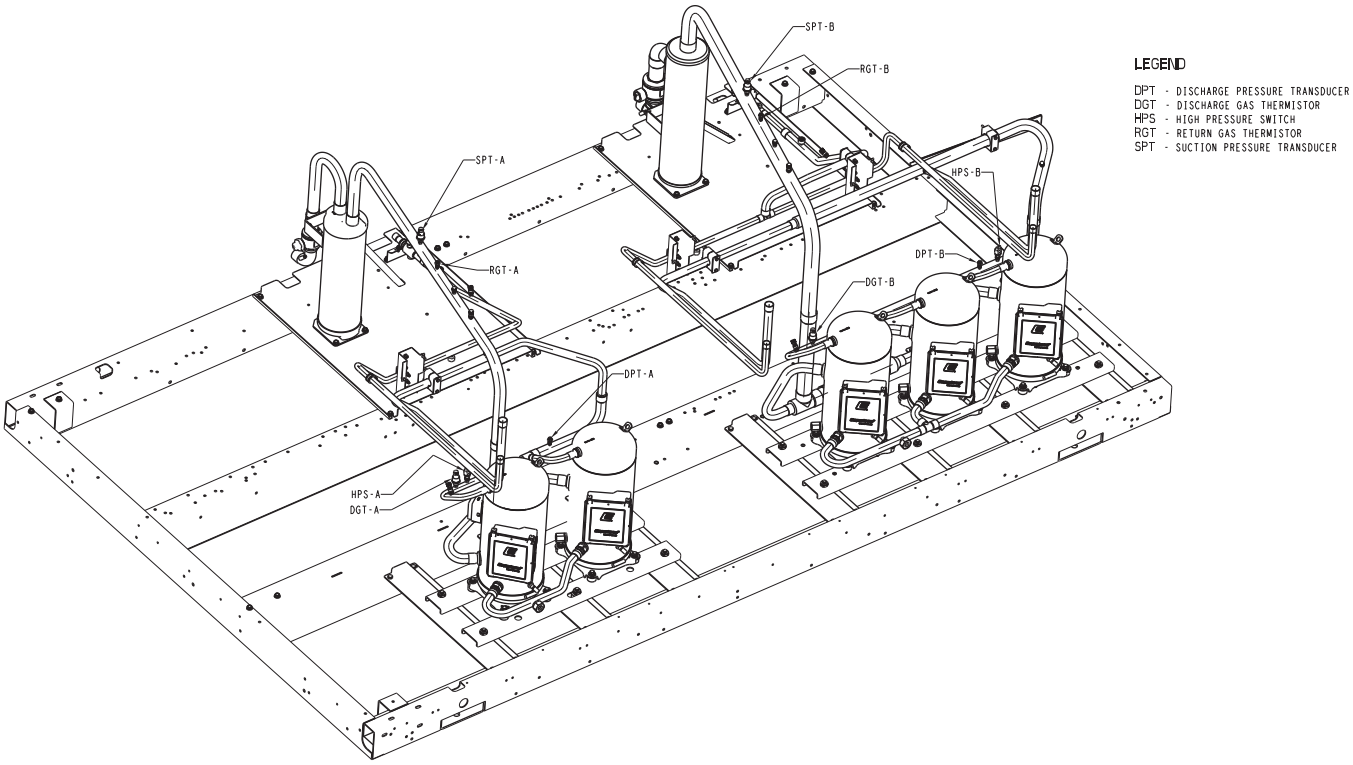


Fig. 50 — 38RCD080 Sensor Locations

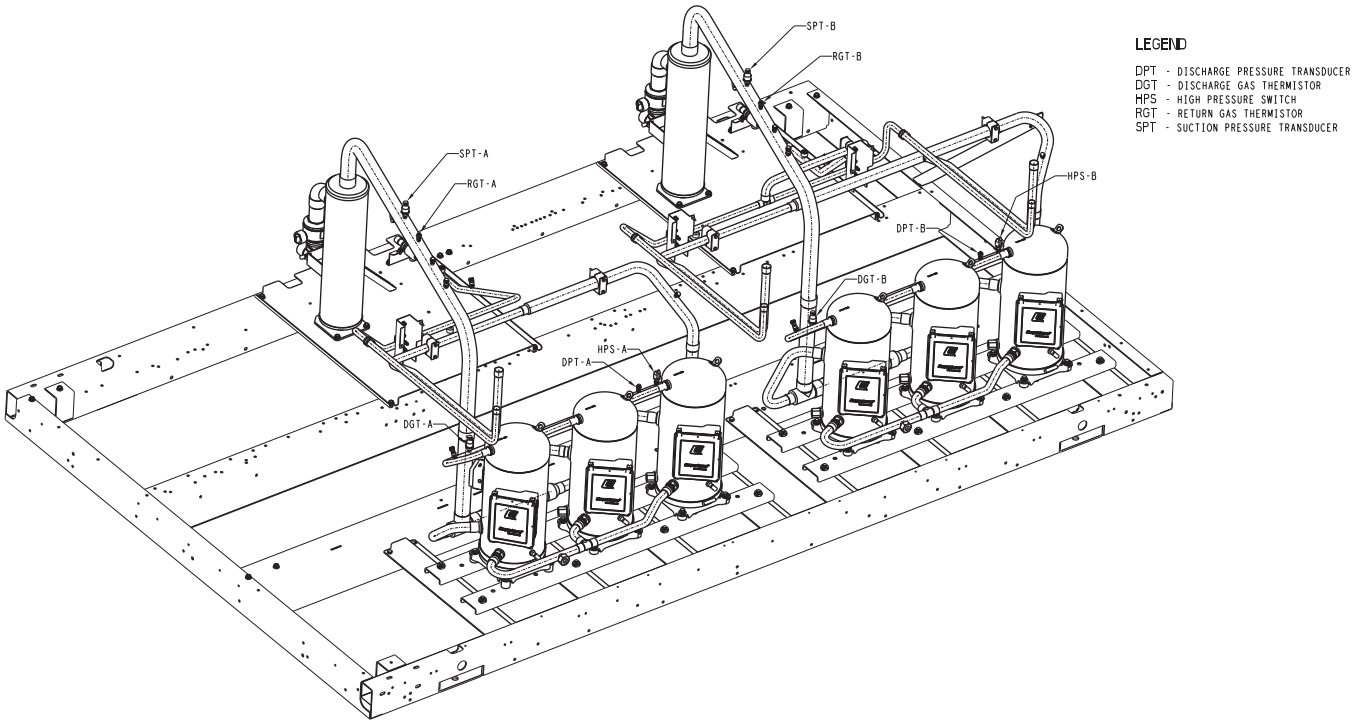
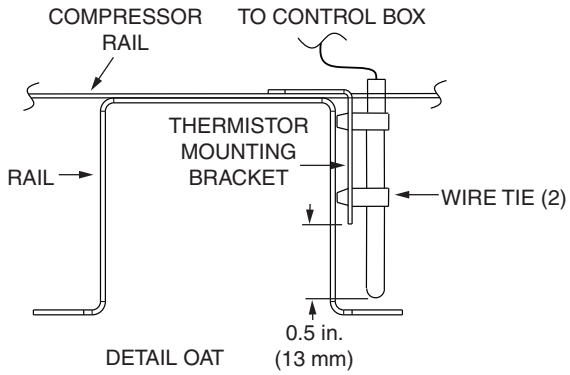


Fig. 51 — 38RCD090-130 Sensor Locations



NOTE: SECURE OAT WITH TWO TIES. INSERT ASSEMBLY INTO BASE HOLE AND SECURE WITH SCREW.

Fig. 52 — Outdoor Air Temperature (OAT) Thermistor Mounting, 38RC025-060

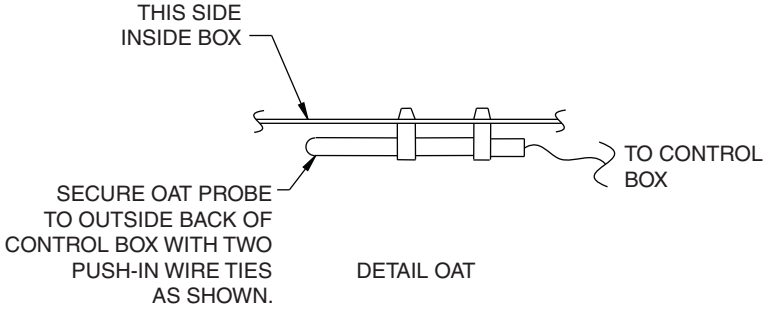


Fig. 53 — Outdoor Air Temperature (OAT) Thermistor Mounting, 38RCD070-130

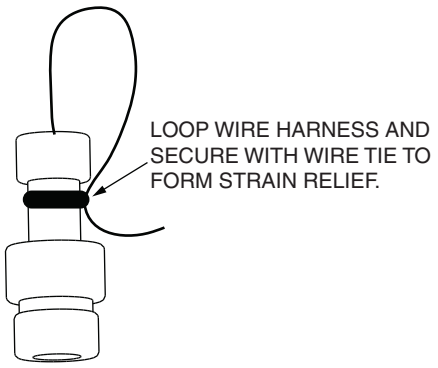


Fig. 54 — High Pressure Switch (HPS), Suction Pressure Transducer (SPT), and Discharge Pressure Transducer (DPT) Mounting

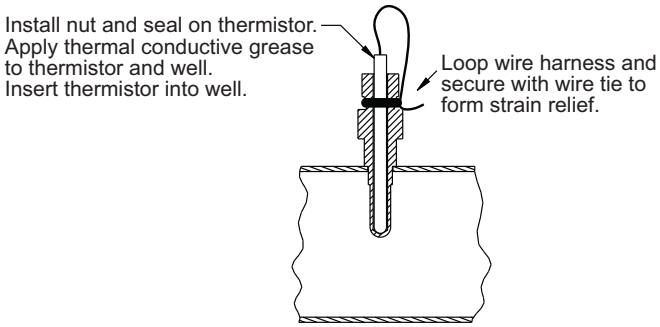


Fig. 55 — Suction and Discharge Gas Thermistor Mounting

OUTPUTS

In addition to the capacity staging outputs of the compressor or digital compressor (if equipped) and the outdoor fan staging for head pressure control, several external and optional outputs are used for status signals and unit refrigerant control.

ALARM RELAY

The 38RC Carrier controller units have a remote alarm relay feature that allows for remote annunciation of a unit alarm. For Alert and Alarm definitions, see the Alarms and Alerts section on page 157. A field-installed relay, ALMR, must be installed and connected between TB5-14 and TB-1. For alarm relay specifications see the appropriate machine control type wiring diagrams.

LIQUID LINE SOLENOID VALVES

The 38RC units have the ability to control a number of liquid line solenoids. See Table 30.

Two conditions will open the liquid line solenoid valves. Each circuit operates independently. The primary liquid line solenoid valve (LLSV-A or LLSV-B) is energized any time a compressor is operating in the circuit. The circuit's primary liquid line solenoid is opened for approximately 20 seconds before a lead circuit compressor is started. The primary liquid line solenoid valve is deenergized 5 seconds after the circuit stops.

If the circuit has an additional liquid line solenoid valve (LLSV-A2 or LLSV-B2), it will be energized with the start of the second compressor in the circuit. The second liquid line solenoid in the circuit will be deenergized when the circuit returns to a single compressor running.

The use of a second solenoid valve in a 2 compressor circuit is not recommended.

As part of the refrigerant management routine, the primary liquid line solenoid valve, LLSV-A or LLSV-B, is opened for 60 minutes, or till OAT > SST + 4°F, after OAT is less than SST for more than 6 hours, then OST is > SST. This action shall only be performed once after each compressor run. If equipped, the second liquid line solenoid in the circuit will not operate as part of this refrigerant management routine.

Table 30 — Liquid Line Solenoid Valve Connections

UNIT	CIRCUIT	LIQUID LINE SOLENOID VALVE CONNECTIONS		COMMENTS
38RCD040-060	A	A1	TB5-3,4	
	B	B1	TB6-25,26	
38RCD070-130	A	A1	TB5-3,4	
		A2	TB5-21,26	Separate Power Supply Required
	B	B1	TB6-25,26	
		B2	TB6-20,22	Separate Power Supply Required
38RCS025-050	A	A1	TB5-3,4	
		A2	TB5-21,26	

OIL LEVEL SENSORS

Oil level sensors are included on compressors YP137 and larger. These are not available on the smaller compressors used on 38RCS/D025 and 38RCD040, and are also not available on all digital compressors.

⚠ CAUTION

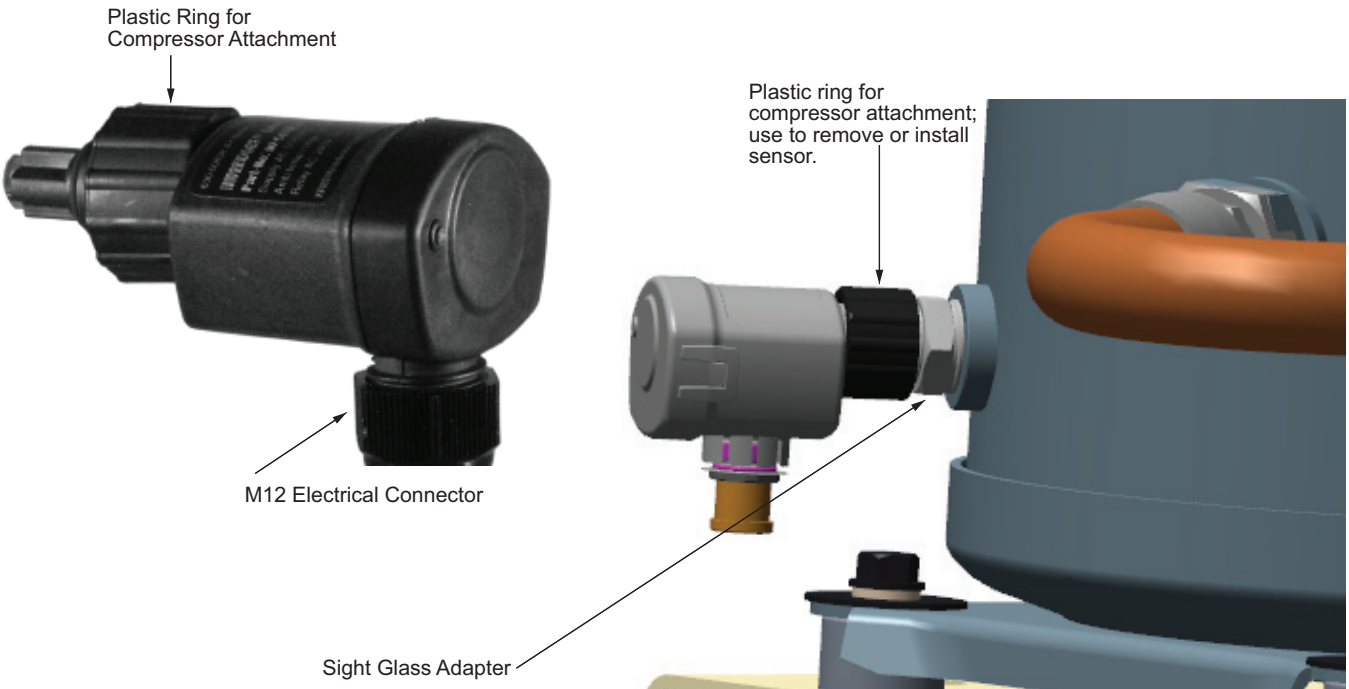
Do not loosen metal hex fitting behind oil sensor. Oil and refrigerant under pressure will escape and cause bodily harm. If changing the sensor, unscrew *only* the plastic collar.

Oil sensors are an optical-type sensing level through a sight glass. See Fig. 56. The Carrier controller receives a signal from the sensor when the oil level drops. The controller will attempt corrective actions such as starting an additional compressor on the circuit if available. If oil level does not correct in the allowed time, the circuit will be stopped and an alarm posted.

The oil level sensor operation is enabled from the factory when the sensors are provided, ***Main Menu → Configuration Menu → Options 1 Configuration → OLS Sensor Switch***. A1SWSTAT = 1 indicates good oil level. A1SWATAT = 0 indicates low oil level. The same logic applies to A1, A2, A3, B1, B2 and B3.

Control power shall be cycled after the OLS replacement.

Oil level sensors may not be available on units built before December of 2025. In this case the standard oil recovery routine will apply. See "D.OIL (Oil Recover Mode)" on page 135.



⚠ CAUTION

Do not remove sight glass adapter! High pressure refrigerant and oil will escape from compressor, and equipment damage or personal injury may result.

Fig. 56 — Oil Sensor

PRE-START-UP

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.

Precautions for Working with Flammable Refrigerant Systems

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.

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; i.e., non-sparking, adequately sealed, or intrinsically safe.

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

No person carrying out work in relation to a refrigerating system which 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, removing, 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.

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.

The following checks shall be applied to installations using flammable refrigerants:

- The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.
- The ventilation machinery and outlets are operating adequately and are not obstructed.
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
- Marking to the equipment is visible and legible. Markings and signs that are illegible shall be corrected.
- Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- that no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

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 it is not already labeled).
- 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.

System Check

Do not attempt to start the air-conditioning system until the following checks have been completed.

1. Check all system components for proper operation, including the air-handling equipment. Consult manufacturer's instructions. If the unit has field-installed accessories, be sure all are properly installed and wired correctly. Refer to unit wiring diagrams.
2. Open liquid line and suction line service valves.
3. Check tightness of all electrical connections.
4. Oil should be visible in the compressor sight glasses. An acceptable oil level in the compressor is from 1/8 to 3/8 of sight glass. Adjust the oil level as required. No oil should be removed unless the crankcase heater has been energized for at least 24 hours. See the Oil Charge section on page 145 for Carrier-approved oils.
5. Electrical power source must agree with unit nameplate.
6. Crankcase heaters must be firmly attached to compressors, and must be on for 24 hours prior to start-up.
7. All condenser fans are 3-phase. For non Greenspeed units, check for proper rotation of condenser fans first BEFORE attempting to start compressors. For Greenspeed units, check the phase to ensure the supply power phase rotation is clockwise A-B-C (L1-L2-L3). To reverse rotation, interchange any two of the main incoming power leads.

Evacuation and Dehydration

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 38RC condensing units 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 38RC 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. This process shall be repeated until no refrigerant is within the system. 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.

START-UP

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 on all units 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 and turn on the fan circuit breakers. Leave the compressor circuit breakers off/open. The crankcase heaters are now energized.

Preliminary Charge

For MCHX (micro-channel heat exchanger) and RTPF (round tube plate fin) units, add the preliminary charge. Using the liquid charging method and charging by weight procedure, charge each circuit with the amount of R-32 refrigerant listed in Tables 31 and 32. These tables are based on 25 ft (7.6 m) of liquid line and do not include the indoor coil refrigerant charge which must be added to the preliminary charge amount. For liquid lines longer than 25 ft (7.6 m), additional charge is required as shown in the notes section of the table. For estimated line refrigerant charge, see Table 33.

Table 31 — MCHX Preliminary R-32 Refrigerant Charge

38RC UNIT SIZE	CIRCUIT A		CIRCUIT B	
	lb	kg	lb	kg
38RCS025	27.5	12.5	—	—
38RCD025	15.0	6.8	15.0	6.8
38RCS027	29.5	13.4	—	—
38RCD027	16.0	7.3	16.0	7.3
38RCS030	33.9	15.4	—	—
38RCD030	16.5	7.5	16.5	7.5
38RCS040	43.9	19.9	—	—
38RCD040	23.6	10.7	19.5	8.8
38RCS050	53.1	24.1	—	—
38RCD050	24.6	11.2	31.1	14.1
38RCD060	32.1	14.5	34.1	15.4
38RCD070	33.6	15.3	34.9	15.8
38RCD080	33.6	15.3	45.0	20.4
38RCD090	39.3	17.8	47.2	21.4
38RCD100	47.3	21.5	47.4	21.5
38RCD110	48.3	21.9	57.6	26.1
38RCD130	57.3	26.0	57.6	26.1

Table 32 — RTPF Preliminary R-32 Refrigerant Charge

38RC UNIT SIZE	CIRCUIT A		CIRCUIT B	
	lb	kg	lb	kg
38RCS025	44.5	20.2	—	—
38RCD025	24.0	10.9	24.0	10.9
38RCS027	51.0	23.1	—	—
38RCD027	27.3	12.4	27.3	12.4
38RCS030	56.4	25.6	—	—
38RCD030	27.8	12.6	27.8	12.6
38RCS040	88.8	40.3	—	—
38RCD040	46.1	20.9	42.0	19.1
38RCS050	98.0	44.4	—	—
38RCD050	47.1	21.4	53.6	24.3
38RCD060	54.6	24.7	56.6	25.7
38RCD070	63.2	28.7	63.6	28.9
38RCD080	63.2	28.7	89.6	40.6
38RCD090	69.0	31.3	91.6	41.6
38RCD100	91.9	41.7	91.9	41.7
38RCD110	92.9	42.1	116.9	53.0
38RCD130	116.6	52.9	117.0	53.1

Table 33 — Estimated Line Refrigerant Charge

R-32 WEIGHT OF REFRIGERANT PER 100 ft (30.48 m) OF TUBING				
Nominal Size (in.)	Suction Line 40°F (4.4°C)		Liquid 120°F (48.9°C)	
	lb	kg	lb	kg
3/8	—	—	3	1.4
1/2	—	—	5.6	2.5
5/8	0.30	0.14	9.0	4.1
7/8	0.61	0.28	18.7	8.5
1-1/8	1.04	0.47	31.8	14.5
1-3/8	1.6	0.72	48.5	22.0
1-5/8	2.2	1.02	68.6	31.2
2-1/8	3.9	1.77	119.3	54.2
2-5/8	6.0	2.73	182.6	83.0
3-1/8	8.6	3.91	262.3	119.2

Adjust Refrigerant Charge

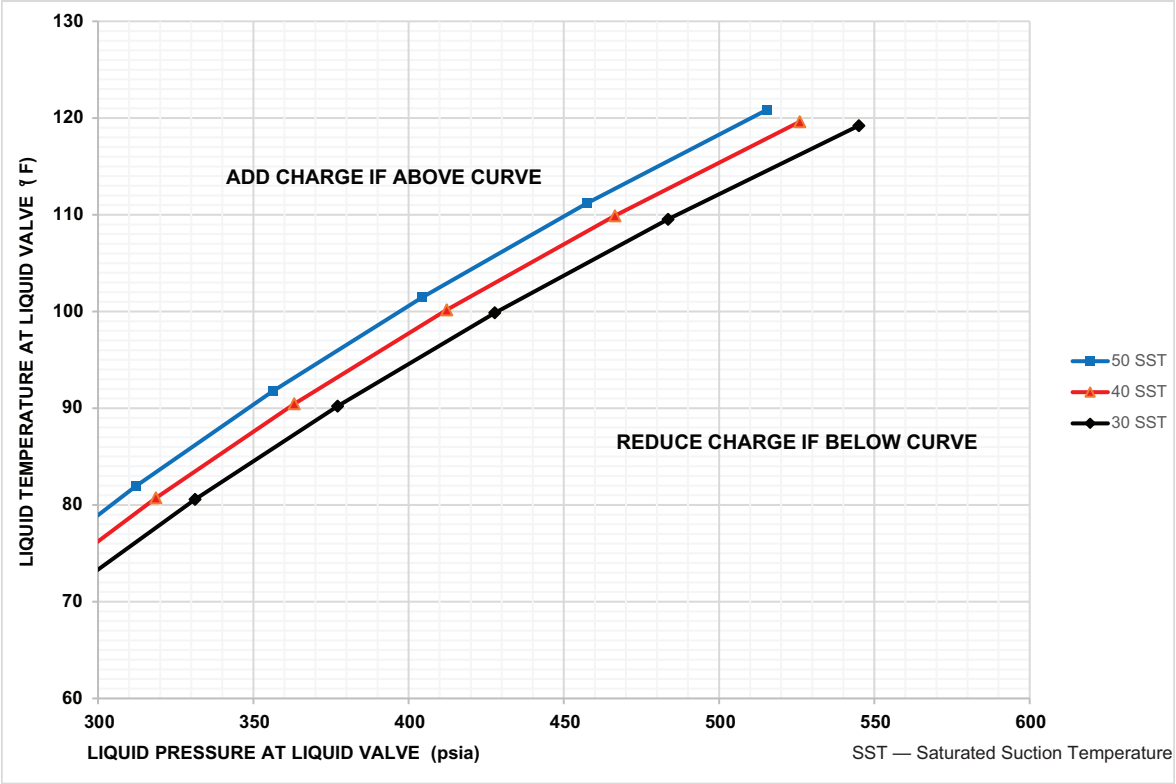
⚠ CAUTION

Never charge liquid into the low pressure side of system. Do not overcharge. During charging or removal of refrigerant, be sure indoor fan system is operating. Failure to comply could result in personal injury or equipment damage.

⚠ CAUTION

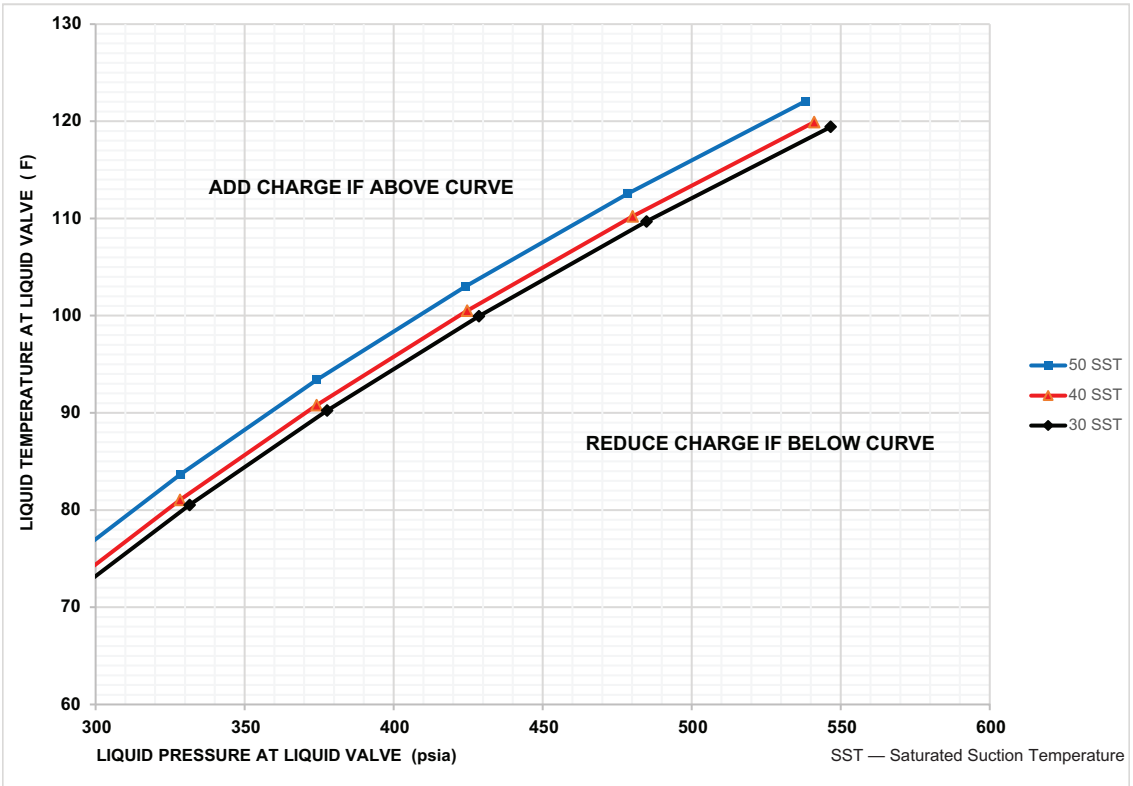
Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete. Ensure that all fans are on and all compressors are running when using charging charts (Fig. 57-79). Failure to comply may result in equipment damage.

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 the "Maximum A1 Unload Time (***Main Menu→Configuration Menu→Unit Configuration***)" from 8 or 10 to 0. Be sure to reenable the digital operation after charging operation is complete.



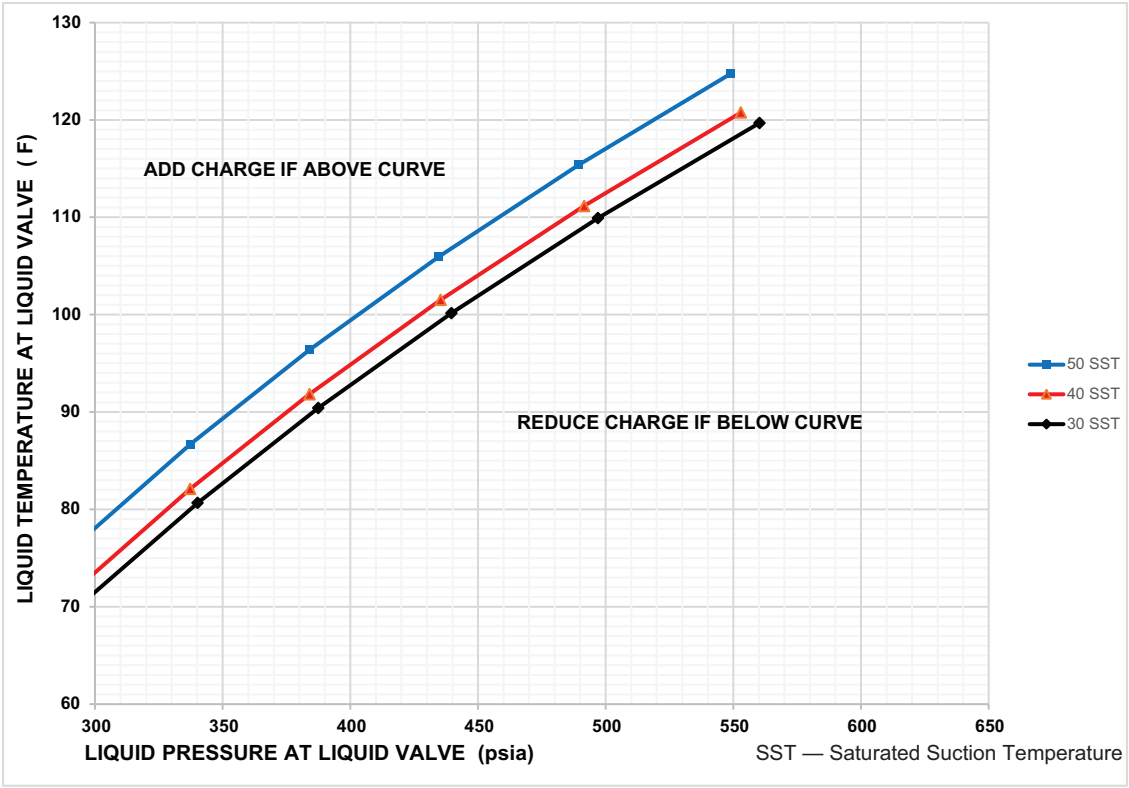
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 57 — Charging Chart — 38RCD025 — Circuit A and B, 50/60 Hz



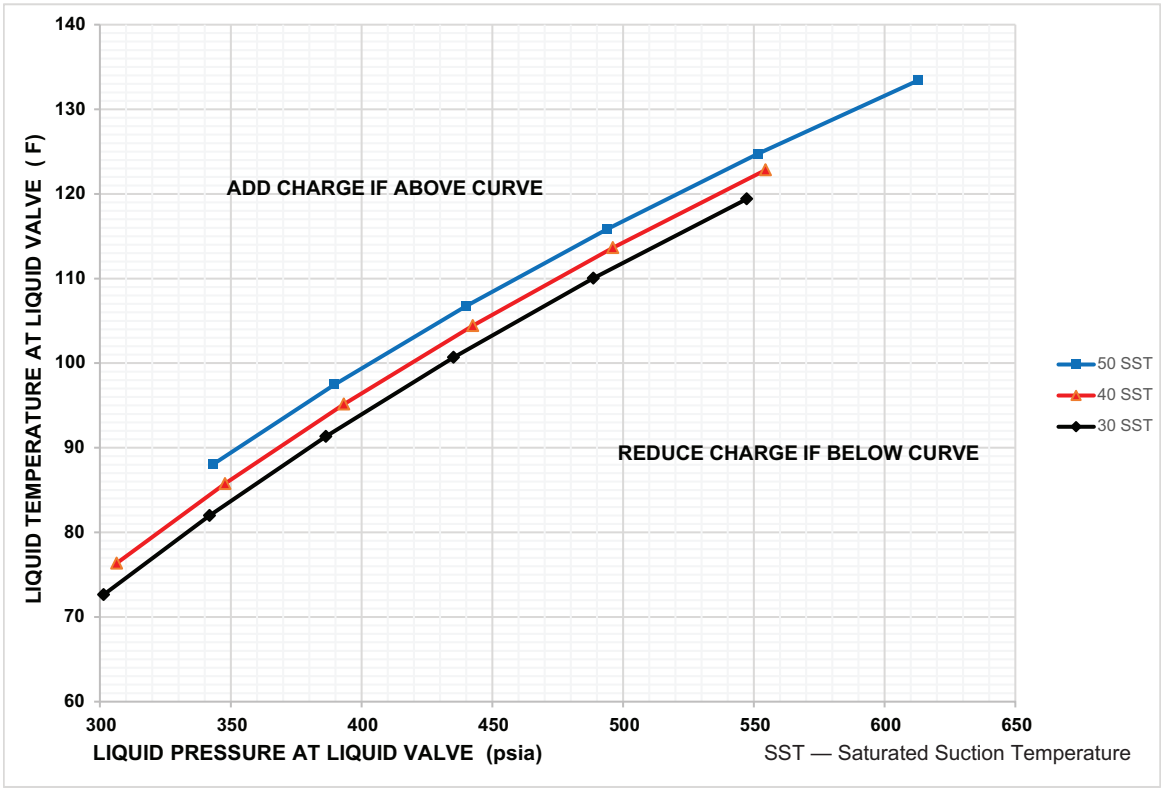
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 58 — Charging Chart — 38RCD027 — Circuit A and B, 50/60 Hz



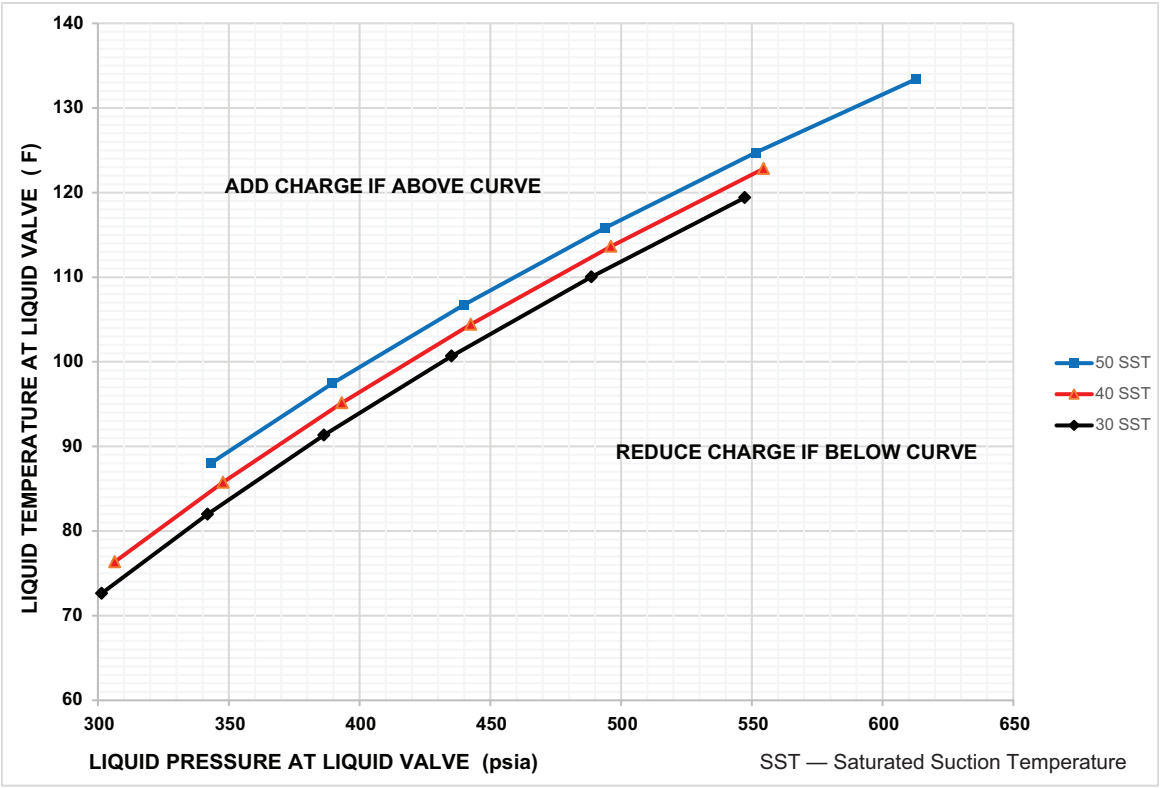
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 59 — Charging Chart — 38RCD030 — Circuit A and B, 50/60 Hz



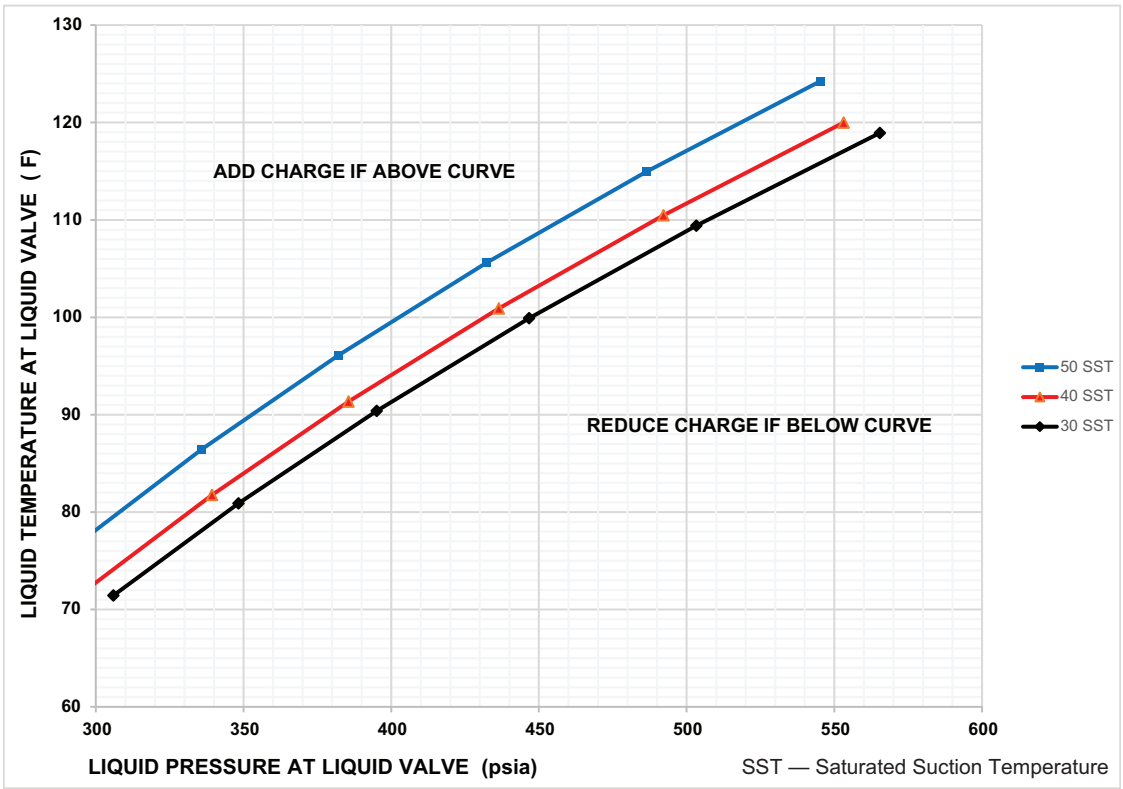
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 60 — Charging Chart — 38RC040 — Circuit A, 50/60 Hz



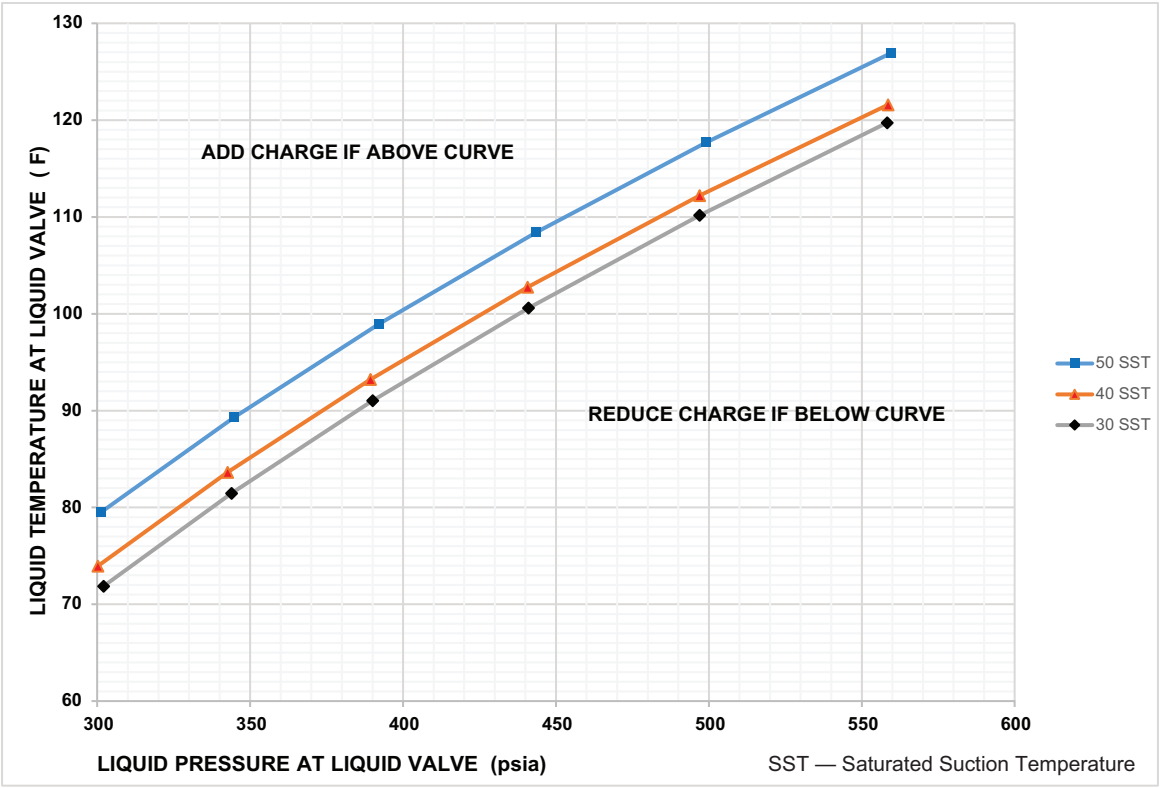
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 61 — Charging Chart — 38RCD040 — Circuit B, 50/60 Hz



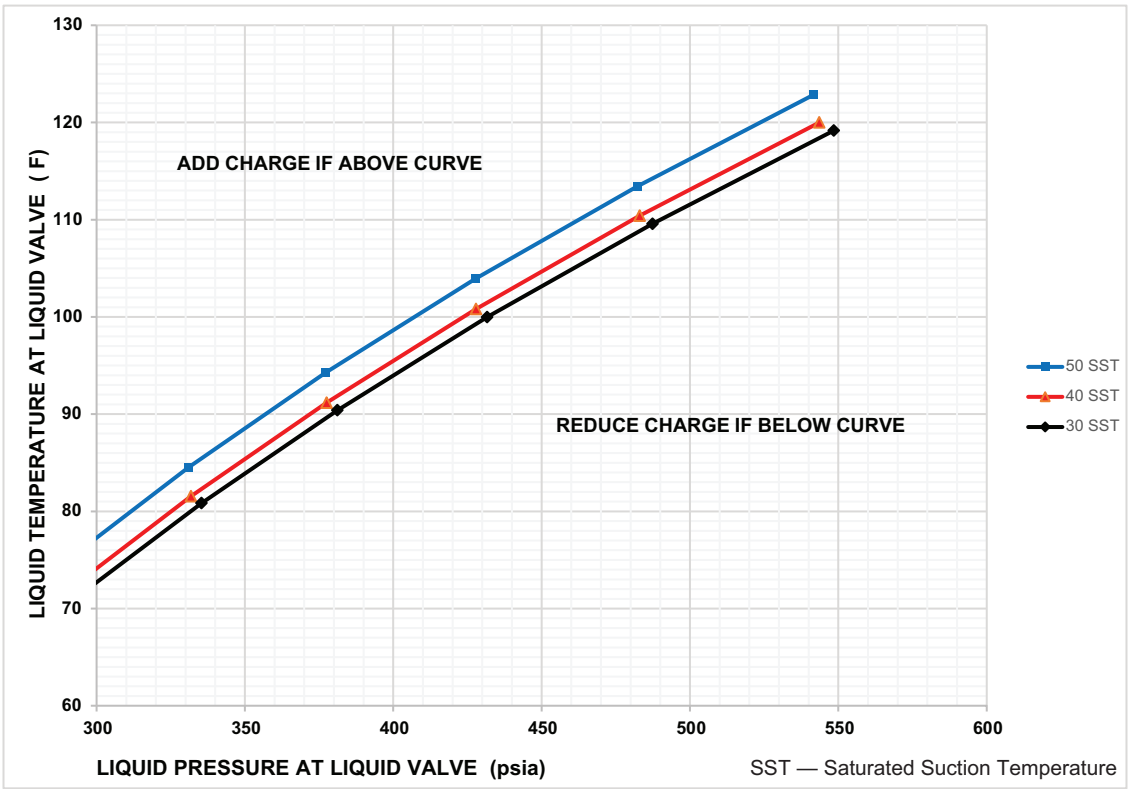
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 62 — Charging Chart — 38RCD050 — Circuit A, 50/60 Hz



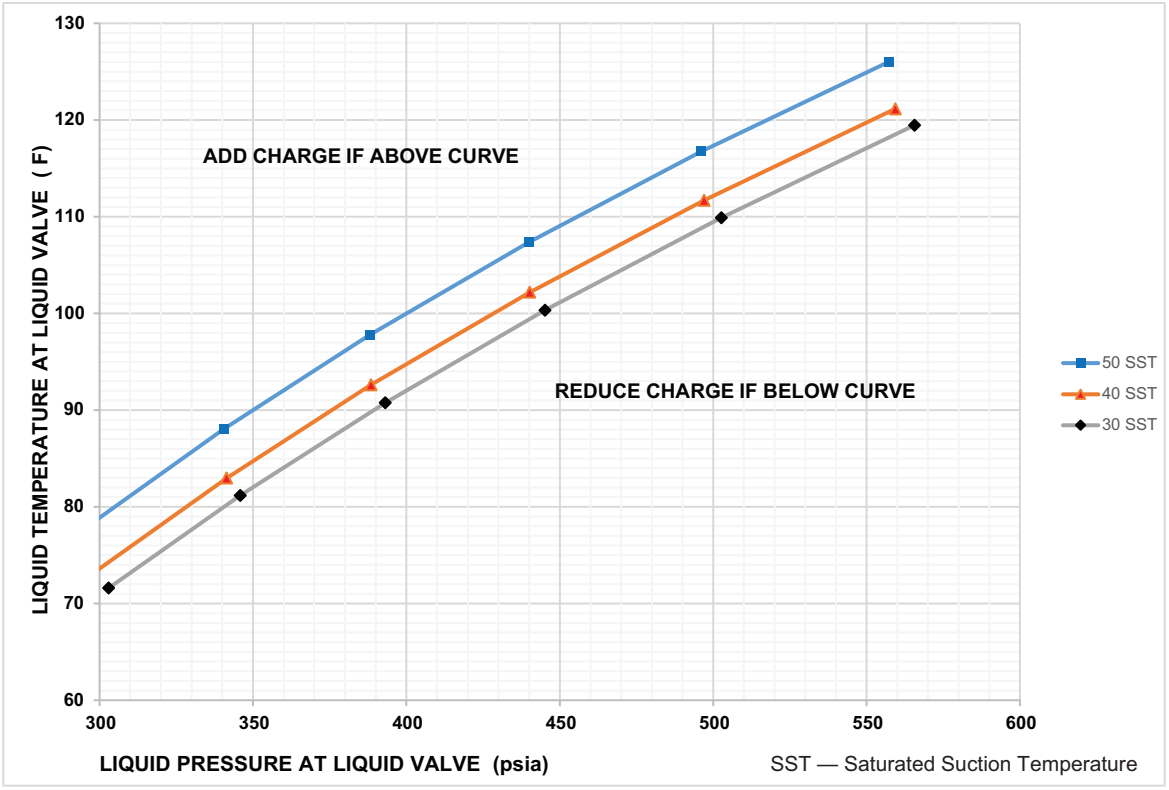
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 63 — Charging Chart — 38RCD050 — Circuit B, 50/60 Hz



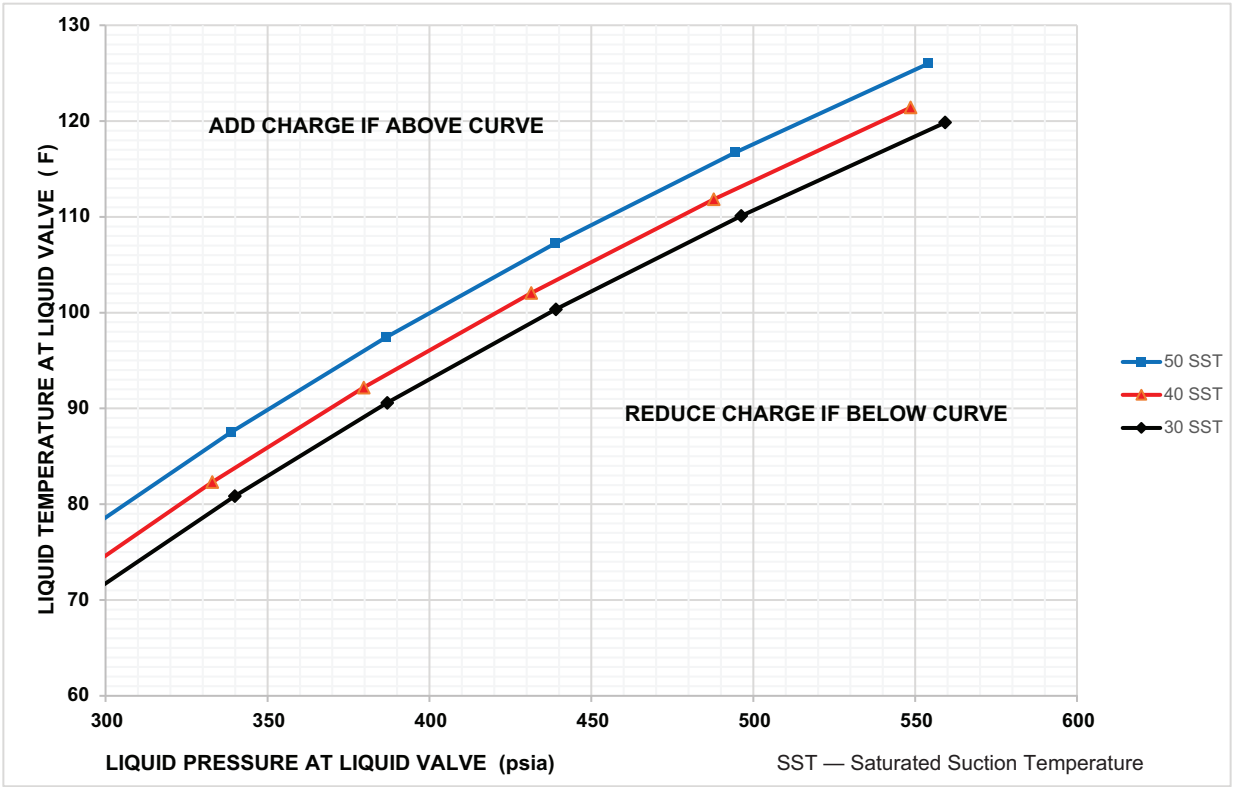
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 64 — Charging Chart — 38RCD060 — Circuit A, 50/60 Hz



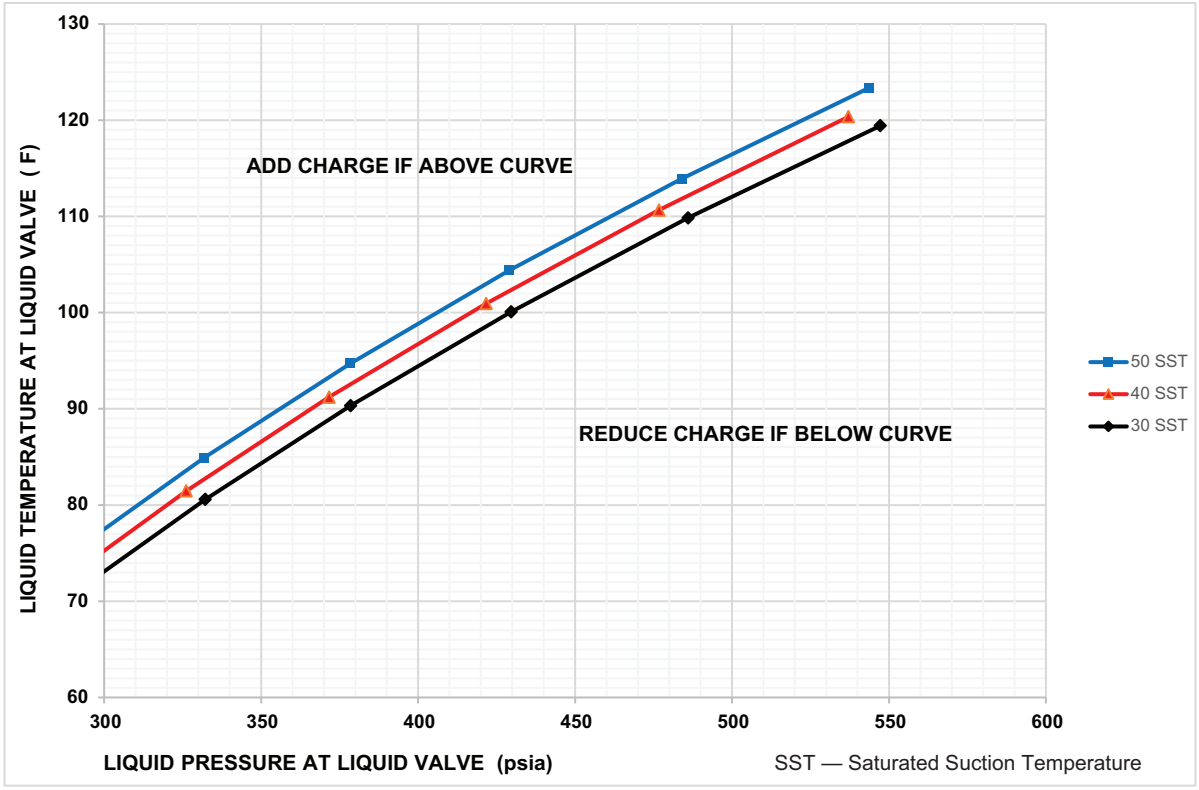
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 65 — Charging Chart — 38RCD060 — Circuit B, 50/60 Hz



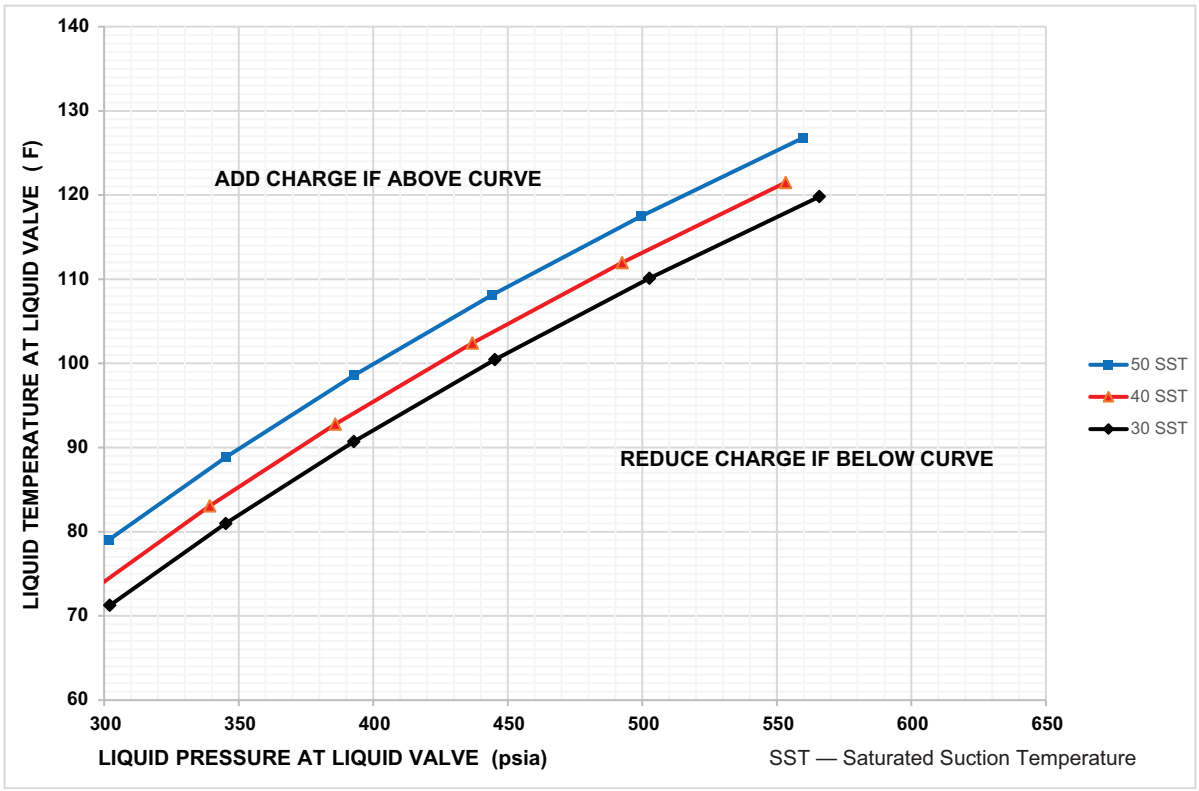
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 66 — Charging Chart — 38RCS025 — 50/60 Hz



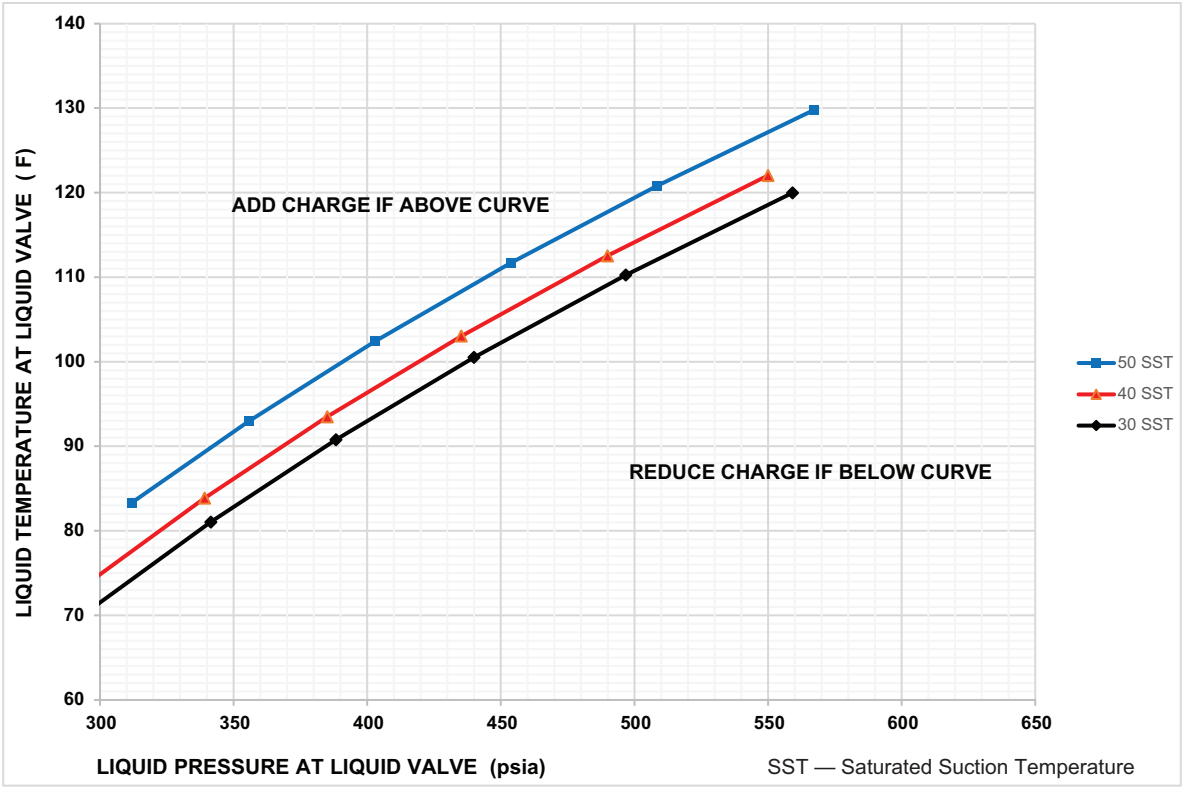
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 67 — Charging Chart — 38RCS027 — 50/60 Hz



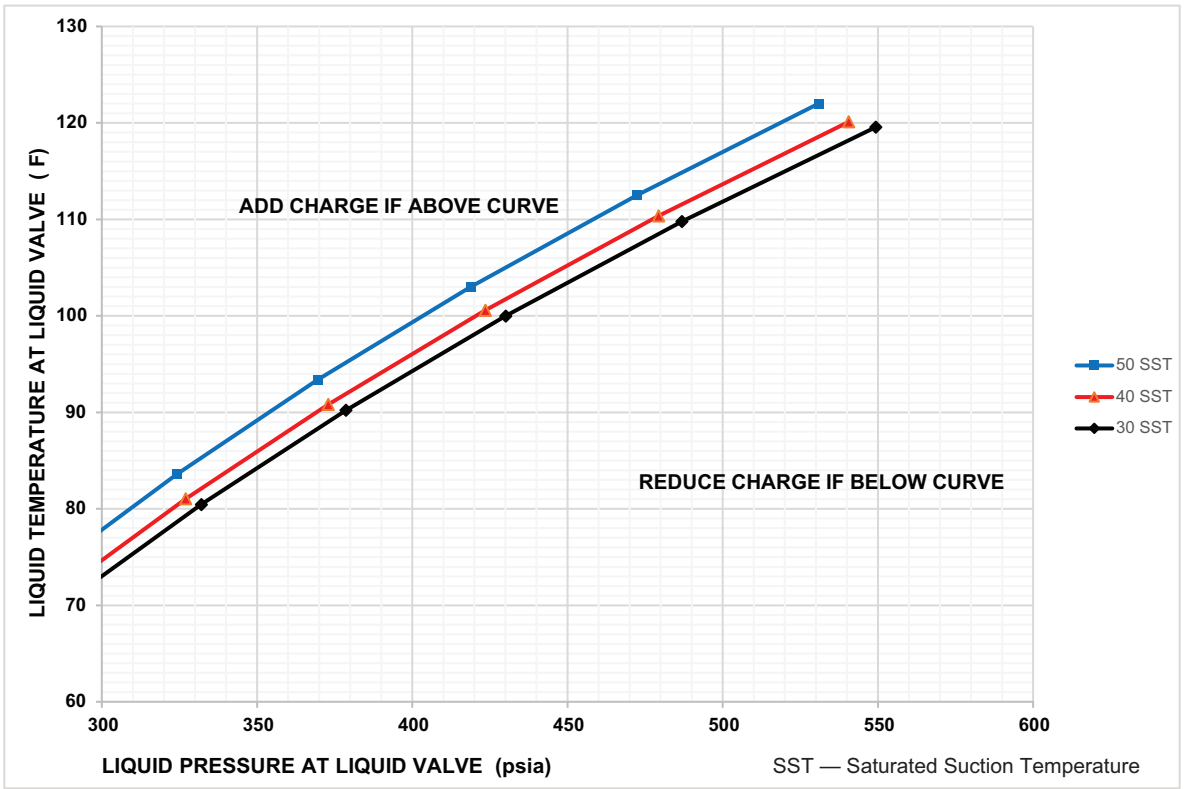
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 68 — Charging Chart — 38RCS030 — 50/60 Hz



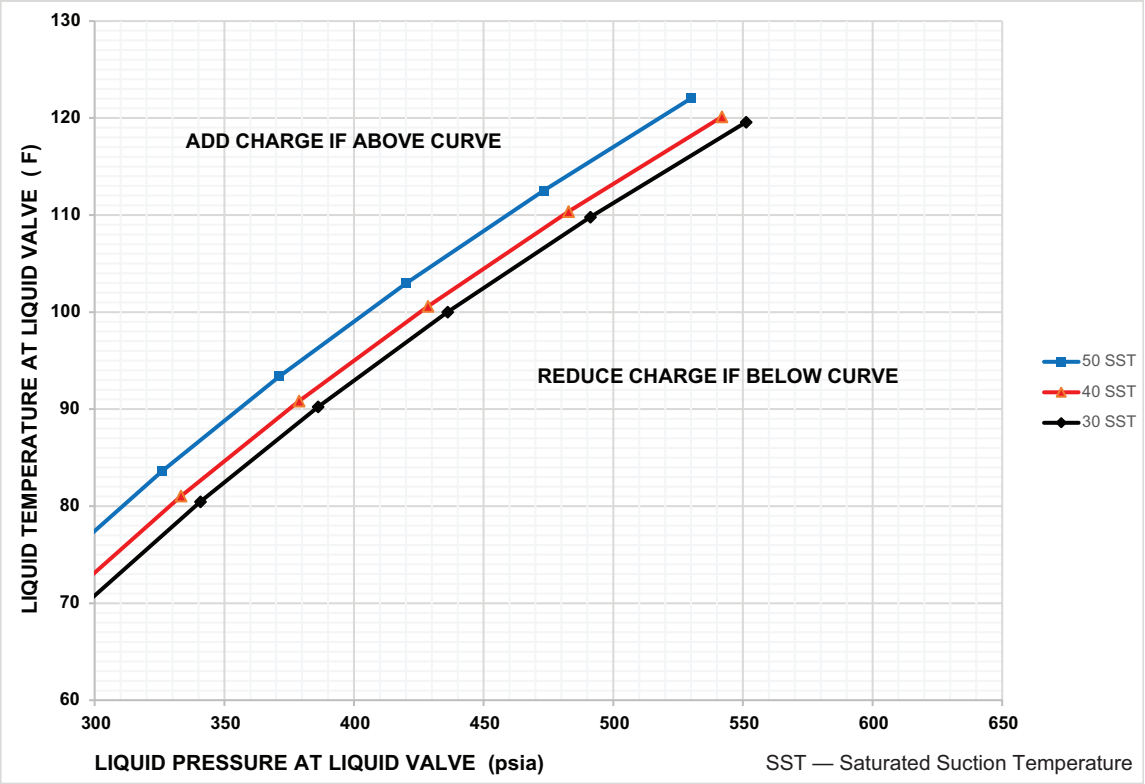
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 69 — Charging Chart — 38RCS040 — 50/60 Hz



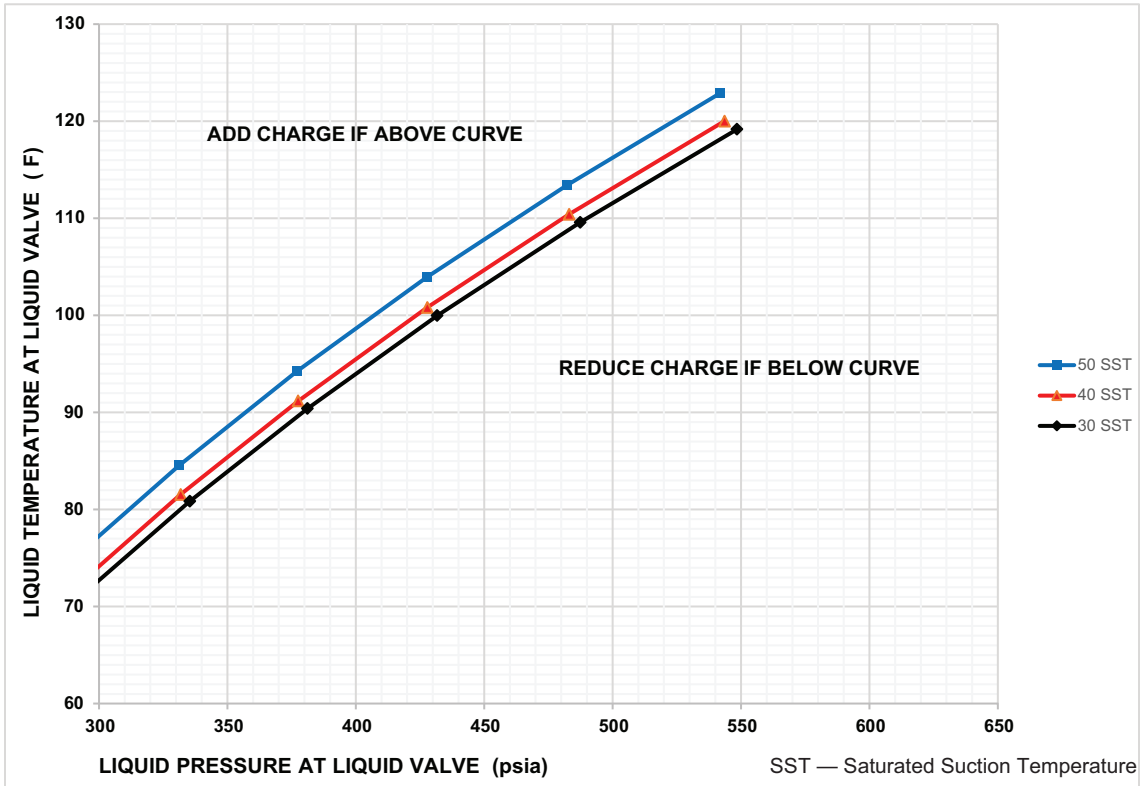
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 70 — Charging Chart — 38RCS050 — 50/60 Hz



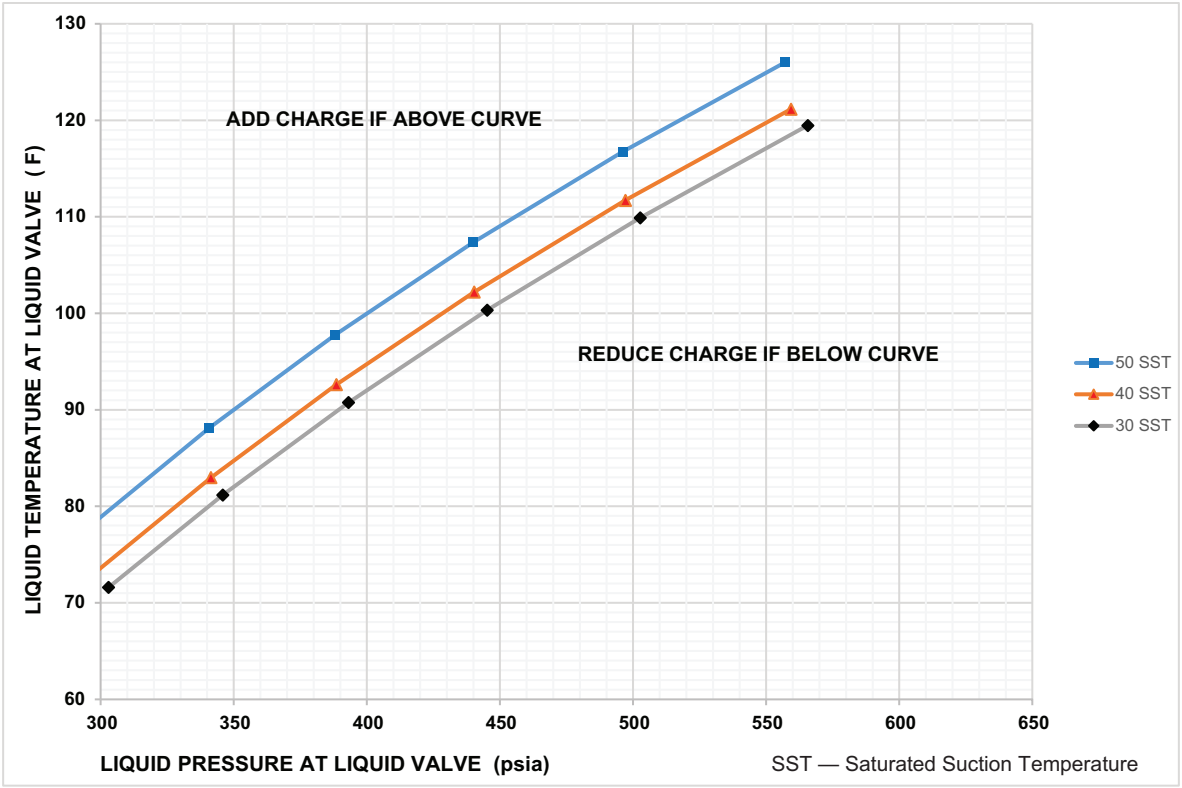
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 71 — Charging Chart — 38RCD070 — Circuit A and B, 50/60 Hz



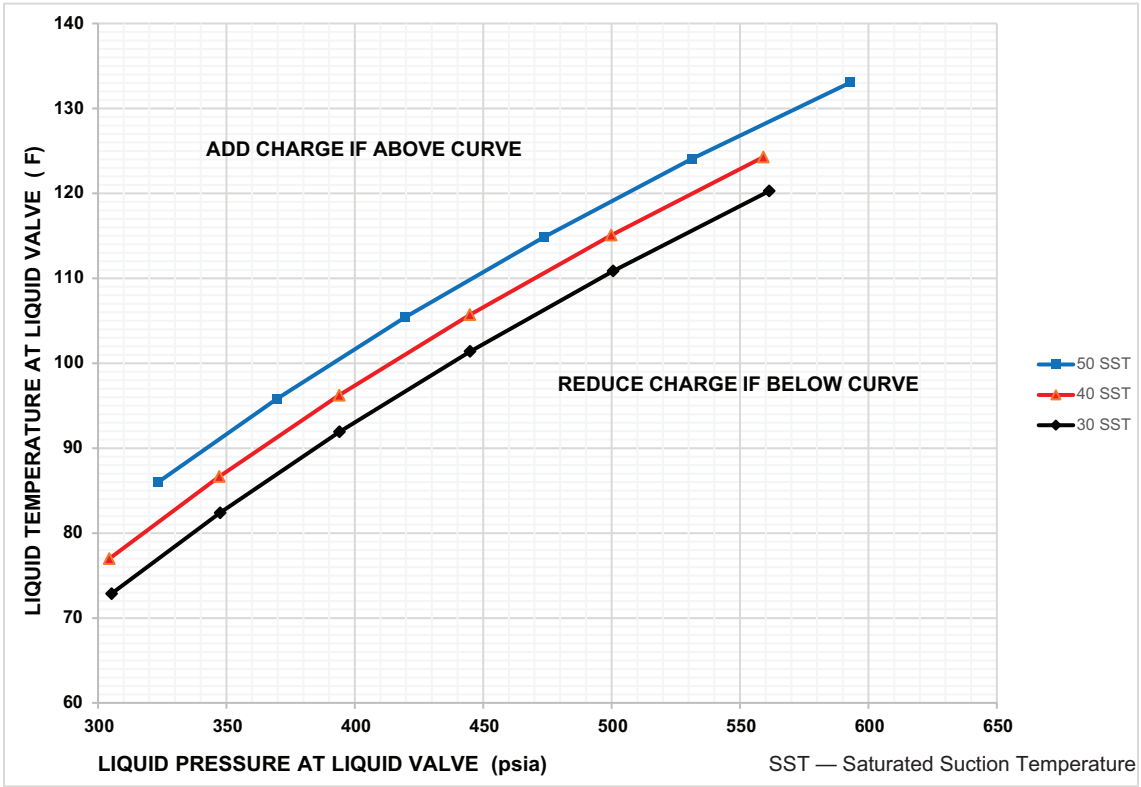
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 72 — Charging Chart — 38RCD080 — Circuit A, 50/60 Hz



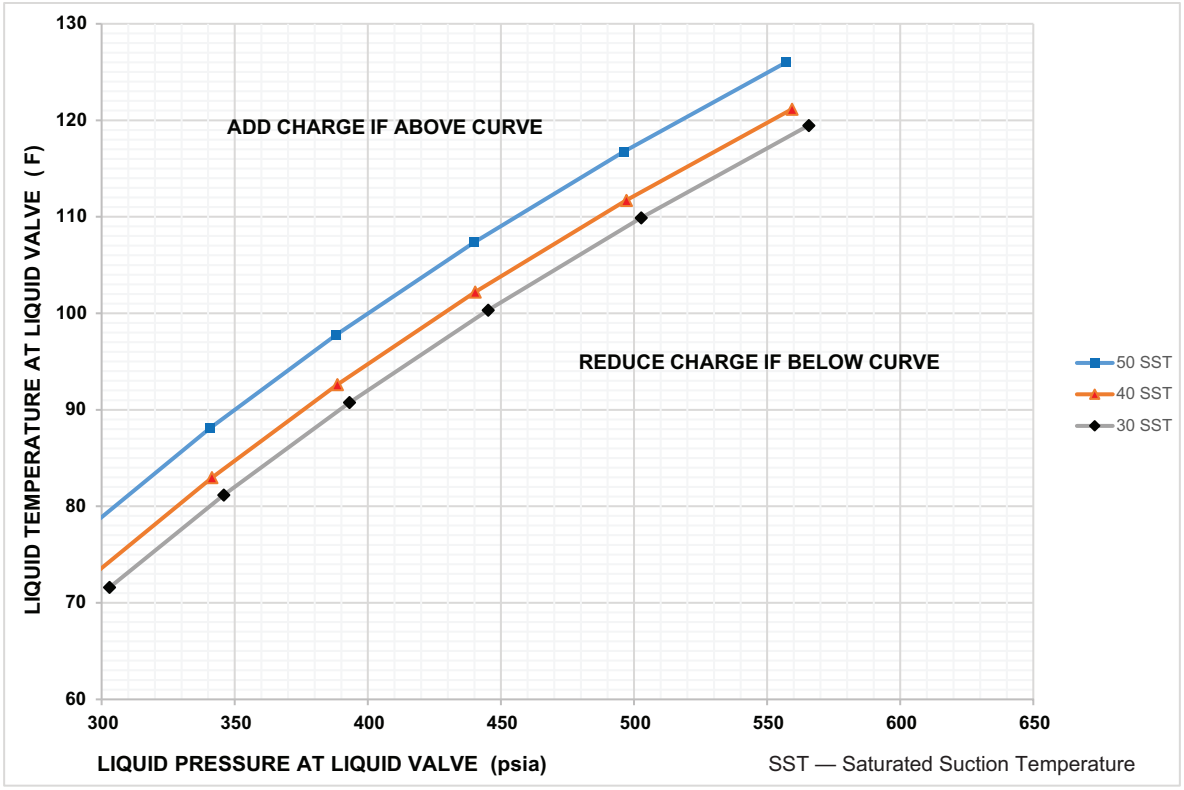
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 73 — Charging Chart — 38RCD080 — Circuit B, 50/60 Hz



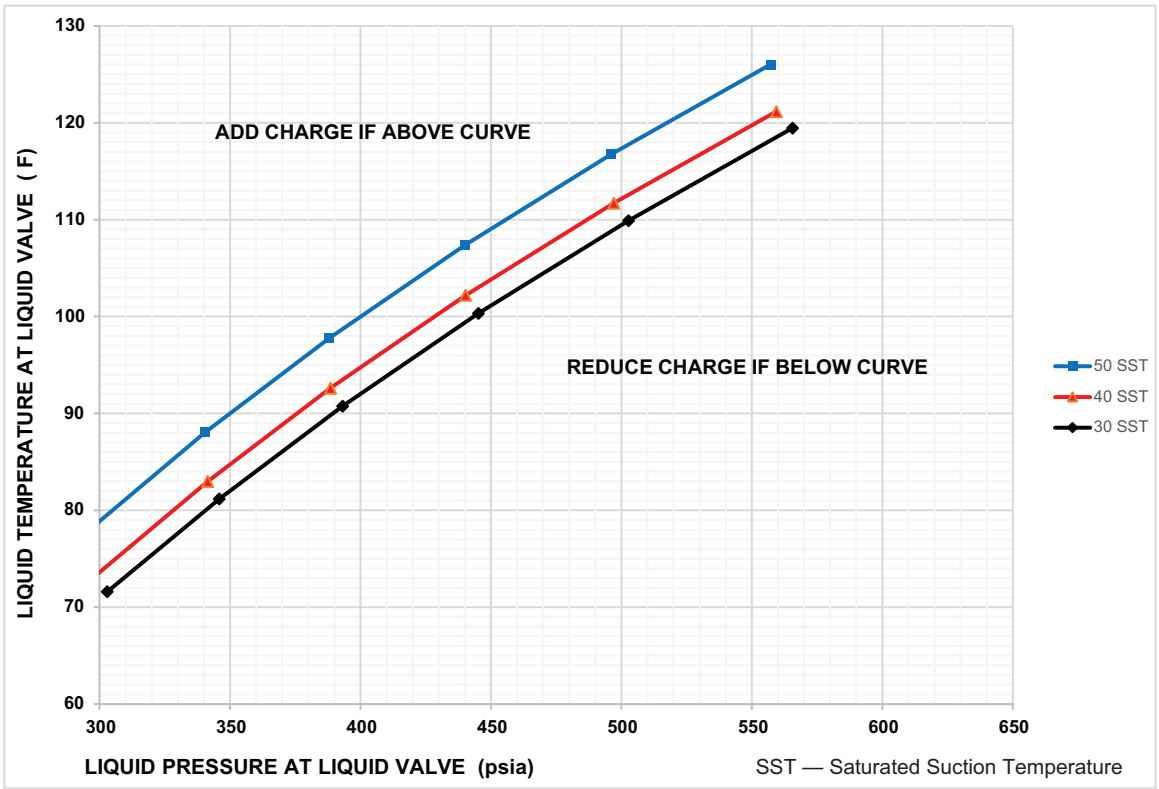
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 74 — Charging Chart — 38RCD090 — Circuit A, 50/60 Hz



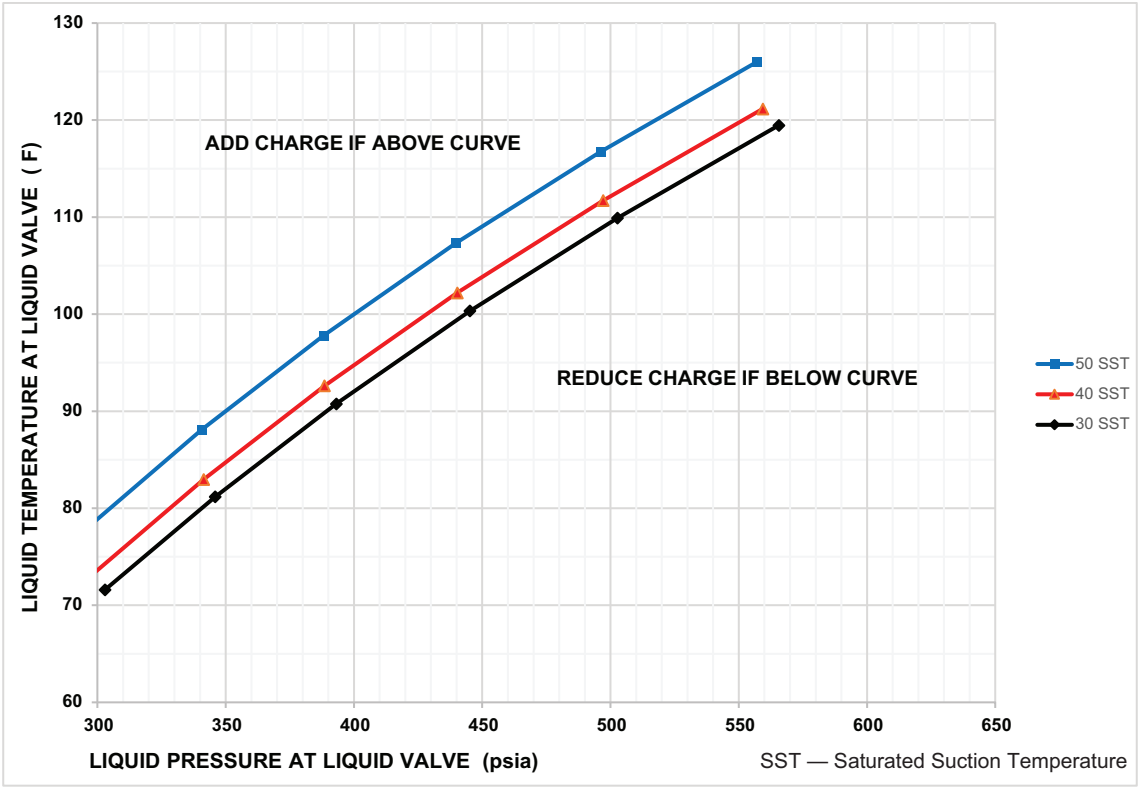
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 75 — Charging Chart — 38RCD090 — Circuit B, 50/60 Hz



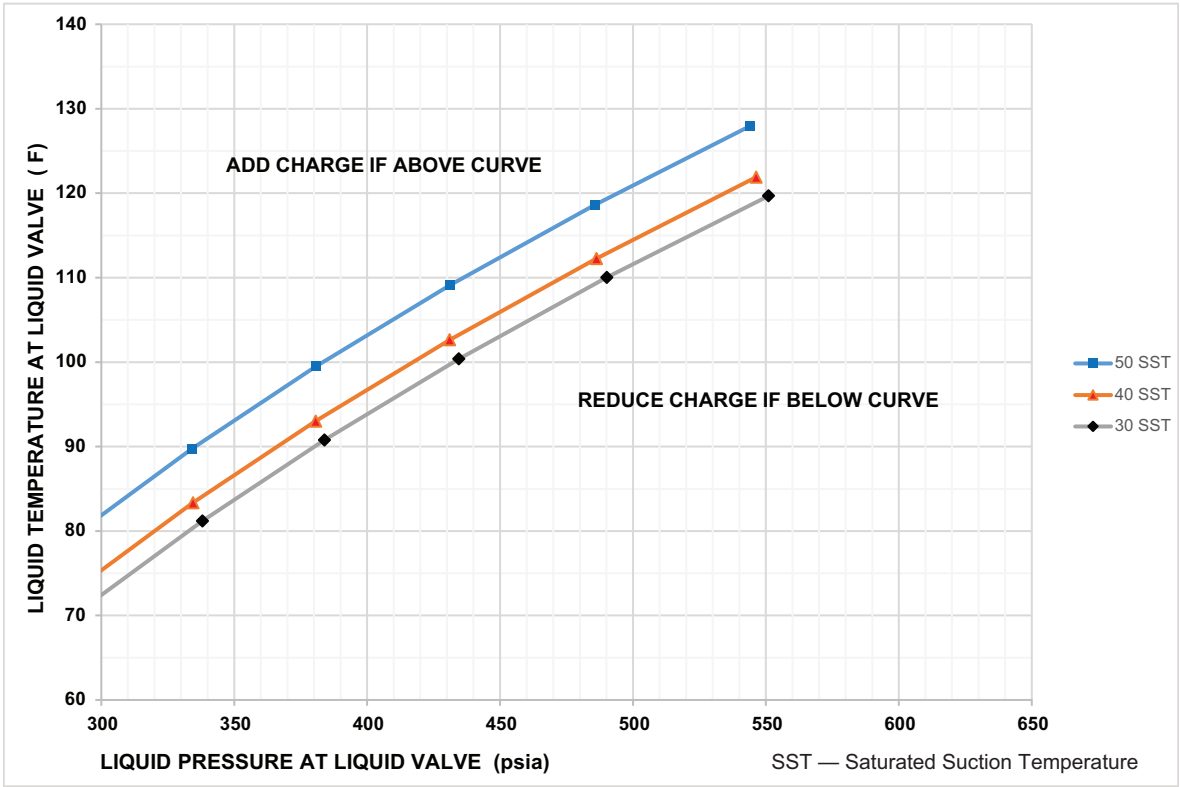
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 76 — Charging Chart — 38RCD100 — Circuit A and B, 50/60 Hz



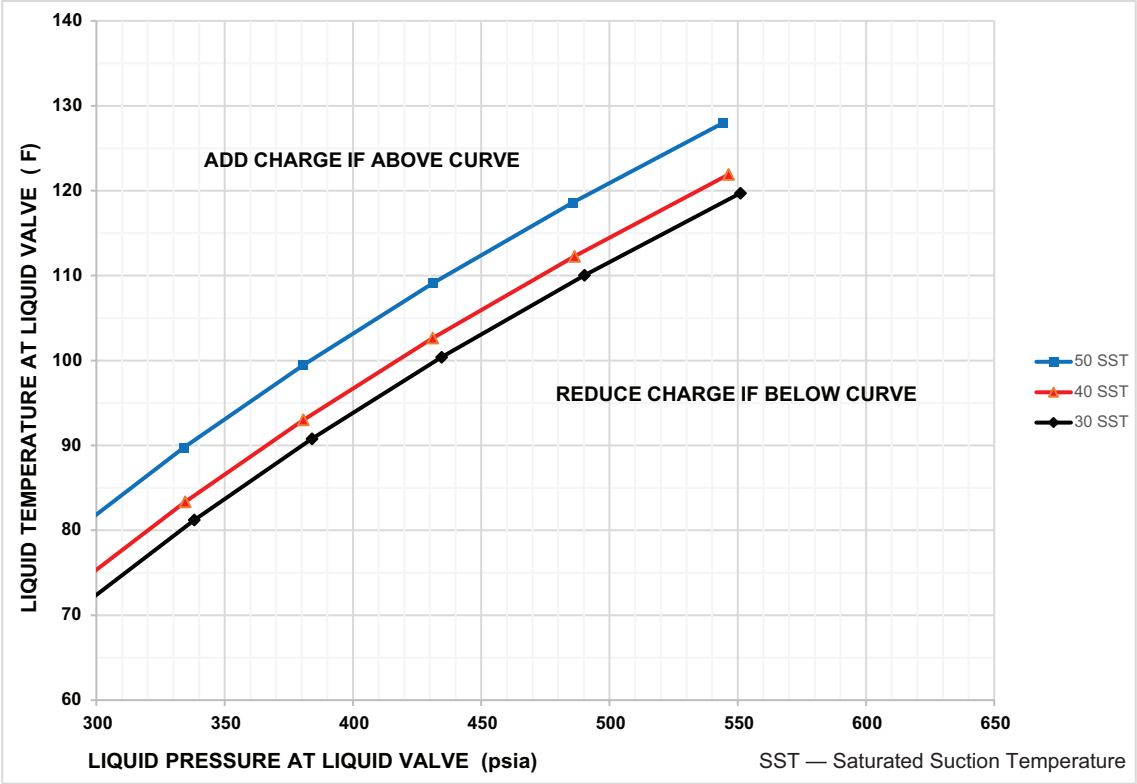
NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 77 — Charging Chart — 38RCD110 — Circuit A, 50/60 Hz



NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 78 — Charging Chart — 38RCD110 — Circuit B, 50/60 Hz



NOTE: For MCHX and RTPF Coil units, ensure that all fans are on and all compressors are running when using charging charts. Charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete.

Fig. 79 — Charging Chart — 38RCD130 — Circuit A and B, 50/60 Hz

Due to the compact design of micro-channel heat exchangers, refrigerant charge is reduced significantly. As a result, charging procedures for MCHX units require very accurate measurement techniques. Charge should be added in small increments. Using cooling charging charts provided, add or remove refrigerant until conditions of the chart are met. As conditions get close to the point on the chart, add or remove charge in 1/4 lb (0.11 kg) increments until complete. Ensure that all fans are on and all compressors are running when using charging charts. If the unit is equipped with a digital compressor, disable the digital operation while charging the machine to maintain stable operation. To disable the digital compressor operation, set ***Main Menu → Configuration Menu → Unit Configuration → Compressor A1 Digital*** to **NO**. Be sure to re-enable the digital operation after charging operation is complete. If charging at low outdoor ambient, the condenser coil can be partially blocked in order to increase head pressure.

NOTE: Do not use recycled refrigerant as it may contain contaminants.

With all fans operating and all compressors on the circuit being serviced operating at full capacity, adjust the refrigerant charge in accordance with the unit charging charts in Fig. 57-70. It is recommended that the full load superheat be between 15 and 20°F (8.3 and 11.1°C), measured entering the compressors downstream of the accumulator. To use the Charging Chart, measure refrigerant pressure at the liquid line service valve, making sure a Schrader depressor is used. Also, measure liquid line temperature as close to the liquid service valve as possible. Compare the readings to those measured with the curve for the appropriate Saturated Suction Temperature, available on the Carrier controller ***Main Menu → Inputs → Temperatures → Refrigerant Temps/Circuit A or B Suction Temp***. Add or remove charge until the pressure and temperature conditions of the charging chart curve are met. If liquid pressure and temperature point fall above curve, add charge. If liquid pressure and temperature point fall below curve, reduce the charge until the conditions match the curve.

NOTE: Indoor-air cfm must be within normal operating range of unit.

Trim refrigerant charge into compressor low-side service port located on the suction service valve using the liquid connection of the refrigerant cylinder and a liquid charging adapter to vaporize the refrigerant before it enters the system.

⚠ CAUTION

Never charge liquid into the low pressure side of system. Do not overcharge. During charging or removal of refrigerant, be sure indoor fan system is operating. Failure to comply could result in personal injury or equipment damage.

If the sight glass is cloudy, check refrigerant charge again. See Fig. 81 and Fig. 82 for proper locations of filter driers, solenoid valves, sight glasses and TXVs. Ensure all fans and compressors on the circuit being serviced are operating. Also ensure maximum allowable liquid lift has not been exceeded. If the sight glass is cloudy, a restriction could exist in the liquid line. Check for a plugged filter drier or partially open solenoid valve. Replace or repair, as needed.

After full load charging is complete, check the circuit superheat entering the compressors downstream of the accumulator at part load conditions to ensure that superheat is greater than 5°F (2.8°C). If superheat is less than 5°F (2.8°C), further field action to increase the superheat is required to prevent nuisance alarms and potential compressor failures.

Once charging is complete, if the digital compressor was disabled, reenable the digital operation.

FIELD CHARGE QUANTITY

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 38RC unit. Mark with fine-tip permanent marker. Marker must comply with ASTM D-4236; See Fig. 80 for example of the label. It is recommended to also record this on the interior of the control panel for backup.

IMPORTANT: Mark final refrigerant charge amount on rating plate using a fine-tip permanent marker. Marker shall comply with ASTM D-4236.

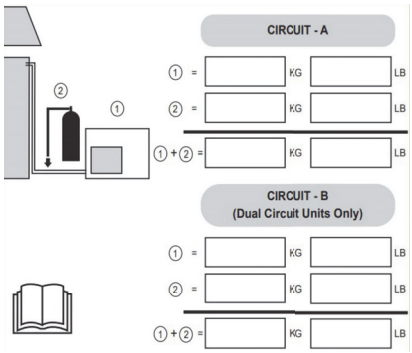


Fig. 80 — Field Charge Quantity Label Example

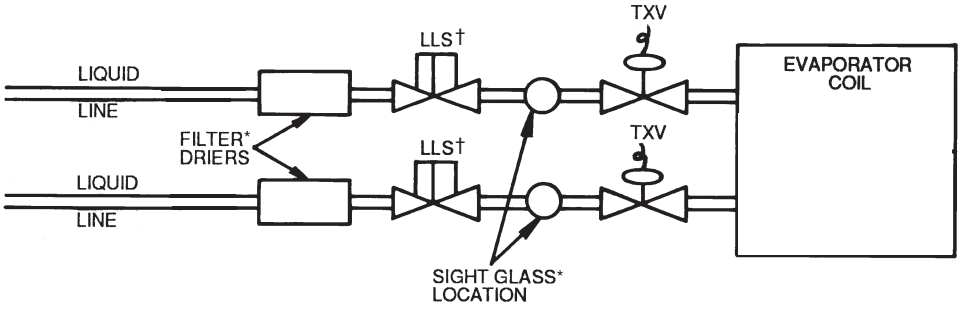
DECOMMISSIONING

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

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

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

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



LEGEND

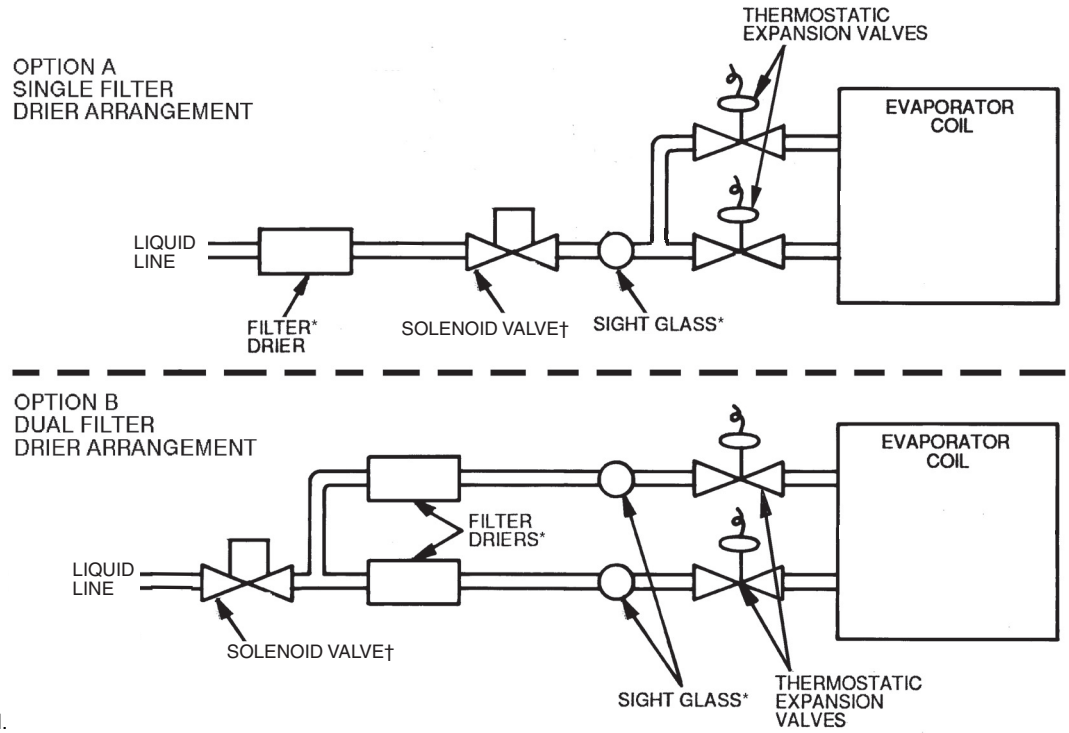
LLS — Liquid Line Solenoid

TXV — Thermostatic Expansion Valve

* Field-supplied.

† Field-supplied when required. Must be controlled by 38RC unit control.

Fig. 81 — Required Location of Solenoid Valves and Recommended Filter Drier and Sight Glass Locations for 38RCD025-130 Dual-Circuit Units



* Field-supplied.

† Field-supplied when required. Must be controlled by 38RC unit control.

Fig. 82 — Required Location of Solenoid Valves and Recommended Filter Drier and Sight Glass Locations for 38RCS025-050 Single-Circuit Units

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 1/8 to 3/8 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 will be required to maintain the oil level in the compressor due to system configuration, piping length, and possible double suction riser traps. Additional lubricant can be estimated by using Tables 34 and 35. See Adding Oil section on page 145 for Carrier-approved oils. After operating the compressor for a period of time, the oil level should be between 1/8 and 3/8 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 34 — 100 ft Refrigerant Line Oil Adder

LIQUID LINE	FLUID OUNCE	SUCTION	FLUID OUNCE
5/8	4.46	5/8	5.71
7/8	9.22	7/8	11.82
1-1/8	12.30	1-1/8	20.14
1-3/8	23.61	1-3/8	30.67
1-5/8	33.41	1-5/8	46.71
2-1/8	58.09	2-1/8	66.09
2-5/8	88.88	2-5/8	111.89
3-1/8	127.10	3-1/8	159.85

Table 35 — 30 m Refrigerant Line Oil Adder

LIQUID LINE	MILLILITERS	SUCTION	MILLILITERS
5/8	130	5/8	169
7/8	268	7/8	349
1-1/8	358	1-1/8	596
1-3/8	687	1-3/8	907
1-5/8	972	1-5/8	1381
2-1/8	1691	2-1/8	1955
2-5/8	2587	2-5/8	3309
3-1/8	3700	3-1/8	4727

Time, Day, and Date

Many features of the 38RC controls require that the time, day and date be properly set. This is especially helpful when troubleshooting alarms, as they are reported with a time and date stamp. The controls also have the ability to automatically adjust for daylight savings time, when configured. The unit time and date is set at the factory based in the Eastern Time Zone.

The time settings are in ***Main Menu → Configuration Menu → Date Time Menu***. See Fig. 83-85. The first setting is the time zone. Selection this icon and pick the correct time zone. If the unit is connected to a network, use the second icon, Network Time Sync, to control the time and date. Add the NTP Server IP on the first line. The second line determines if the time is checked once (1 Shot), on intervals (Recurring), or disabled (Stop). The third icon on the Date Time Menu is for manually setting the time. Set the date and time, then check the boxes below that apply. Select Save to retain these settings.

Tables 36 and 37 list the required configurations for these settings.

TIME/DATE BROADCAST

The 38RC unit controls have the ability to broadcast the time and date on the network. If the CCN Time/Date Broadcast configuration ***Configuration → BCST → T.D.BC=ON,*** the control will send the time and date out onto the CCN bus once a minute. If this device is on a CCN network, it is important to make sure that only one device on the bus has this configuration set to **ON**. If more than one time broadcaster is present, problems with the time will occur. If the unit is installed on a network, another unit must be configured to be Broadcast Acknowledger, ***Configuration → BCST → BC.AK***. Only one unit can be the Broadcast Acknowledger. See Table 38 for required configurations.

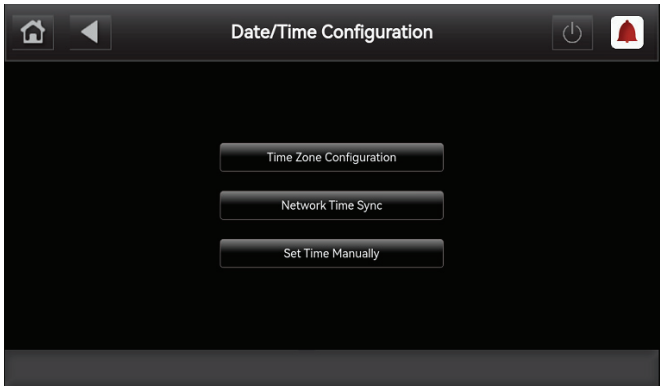


Fig. 83 — Date/Time Configuration

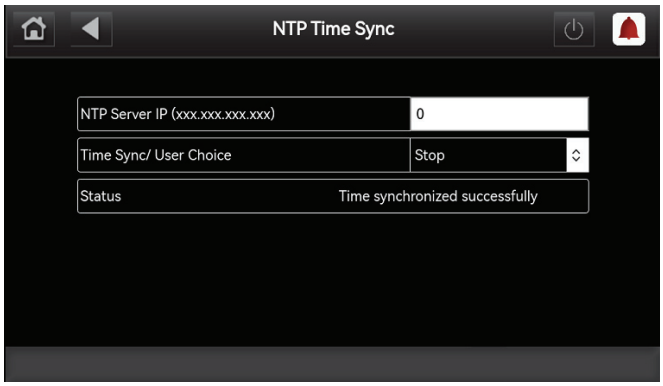


Fig. 84 — NTP Time Sync

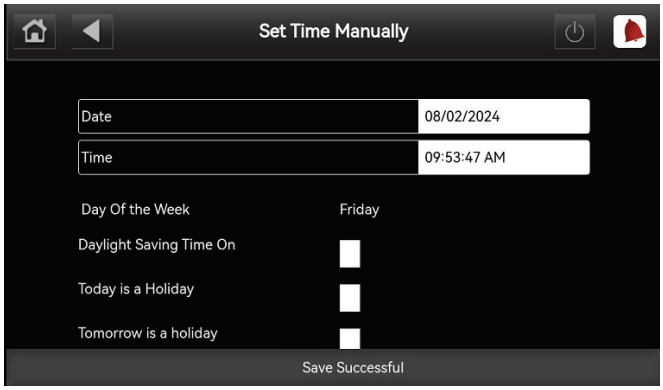


Fig. 85 — Set Time Manually

Table 36 — Time Required Configuration

TIME CLOCK MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
TIME	HH.MM	XX.XX	Hour and Minute	24-hour format Range: 00.00 to 23.59

Table 37 — Day and Date Required Configurations

TIME CLOCK MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
DATE	MNTH	XX	Month of Year	Range: 1-12 (1=January, 2=February, etc.)
	DOM	XX	Day of Month	Range: 1-31
	DAY	X	Day of Week	Range: 1-7 (1=Monday, 2=Tuesday, etc.)
	YEAR	XXXX	Year of Century	

Table 38 — Broadcast Required Configurations

CONFIGURATION MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
BCST	CCNBC	ON/OFF	CCN Time/ Date Broadcast	Default: Off Must be set to ON to enable automatic Daylight Savings Time correction.[a]
	CCNBCACK	ON/OFF	CCN Broadcast Ack'er	Default: Off One unit on the network must be set to ON. The broadcast unit cannot be the acknowledger.

NOTE(S):

a. Only the time and date broadcaster can perform daylight savings time adjustments. Even if the unit is stand-alone, the user may want to set this to ON to accomplish the daylight savings function.

Timed Override

There are several ways to override the occupancy schedule to keep the unit in an occupied period. Schedule overrides can be initiated at the unit's interface with the Carrier Controller, from a space temperature sensor equipped with a timed override button (see unit Installation Instructions for selection and wiring information), or through CCN communications. Initiation of an override period can only be accomplished if the unit is in an unoccupied period. If Timed Override is in effect, ***Main Menu → Status Menu → General Unit Parameters → Override Modes in Effect***, Timed Override in Effect will be active. Override expires after each initiation.

Timed Override from Carrier Controller

A timed override period can be initiated with the unit's interface device. To initiate an override period from the unit's interface device, the number of hours requested must be set in ***Main Menu → Configuration Menu → Schedule → Local Schedule/Timed Override Extension***. See Table 39.

Once a non-zero value has been entered, the unit will resume an occupied period for the duration of the time programmed. The number of hours in the override time period will be displayed and will count down as the time period progresses. This value cannot be changed until the override period has expired or is canceled. The override time period can be canceled by changing the Timed Override Extension value to 0. This can be done at the unit's interface device or through CCN communications by writing to the point OVR_EXT.

Table 39 — Timed Override Required Configuration

TIME CLOCK MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
OVR	OVR.T	X	Timed Override Hours	Default: 0 Range: 0 to 4

Timed Override from Space Temperature Sensor with Override Button

A timed override period can be initiated using a space temperature sensor with an override button from the space.

NOTE: This feature requires a single space temperature sensor connected to the unit. It does not function when used with averaging space temperature sensor arrays.

To configure this feature, ***Main Menu → Configuration Menu → Schedule → Local Schedule → Timed Override Extension*** (Override Time Limit) must be set to a non-zero value. This determines the maximum number of hours the override period can extend an occupied period when the override button is pushed. This item has a range of 0 to 4 hours and should be set to the limit desired for the override period. See Table 40.

Pressing the override button on the Space Temperature Sensor will initiate an override period. The override button must be pressed for 5 to 10 seconds for the control to acknowledge the call. The control will ignore a momentary press of the override button. However, if the override button is held for longer than 4 seconds, a Space Temperature Thermistor Failure alarm will be generated. The number of hours in the override time period will be displayed and will count down as the time period progresses. See Table 39.

Table 40 — Space Temperature Override Required Configuration

TIME CLOCK MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
OVR	OVR.L	X	Override Time Limit	Default: 0 Range: 0 to 4

Timed Override from CCN

A timed override period can be initiated through CCN communications by writing to the point OVR_EXT. This point has a range of 0 to 4 hours and should be set for the desired amount of time.

The number of hours in the override time period will be displayed in ***Time Clock → OVR → OVR.T*** (Timed Override Hours) and will count down as the time period progresses. See Table 39.

Once a non-zero value has been entered, the unit will resume an occupied period for the duration of the time programmed. The number of hours in the override time period will be displayed in ***OVR.T*** and will count down as the time period progresses. This value cannot be changed until the override period has expired or is canceled. The override time period can be canceled by changing the ***OVR.T*** value to **0**. This can be done at the unit's interface device or through CCN communications by writing to the point OVR_EXT.

Capacity Control

When mechanical cooling is required, the Carrier controller can control the unit capacity by staging compressors and controlling the digital scroll compressor operation. The control also checks on various other operation parameters in the unit to make sure that safeties are not exceeded and the compressors are reliably operated.

The Carrier controller control system offers two basic control approaches to mechanical cooling: constant volume operation for 2 stages of cooling, or variable air volume (VAV) operation for multiple stages of cooling. In addition to these methods of control, the Carrier controller offers the ability to run multiple stages of cooling from a space temperature sensor, thermostat, return air temperature, or directly from a 4 to 20 mA signal. The Control Type (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) determines the selection of the type of cooling control as well as the method for selecting a cooling capacity input.

C.TYP **= 1** (VAV)

This configuration is the standard VAV operation. With this control type, the Carrier Controller capacity control routine stages compressor capacity to attempt to meet the current Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***).

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage.

If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

Recommended Applications

This control scheme is recommended for VAV applications with a single 38RC unit matched with a single air handler. It can be used for 38RC units with or without digital compressors; however, better temperature control will be achieved with the digital compressor option. Hot gas bypass, HGBP, is supported by this control scheme. HGBP and digital compressor operation are not supported simultaneously.

Hardware Requirements

- supply air sensor
- return air sensor or mixed air sensor

In lieu of wiring sensors to the 38RC unit, both values can be communicated via CCN to the 38RC. For information on broadcasting values, see the Thermistors section on page 39. The Return Air Thermistor (***Main Menu → Configuration Menu → Options 1 Configuration → RAT Thermistor Type***) and Supply Air Thermistor (***Main Menu → Configuration Menu → Options 1 Configuration → SAT Thermistor Type***) must be configured for the same type, either 5k or 10k type sensors, whether they are hard-wired or their values are communicated to the controller.

Required Configurations

Table 41 shows configurations required for proper operation.

Recommended Settings

CSP.1 should be set to the design supply air temperature (SAT).

Wiring

See Fig. 86.

Sequence of Operation

The Carrier Controller uses Cooling Setpoint 1 (***Main Menu → Set Points → Cooling setpoint 1***) as the basis for the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***). The Control Point (***Main Menu → Status Tables → Control Point***) is the Active Set Point (***SP***) or Cooling Set Point 1 (***CSP.1***) adjusted for any temperature reset that is applied. See Temperature Reset on page 130 for additional information.

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or when changing from Local Off to Local On, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid Line Solenoid Valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

Table 41 — C.TYP=1 (VAV) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 1 (VAV)
SETPOINTS MODE				
COOL	CSP1	XX.X	Cooling Setpoint 1	Range: 40.0 to 80.0 °F (4.4 to 26.7 °C) Default: 60.0 °F (15.6 °C)

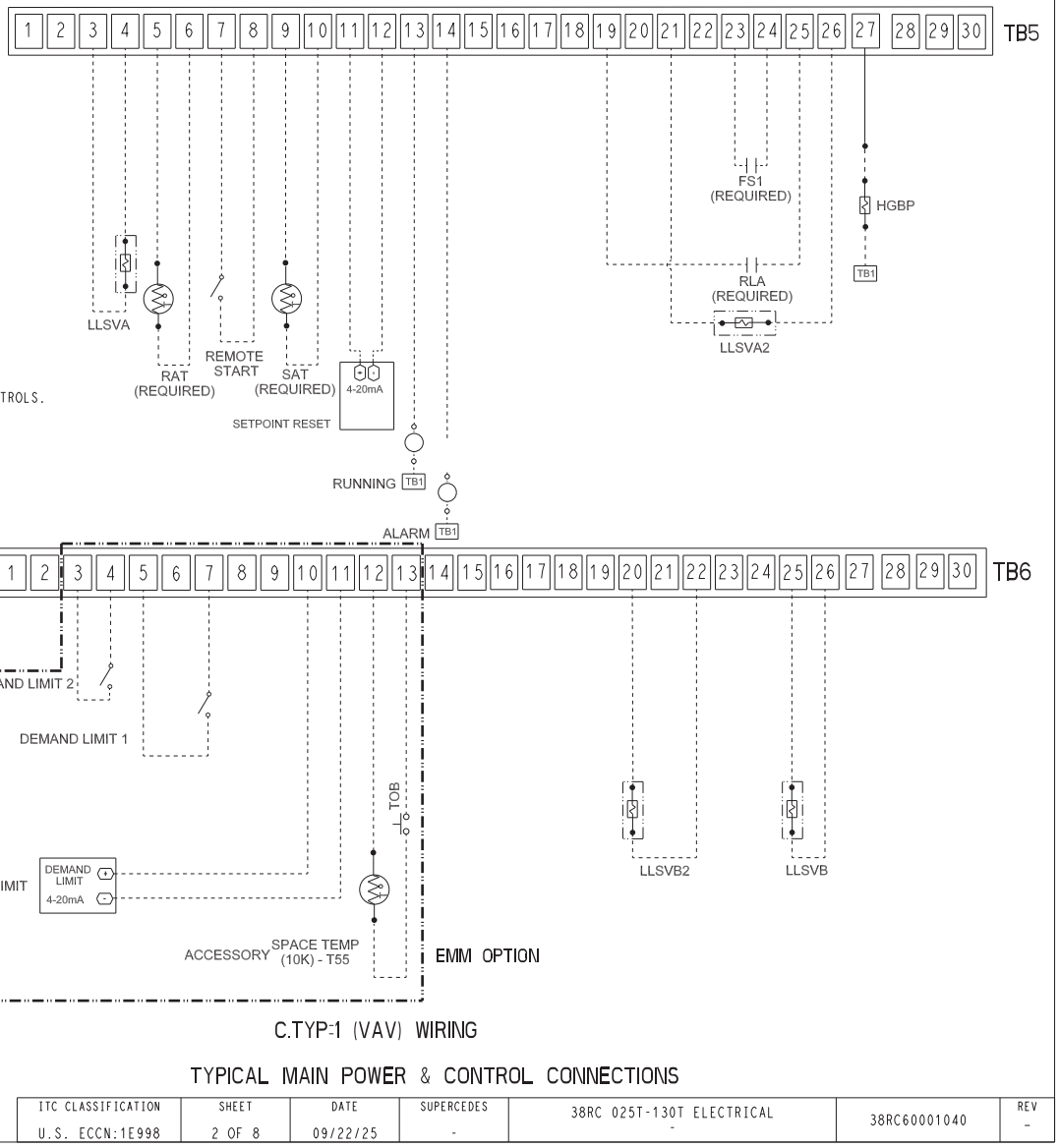
LEGEND

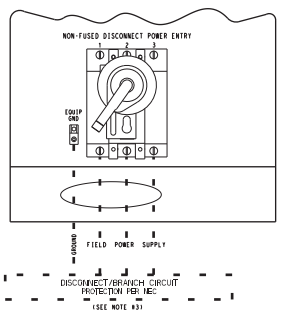
RAT — Return Air Thermistor
SAT — Supply Air Thermistor
VAV — Variable Air Volume

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 75°C. USE COPPER CONDUCTORS ONLY.

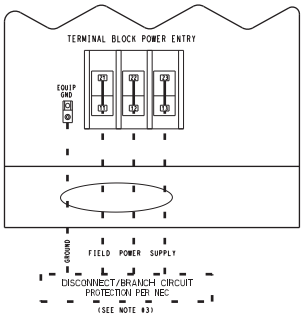
CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	MCA UP TO 175	14 AWG TO 2/0 AWG	1	J, T, RK1, RK5, G, CC
		MCA 175.1 TO 420	2 AWG TO 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
8. ENERGY MANAGEMENT OPTION IS REQUIRED FOR 4-20 mA DEMAND LIMIT, SINGLE OR TWO-STEP DEMAND LIMIT.
9. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED METHOD.
10. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.





NON-FUSED DISCONNECT



TERMINAL BLOCK

LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE
TOB	- TIMED OVERRIDE BUTTON
VAV	- VARIABLE AIR VOLUME

COM WIRING
TB3 CCN
+ COM - SHIELD
CCN DATA COM PORT

FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

C.TYP=1 (VAV) WIRING

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	38RC 025T-130T ELECTRICAL	38RC60001040	REV
U.S. ECCN:1E998	2 OF 8	09/22/25	-	-		-

Fig. 86 — C.TYP=1 (VAV) Wiring

In this Control Type, Space Temp Control Mode, ***Run Status → VIEW → SPT.M*=0** (Off Cool) as long as **Main Menu → Status Tables → General Unit Parameters → Control Mode=1** (Off Local), **2** (Off CCN), **3** (Off Time) or **4** (Off Emrgcy). ***SPT.M*=3** (Cool On) exists when Control Mode, ***STAT*=5** (On Local), **6** (On CCN), or **7** (On Time). In this Control Type, if the Indoor Fan Status Switch opens, **Main Menu → Input Status → Indoor Fan Status CIRA=OFF**, Control Mode (***STAT)*** will change to **8** (IDFS Not On); the unit will alarm and switch to **4** (Off Emrgcy). Table 42 shows the space temperature control mode response for ***C.TYP*=1**.

Table 42 — Space Temperature Control Mode Response for C.TYP=1 (VAV)

CONTROL MODE STAT	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMP. CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***0*** (Cool Off)
2 (Off CCN)	***Off*** or ***On***	***0*** (Cool Off)
3 (Off Time)	***Off*** or ***On***	***0*** (Cool Off)
4 (Off Emrgcy)	***Off*** or ***On***	***0*** (Cool Off)
5 (On Remote)	On	***3*** (Cool On)
6 (On CCN)	On	***3*** (Cool On)
7 (On Time)	On	***3*** (Cool On)
8 (IDFS Not On)	Off	***3*** (Cool On)
9 (SPT Satisfied)	Not Applicable	
10 (On Local)	On	***3*** (Cool On)

38RCD Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined (see Lead/Lag Determination on page 117). The lead compressor will be determined and started (see Circuit Compressor Staging on page 117). If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's supply air temperature meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined and started. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

38RCS Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's capacity meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

***C.TYP* = 3** (TSTAT MULTI)

This configuration will allow the Carrier Controller to monitor the thermostat inputs to make a determination of supply air temperature. Unlike traditional 2-stage thermostat control, the unit is allowed to perform VAV style operation using multiple stages of cooling capacity to attempt to meet the current Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***).

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage.

If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

Recommended Applications

This control scheme is recommended for constant volume or 100% outdoor air applications. It can be used with or without digital compressors. This control method is recommended for 38RCD,RCS025-030 units with digital scroll option and 38RCD,RCS040-130 units with two-stage thermostat control. HGBP is supported by this control scheme. HGBP and digital compressor operation are not supported simultaneously.

Hardware Requirements

- supply air sensor
- return air sensor or mixed air sensor
- 2-stage thermostat

This control scheme requires a supply air sensor and a return air sensor or mixed air sensor. In lieu of wiring sensors to the 38RC unit, both values can be communicated via CCN. For information on broadcasting values, see Thermistors on page 39. ***Main Menu → Configuration Menu → Options 1 Configuration → RAT Thermistor Type*** (RAT Thermistor Type) and ***Main Menu → Configuration Menu → Options 1 Configuration → SAT Thermistor Type*** (SAT Thermistor Type) must be configured for for the same type, either 5k or 10k type sensors, whether they are hard wired or their values are communicated to the controller.

Required Configurations

Table 43 lists the configurations required for proper operation.

Recommended Settings

With this Control Type, ***CSP.2*** should be set to design Supply Air Temperature. ***CSP.1*** will depend on application. The difference between default values for ***CSP.1*** and ***CSP.2*** is 5°F (2.8°C). In most cases, the default differential is acceptable, but the application may require a smaller or larger difference. For example, a face split coil may require a larger differential. ***CSP.1*** should be set to a value that allows unit to operate without rapid cycling. ***CSP.1*** should be greater than ***CSP.2*** to allow unit to produce a lower supply air temperature when Y2 is made, if unit has the available capacity.

Wiring

See Fig. 87.

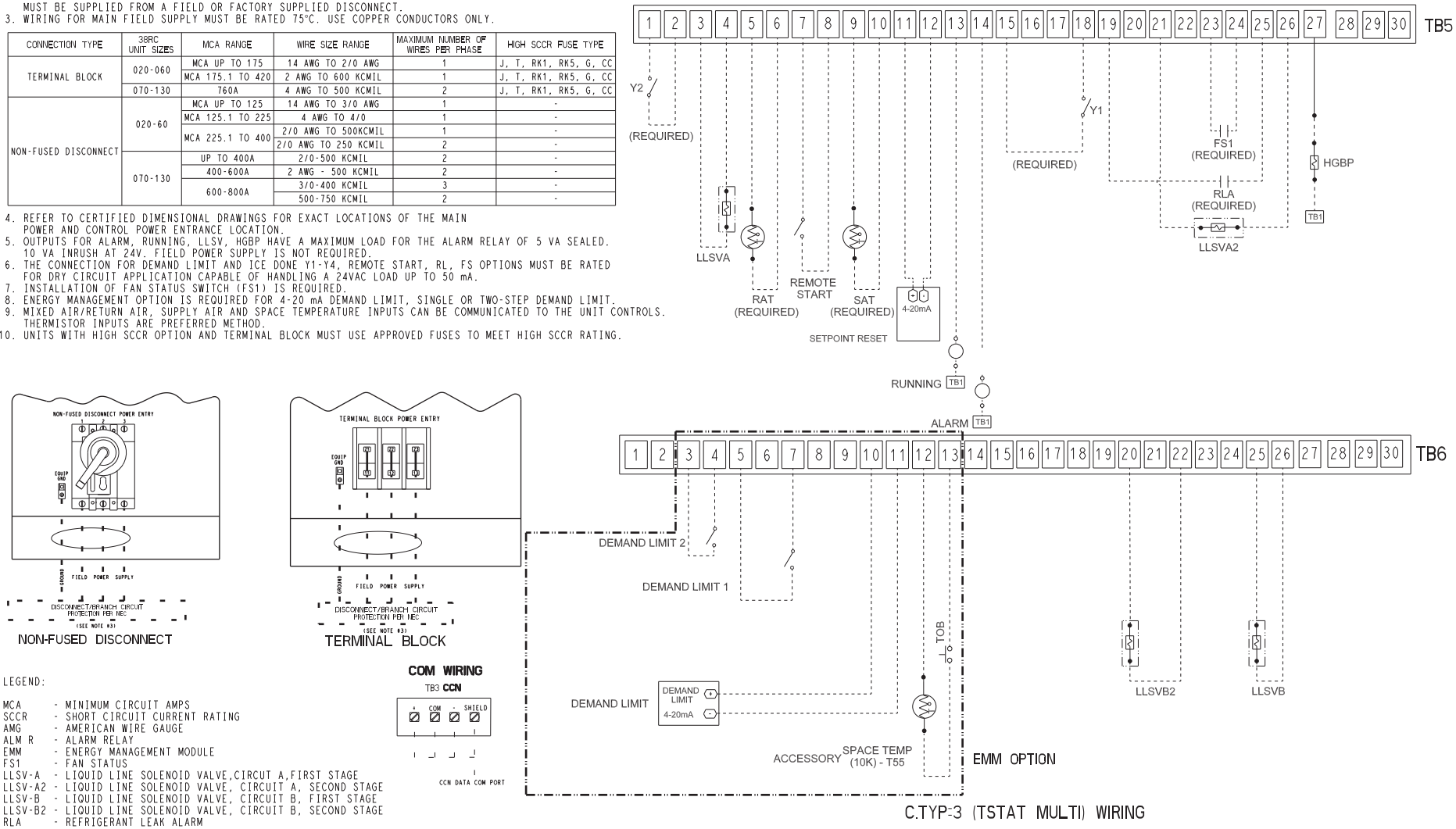
Table 43 — C.TYP=3 (Tstat Multi) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 3 (Tstat Multi)
SETPOINTS MODE				
COOL	CSP1	XX.X	Cooling Setpoint 1	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 60.0°F (15.6°C) Set for desired Supply Air Temperature with Y1 input.
	CSP2	XX.X	Cooling Setpoint 2	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 55.0°F (12.8°C) Set for desired Supply Air Temperature with Y2 input. Should be lower than CSP.1

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 75°C. USE COPPER CONDUCTORS ONLY.

CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	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 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
8. ENERGY MANAGEMENT OPTION IS REQUIRED FOR 4-20 mA DEMAND LIMIT, SINGLE OR TWO-STEP DEMAND LIMIT.
9. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED METHOD.
10. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.



LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE
VAV	- VARIABLE AIR VOLUME
Y1	- STAGE 1 COOLING
Y2	- STAGE 2 COOLING

FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

C.TYP=3 (TSTAT MULTI) WIRING

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:1E998	3 OF 8	09/22/25	-	38RC 025T-130T ELECTRICAL -	38RC60001040	-

Fig. 87 — C.TYP=3 (Tstat Multi) Wiring

Sequence of Operation

The Carrier Controller monitors the thermostat inputs to make a determination of Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***). The control will vary the Active Set Point based on Y1 and Y2 inputs. When Y1 is closed Cooling Setpoint 1 (***Main Menu → Set Points → Cooling Setpoint 1***) will be used and when Y2 is closed Cooling Setpoint 2 (***Main Menu → Set Points → Cooling Setpoint 2***) will be used as the basis for the Active Set Point, ***SP***. Thermostat inputs can be monitored at the unit's interface device, Y1Thermostat Input (***Main Menu → Inputs → Input Status → Y1 Thermostat Input***) and Y2 Thermostat Input (***Main Menu → Inputs → Input Status → Y2 Thermostat Input***). With this type of control, the Carrier Controller capacity control routine stages compressor capacity to attempt to meet the current Control Point (***Main Menu → Status Tables → Unit General Parameters → Control Point***). The Control Point is the Active Set Point (***SP***) adjusted for any temperature reset that is applied. See Temperature Reset on page 130 for additional information.

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Machine Control Type***) and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or changing from Local Off to Local on, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid line solenoid valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

In this Control Type, Space Temp Control Mode, **Main Menu → Status Tables → General Unit Parameters → Space Temp Control Mode=0** (Off Cool) as long as Control Mode **Main Menu → Status Tables → General Unit Parameters → Control Mode=1** (Off Local), **2** (Off CCN), **3** (Off Time), **4** (Off Emrgcy), or **9** (SPT Satisfied). When the Control Mode ***STAT*=5** (On Local), **6** (On CCN), or **7** (On Time), ***SPT.M*=1** (Lo Cool) if Y1 is closed, ***Main Menu → Inputs → Input Status → Y1 Thermostat Input*=ON** or ***SPT.M*=2** (High Cool) if Y2 is closed, ***Main Menu → Inputs → Input Status → Y2 Thermostat Input → Y.2*=ON**. If Y1 and Y2 are both open, ***Y.1*=OFF** and ***Y.2*=OFF**, ***STAT*=9** (SPT Satisfied) and ***SPT.M*=0** (Off Cool) will be displayed. In this Control Type, if the Indoor Fan Status Switch opens (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA*=OFF**), Control Mode (***STAT***) will change to **8** (IDFS Not On) as long as there is no call for cooling, ***Y.1*=OFF** and ***Y.2*=OFF**. If there is a call for cooling, ***Y.1*=ON** or ***Y.2*=ON** the unit will alarm and ***STAT*** switch to **4** (Off Emrgcy). Table 44 shows the space temperature control mode response for ***C.TYP*=3**.

38RCD

On a call for cooling, the Indoor Fan Status Cir A, (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined. See Lead/Lag Determination on page 117. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's capacity meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined and started. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

Table 44 — Space Temperature Control Mode Response for C.TYP=3

CONTROL MODE STAT	Y1 STATUS Y.1	Y2 STATUS Y.2	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMP. CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
2 (Off CCN)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
3 (Off Time)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
4 (Off Emrgcy)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
5 (On Local)	On	Off	On	***1*** (Lo Cool)
	Off or On	On	On	***2*** (Hi Cool)
6 (On CCN)	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
7 (On Time)	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
8 (IDFS Not On)	***Off*** or ***On***	***Off*** or ***On***	Off	***0*** (Cool Off)
9 (SPT Satisfied)	Off	Off	On	***0*** (Cool Off)

38RCS Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's capacity meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

***C.TYP* = 4** (TSTAT 2 STG)

This configuration allows the Carrier Controller to monitor the thermostat inputs to make capacity stage decisions. If Y1 input is closed, no more than 50% of the circuit capacity will be energized. If Y2 is closed, 100% of the circuit capacity will be energized for that circuit and air handler. Y1 closure is not required for 100% capacity.

Recommended Applications

This control type is recommended for constant volume, non-digital compressor applications with units with less than 3 stages of compression. It is not recommended for units with more than two stages of capacity.

This control scheme cannot be used with:

- Units with digital compressors. Digital operation is not supported with this control scheme.
- HGBP Control is not supported with this control scheme.

Hardware Requirements

- 2-stage thermostat

Required Configurations

Table 45 lists the configurations required for proper operation.

Wiring

See Fig. 88.

Sequence of Operation

The Carrier Controller monitors the thermostat inputs to make a determination of capacity stage. When Y1 closes, no more than 50% of the unit's capacity will be energized. When Y2 closes, the remaining capacity will be energized. Thermostat inputs can be monitored at the unit's interface device: Y1 Thermostat Input (***Main Menu → Inputs → Input Status → Y1 Thermostat Input***) and Y2 Thermostat Input (***Main Menu → Inputs → Input Status → Y2 Thermostat Input***).

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***), and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or changing from Off to Enabled, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid line solenoid valve operation is described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

In this Control Type, Space Temp Control Mode, ***Main Menu → Status Tables → General Unit Parameters → Space Temp Control Mode*=0** (Off Cool) as long as ***Main Menu → Status Tables → General Unit Parameters → Control Mode*=1** (Off Local), **2** (Off CCN), **3** (Off Time), or **4** (Off Emrgcy). When the Control Mode ***STAT*=5** (On Local), **6** (On CCN), or **7** (On Time), ***SPT.M*=1** (Lo Cool) if Y1 is closed, ***Main Menu → Inputs → Input Status → Y1 Thermostat Input*=ON**, ***SPT.M*=2** (High Cool) if Y2 is closed, ***Main Menu → Inputs → Input Status → Y2 Thermostat Input*=ON**, or ***SPT.M*=0** (Off Cool) if Y1 and Y2 are both open, ***Y.1*=OFF** and ***Y.2*=OFF**. With this Control Type, if the Indoor Fan Status Switch opens (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA=OFF***), ***STAT*** will change to **8** (IDFS Not On), the unit will remain with ***SPT.M*=0** (Off Cool) if Y1 and Y2 are both open, ***Y.1*=OFF** and ***Y.2*=OFF**. If Y1 or Y2 close, ***Y.1*=ON** or ***Y.2*=ON,** the unit Control Mode will change from ***STAT*=8** (IDFS Not On), to **4** (Off Emrgcy) as an alarm is generated. Table 46 shows the space temperature control mode response for ***C.TYP*=4**.

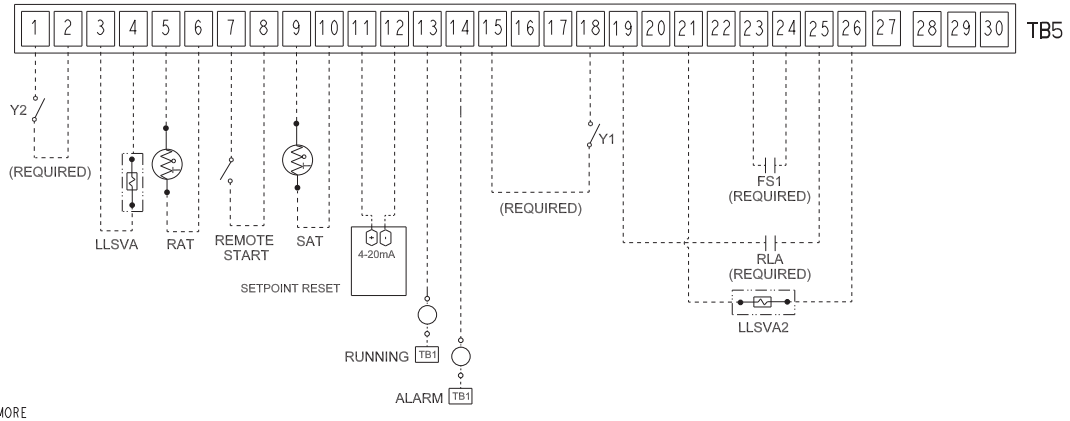
Table 45 — C.TYP=4 (Tstat 2 Stg) Required Configuration

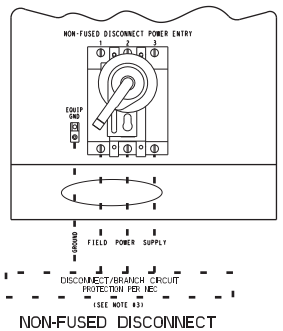
CONFIGURATION MODE				
SUBMODE	ITEM	DISPLAY	ITEM DESCRIPTION	COMMENT
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set item to 4 (Tstat 2 Stg)

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 75°C. USE COPPER CONDUCTORS ONLY.

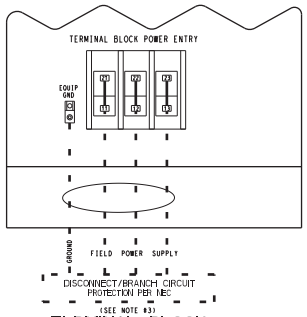
CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	MCA UP TO 175	14 AWG TO 2/0 AWG	1	J, T, RK1, RK5, G, CC
		MCA 175.1 TO 420	2 AWG TO 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
8. ENERGY MANAGEMENT OPTION IS REQUIRED FOR 4-20 mA DEMAND LIMIT, SINGLE OR TWO-STEP DEMAND LIMIT.
9. THIS CONTROL SCHEME DOES NOT SUPPORT DIGITAL COMPRESSOR OR MINIMUM LOAD CONTROL OPERATION.
10. THIS CONTROL SCHEME IS NOT RECOMMENDED FOR 38RCD040- 150 AND 38RCS040-060 UNITS SINCE THERE ARE MORE THAN 2 STAGES OF CAPACITY AVAILABLE.
11. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE ARE NOT REQUIRED FOR THIS CONTROL SCHEME. ALTHOUGH NOT REQUIRED MIXED AIR/RETURN AIR,SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED OVER COMMUNICATION
12. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.

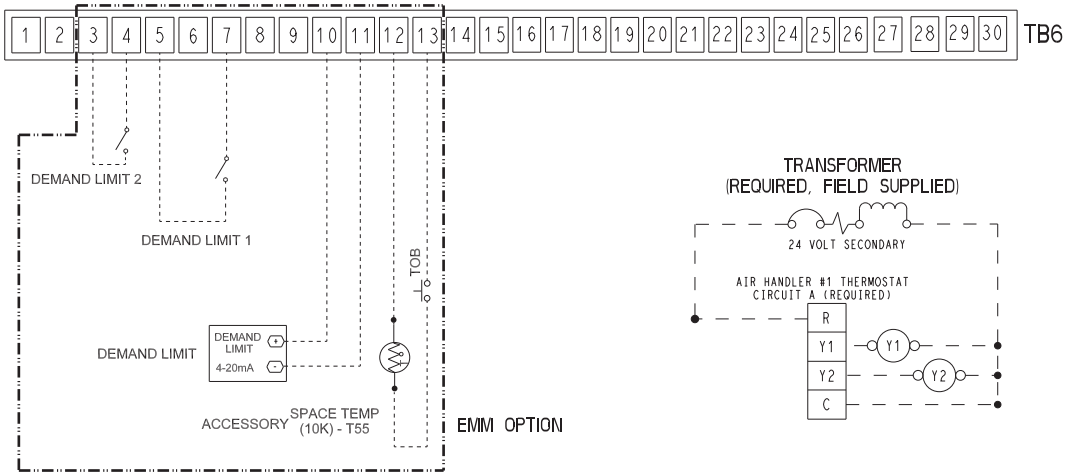




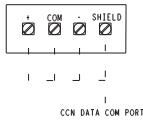
NON-FUSED DISCONNECT



TERMINAL BLOCK



COM WIRING



LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE
Y1	- STAGE 1 COOLING
Y2	- STAGE 2 COOLING

FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

C.TYP=4 (TSTAT 2STG) WIRING

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	38RC 025T-130T ELECTRICAL	38RC60001040	REV
U.S. ECCN:1E998	4 OF 8	09/22/25	-	-		-

Fig. 88 — C.TYP=4 (Tstat 2 Stg) Wiring

Table 46 — Space Temperature Control Mode Response for C.TYP=4

CONTROL MODE STAT	Y1 STATUS Y.1	Y2 STATUS Y.2	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMP. CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
2 (Off CCN)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
3 (Off Time)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
4 (Off Emrgcy)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
5 (On Remote)	Off	Off	***Off*** or ***On***	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or On	On	On	***2*** (Hi Cool)
6 (On CCN)	Off	Off	***Off*** or ***On***	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
7 (On Time)	Off	Off	On	***0*** (Off Cool)
	On	Off	***Off*** or ***On***	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
8 (IDFS Not On)	***Off*** or ***On***	***Off*** or ***On***	Off	***0*** (Cool Off)
9 (SPT Satisfied)	Not Applicable			
10 (On Local)	Off	Off	***Off*** or ***On***	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or On	On	On	***2*** (Hi Cool)
	Off	Off	***Off*** or ***On***	***0*** (Off Cool)

38RCD Units

On a call for cooling, Y1 closure, Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined. See Lead/Lag Determination on page 117. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. The solenoid corresponding to the lead compressor circuit is opened 30 seconds after the Y1 closure. The lead compressor is started 20 seconds later. Compressors will be staged at 70-second intervals until the unit's capacity is as close as possible to 50% without exceeding it. If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined. The lag circuit solenoid valve will be energized. When the Y2 contact is closed, the remaining capacity will be started, staging compressors at 60-second intervals. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease and the Y2 contact opens, the machine controls will reduce the unit's capacity by removing compressors. The first compressor will turn off between 30 and 60 seconds following the loss of the Y2 signal. The remaining compressors will turn off in 90-second intervals until the unit is as close as possible to 50% capacity without exceeding it. Finally, as the Y1 contact opens, the remaining capacity is removed immediately.

38RCS Units

On a call for cooling, Y1 closure, Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Y1 Thermostat Input***) is checked. The switch must be closed before the capacity routine will start. The solenoid is opened 30 seconds after the Y1 closure. The lead compressor will be determined and is started 20 seconds later. See Circuit Compressor Staging on page 117. Compressors will be staged at 70-second intervals until the unit's capacity is as close as possible to 50% without exceeding it. When the Y2 contact is closed, the remaining capacity will be started, staging compressors at 70-second intervals. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

As the capacity requirement begins to decrease and the Y2 contact opens, the machine controls will reduce the unit's capacity by removing compressors. The first compressor will turn off between 30 and 60 seconds following the loss of the Y2 signal. The remaining compressors will turn off in 90-second intervals until the unit is as close as possible to 50% capacity without exceeding it. Finally, as the Y1 contact opens, the remaining capacity is removed immediately.

***C.TYP* = 5** (SPT MULTI)

This configuration will allow the Carrier Controller to monitor the space temperature sensor and compare it to the Space Temperature Set Point (***Main Menu → Setpoints → Space T Cool Setpoint***) to make a capacity determination. Space Temperature Set Point can be a static set point set in the controls or communicated via a 4-20 mA signal to the controller. The unit is allowed to use multiple stages of cooling control and perform VAV-style operation in an attempt to meet the current Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***).

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage.

If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

The Control Point is the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***), either Cooling Setpoint 1 (***Main Menu → Setpoints → Cooling Setpoint 1***) or Cooling Set Point 2 (***Main Menu → Setpoints → Cooling Setpoint 2***) depending on the difference between the Space Temperature (***Main Menu → Status Tables → Unit Parameters → Space Temperature***) and ***SPT_SP***, adjusted for any temperature reset that is applied. See Temperature Reset on page 130 for information on Temperature Reset.

Additionally, with an appropriate space temperature sensor, a space temperature offset can be applied to the space temperature as sensed in the conditioned space. This offset adjusts the actual space temperature reading being sent to the 38RC controls, thereby changing the system's response.

Recommended Applications

This control scheme is recommended for constant volume applications and is compatible with both standard and digital compressor operation. HGBP Control is supported by this control scheme; however, HGBP Control and digital compressor operation cannot be supported simultaneously.

Hardware Requirements

- space temperature sensor
- return/mixed air sensor
- supply air sensor

NOTE: If Space Temperature Setpoint is based on a 4-20 mA signal, and Energy Management Module and 4-20 mA Signal Generator is required.

This control scheme requires a supply air sensor and a return air sensor or mixed air sensor. In lieu of wiring sensors to the 38RC unit, both values can be communicated via CCN to the 38RC unit. For information on broadcasting values, see Thermistors on page 39. The Supply Air Thermistor (***Main Menu → Configuration Menu → Option 1 Configuration → SAT Thermistor Type***) and Return Air Thermistor (***Main Menu → Configuration Menu → Options 1 Configuration → RAT Thermistor Type***) must be configured for the same type, either 5k or 10k type sensors, whether they are hard wired or their values are communicated to the controller.

A space temperature sensor must be installed (T55, T56 or T59) and enabled (***Main Menu → Configuration Menu → Options 1 Configuration → Space Temp Sensor***). If a T56 or T59 sensor with space temperature offset is installed with the space temperature offset slider, it must be enabled (***Main Menu → Configuration Menu → Options 1 Configuration → Space Temp Offset Enable***) to affect the unit control. If a T56 or T59 space temperature offset sensor is installed, it is possible to configure the range of the slider by adjusting this range configuration, Space Temperature Offset Range (***Main Menu → Configuration Menu → Options1 Configuration → SPTRANGE***). The range for this item is 1 to 10°F (0.6 to 5.6°C); the factory default is 5°F (2.8°C). With the slider in the neutral position, no offset is applied. In lieu of sensors wired to the unit controls, Space Temperature can be broadcast. For information on broadcasting values, see Thermistors on page 150.

Required Configurations

Tables 47 and 48 list the configurations required for proper operation.

Recommended Settings

With this Control Type, it is critical to set ***CSP2*** to the design supply air temperature, corresponding to the design space temperature in the initial setup. ***CSP1*** will depend on the application. The difference between the default values for ***CSP1*** and ***CSP2*** is 5°F (2.8°C). In most cases, the default differential is acceptable, but the application may require a smaller or larger difference. For example, a face split coil may require a larger differential. ***CSP1*** should be set to a value that allows the unit to operate without rapid cycling. ***CSP1*** should be greater than ***CSP2*** to allow the unit to produce a lower supply air temperature when a call for High Cool is made, if the unit has the available capacity.

Space Temperature Cool Set Point (***SPT_SP)*** should be the desired room temperature.

This value can be set in the unit controls, communicated via a 4-20 mA signal or written to the CCN Point, SPT_SP.

If Space Temperature setpoint is communicated via a 4-20 mA signal, ***CLSP_TYP = 1, SPT_SP*** (***Main Menu → Setpoints***) will be calculated based on a 4-20 mA signal to LVT-10 (+) and LVT-8 (-) by the following formula:

Space Temperature Setpoint (°F) = 0.9375 x mA + 61.25

Space Temperature Setpoint (°C) = 0.521 x mA + 16.25

Graphically, this is represented as:

MA SIGNAL	SPS.P (SPACE TEMPERATURE SETPOINT)	
	°F	°C
2	65	18.3
4	65	18.3
20	80	26.7
22	80	26.7

The Requested Cooling Setpoint Signal (mA) can be monitored with the 4-20 mA Cooling Set Point item (***Inputs → 4-20 → COOL_MA***).

Wiring

See Fig. 89.

Table 47 — C.TYP=5 (SPT Multi) Required Configuration, Single Setpoint

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	SPTSENS	ENBL/DSBL	Space Temp Sensor	Default: DSBL Set to ENBL. Cannot be enabled until C.TYP=5. If C.TYP=5, this item is automatically enabled.
	SPTOSENS	ENBL/DSB	Space Temp Offset Enable	Default: DSBL Set to ENBL if T56 sensor is installed and temperature offset is to be used.
	SPTRANGE[a]	XX ΔF (ΔC)	Space Temp Offset Range	Range: –5 to 5 ΔF (–2.8 to 2.8 ΔC) Default: 0 ΔF (0 ΔC)
	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 5 (SPT Multi)
SLCT	CLSP	—	Cooling Set Point Select	Range: 0 = Use Space Temperature Cool Setpoint (Setpoints → COOL → SPS.P) 1 = Use 4-20 mA signal for Space Temperature Cool Setpoint Default: 0 Required Value: 0
SETPOINTS MODE				
COOL	CSP1	XX.X	Cooling Setpoint 1	Default: 60.0°F (15.6°C) Range: 40.0 to 80.0°F (4.4 to 26.7°C)
	CSP2	XX.X	Cooling Setpoint 2	Default: 55.0°F (12.8°C) Range: 40.0 to 80.0°F (4.4 to 26.7°C)
	SPT_SP	XX.X	Space T Cool Setpoint	Default: 78.0°F (25.6°C) Range: 65.0 to 80.0°F (18.3 to 26.7°C)
	DMDLCON	X.X	Lo Cool On Setpoint	Default: 1 ΔF (0.6 ΔC) –1 to 2 ΔF (–0.6 to 1.1 ΔC)
	DMDHCON	XX.X	Hi Cool On Setpoint	Default: 3 ΔF (1.7 ΔC) 0.5 to 20 ΔF (0.3 to 11.1 ΔC)
	DMDLCOFF	X.X	Lo Cool Off Setpoint	Default: 0.5 ΔF (0.3 ΔC) 0.5 to 2 ΔF (0.3 to 1.1 ΔC)

NOTE(S):

a. If equipped.

Table 48 — C.TYP=5 (SPT Multi) Required Configuration, 4-20 mA Setpoint

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	SPTSENS	ENBL/DSBL	Space Temp Sensor	Default: DSBL Set to ENBL. Cannot be enabled until C.TYP=5. If C.TYP=5, this item is automatically enabled.
	SPTOSENS	ENBL/DSB	Space Temp Offset Enable	Default: DSBL Set to ENBL if T56 sensor is installed and temperature offset is to be used.
	SPTRANGE[a]	XX ΔF (ΔC)	Space Temp Offset Range	Range: –5 to 5 ΔF (–2.8 to 2.8 ΔC) Default: 0 ΔF (0 ΔC)
	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 5 (SPT Multi)
SLCT	CLSP		Cooling Set Point Select	Range: 0 = Use Space Temperature Cool Setpoint (Setpoints → COOL → SPS.P) 1 = Use 4-20 mA signal for Space Temperature Cool Setpoint Default: 0 Required Value: 1
SETPOINTS MODE				
COOL	CSP1	XX.X	Cooling Setpoint 1	Default: 60.0°F (15.6°C) Range: 40.0 to 80.0°F (4.4 to 26.7°C)
	CSP2	XX.X	Cooling Setpoint 2	Default: 55.0°F (12.8°C) Range: 40.0 to 80.0°F (4.4 to 26.7°C)
	SPT_SP	XX.X	Space T Cool Setpoint	Default: 78.0°F (25.6°C) Range: 65.0 to 80.0°F (18.3 to 26.7°C)
	DMDLCON	X.X	Lo Cool On Setpoint	Default: 1 ΔF (0.6 ΔC) –1 to 2 ΔF (–0.6 to 1.1 ΔC)
	DMDHCON	XX.X	Hi Cool On Setpoint	Default: 3 ΔF (1.7 ΔC) 0.5 to 20 ΔF (0.3 to 11.1 ΔC)
	DMDLCOFF	X.X	Lo Cool Off Setpoint	Default: 0.5 ΔF (0.3 ΔC) 0.5 to 2 ΔF (0.3 to 1.1 ΔC)

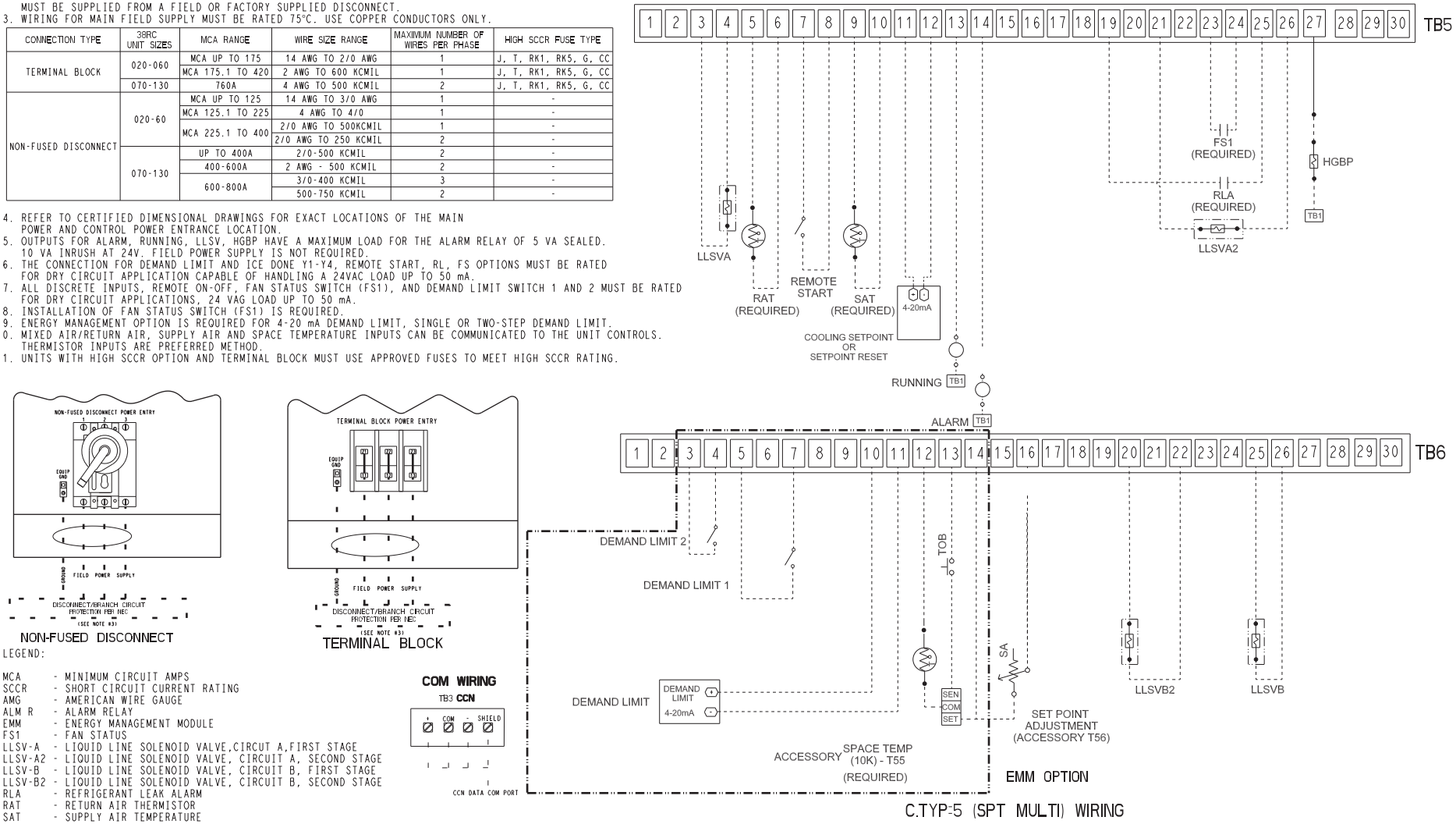
NOTE(S):

a. If equipped.

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 75°C. USE COPPER CONDUCTORS ONLY.

CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	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 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. ALL DISCRETE INPUTS, REMOTE ON-OFF, FAN STATUS SWITCH (FS1), AND DEMAND LIMIT SWITCH 1 AND 2 MUST BE RATED FOR DRY CIRCUIT APPLICATIONS, 24 VAG LOAD UP TO 50 mA.
8. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
9. ENERGY MANAGEMENT OPTION IS REQUIRED FOR 4-20 mA DEMAND LIMIT, SINGLE OR TWO-STEP DEMAND LIMIT.
10. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED METHOD.
11. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.



C.TYP-5 (SPT MULTI) WIRING

LEGEND:

MCA - MINIMUM CIRCUIT AMPS
SCCR - SHORT CIRCUIT CURRENT RATING
AMG - AMERICAN WIRE GAUGE
ALM R - ALARM RELAY
EMM - ENERGY MANAGEMENT MODULE
FS1 - FAN STATUS
LLSV-A - LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2 - LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B - LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2 - LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA - REFRIGERANT LEAK ALARM
RAT - RETURN AIR THERMISTOR
SAT - SUPPLY AIR TEMPERATURE
SPT - SPACE TEMPERATURE
SET - SET POINT ADJUSTMENT
SA - SET POINT ADJUSTMENT
COM - COMMON
SEN - SENSOR
TOB - TIMED OVERRIDE BUTTON

FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	38RC 025T-130T ELECTRICAL	38RC60001040	REV
U.S. ECCN:1E998	5 OF 8	09/22/25	-	-		-

Fig. 89 — C.TYP=5 (SPT Multi) Wiring

Sequence of Operation

The Carrier Controller monitors the space temperature input together with the unit configurations to make a determination of ***Control Point Main Menu → Status Tables → General Unit Parameters → Control Point***. The control will call for a low cool set point, ***Main Menu → Setpoints → Cooling Setpoint 1*** (Cooling Setpoint 1) or high cool set point ***Main Menu → Setpoints → Cooling Setpoint 2*** (Cooling Setpoint 2) depending on the difference between the Space Temperature (***Main Menu → Status Tables → Unit Parameters → Space Temperature***) and the space temperature set point (***Main Menu → Status Tables → General Unit Parameters → Active Set Point***). ***CSP.1*** should be greater than ***CSP.2***. ***CSP.1*** or ***CSP.2*** will be used as the basis for the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Set Point***) based on the configuration settings, Low Cool On Set Point (***Main Menu → Setpoints → Lo Cool On Setpoint***), High Cool On Set Point (***Main Menu → Setpoints → Hi Cool On Setpoint***), and Low Cool Off Set Point (***Main Menu → Setpoints → Lo Cool Off Setpoint***) to determine the control point.

If Space Temperature rises above the ***SPT_SP + DMDLCON***, the system will start with ***CSP.1*** as the Control Point. Space Temperature Control Mode (***Main Menu → Status Tables → General Unit Parameters → Space Temp Control Mode***) will indicate **1** (Lo Cool). As long as the Space Temperature does not rise above ***SPT_SP + DMDLCON + DMDHCON***, the unit will continue to supply conditioned air with ***CSP.1*** as the Control Point until the Space Temperature falls below ***SPT_SP + DMDLCON - DMDLCOFF***. If the Space Temperature falls below ***SPT_SP + DMDLCON - DMDLCOFF***, mechanical cooling will cease. Space Temperature Control Mode, ***SPTMODE*** will indicate **0** (Cool Off). If the Space Temperature rises above ***SPT_SP + DMDLCON + DMDHCON***, the unit will change the Control Point to ***CSP.2***. Space Temperature Control Mode, ***SPTMODE*** will indicate **2** (Hi Cool). ***CSP.2*** will remain the Control Point until the Space Temperature falls below ***ST_SP + DMDLCON - (DMDLCOFF/2)***) at which time the Control Point will change to ***CSP.1***. ***CSP.1*** will remain the Control Point until the Space Temperature falls below ***SPT_SP + DMDLCON - DMDLCOFF***. Space Temperature Control Mode, ***SPTMODE*** will indicate **0** (Cool Off).

The following example illustrates this control scheme. Given:

SPT_SP = 72°F,

DMDLCON = 1,

DMDHCON = 3,

DMDLCOFF = 2°F,

CSP.1 = 60°F,

CSP.2 = 55°F

If Space Temperature equals 73°F (***SPT_SP + DMDLCON*** [Low Cool On]) cooling will begin and the Control Point equals 60°F (***CSP.1)***. As long as Space Temperature does not exceed the High Cool On setting (***SPT_SP + DMDLCON + DMDHCON***), ***CSP.1*** will remain the Control Point until the Space Temperature falls below 71°F (***SPS.P*** + ***L.C.ON*** – ***L.C.OF*** [Low Cool Off]) when mechanical cooling will cease.

If space temperature rises above 76°F (***SPT_SP + DMDLCON + DMDHCON*** [High Cool On]), control point set point changes to 55°F (***CSP.2***). ***CSP.2*** will remain the Control Point until the Space Temperature falls below 72°F (***SPT_SP + DMDLCON - (DMDLCOFF/2***) [High Cool Off]), control point transitions back to 60°F (***CSP.1***). If space continues to fall below 71°F (***SPT_SP + DMDLCON – DMDLCOFF*** [Low Cool Off]), the unit is shut off.

Figure 90 summarizes this example.

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or when changing from Local Off to Local On, the machine will remain off until Minutes Off Time ***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time*** timer has expired. See Minutes Off Time on page 129 for additional information. Liquid Line Solenoid Valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

In this Control Type, Space Temp Control Mode, ***Main Menu → Status Tables → General Unit Parameters → Space Temp Control Mode*=0** (Off Cool) as long as ***Main Menu → Status Tables → General Unit Parameters → Control Mode*=1** (Off Local), **2** (Off CCN), **3** (Off Time), or **4** (Off Emrgcy). Table 49 shows the space temperature control mode response for ***C.TYP*=5**.

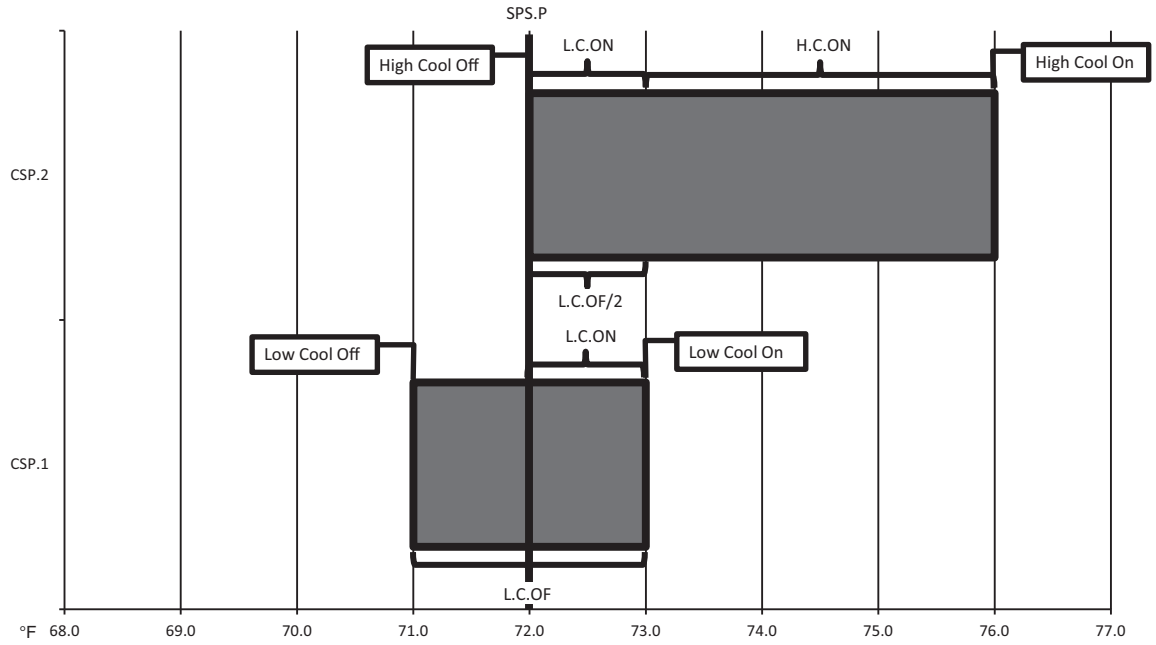


Fig. 90 — C-TYP=5, Space Temperature Control Example

Table 49 — Space Temperature Control Mode Response for C.TYP=5

CONTROL MODE STAT	SPACE TEMPERATURE SPT	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMP. CONTROL MODE SPT.M
1 (Off Local)	Not Applicable	***Off*** or ***On***	***0*** (Off Cool)
2 (Off CCN)	Not Applicable	***Off*** or ***On***	***0*** (Off Cool)
3 (Off Time)	Not Applicable	***Off*** or ***On***	***0*** (Off Cool)
4 (Off Emrgcy)	Not Applicable	***Off*** or ***On***	***0*** (Off Cool)
5 (On Remote)	SPT_SP + DMDLCON < SPT < SPT_SP + DMDLCON + DMDHCON	On	***1*** (Lo Cool)[a]
	SPT > SPT_SP + DMDLCON + DMDHCON remain on till SPT < SPT_SP + DMDLCON - DMDLCOFF/2	On	***2*** (Hi Cool)[a]
6 (On CCN)	SPT_SP + DMDLCON < SPT < SPT_SP + DMDLCON + DMDHCON	On	***1*** (Lo Cool)[a]
	SPT > SPS.P + L.C.ON+H.C.ON, remain on till SPT < SPS.P+L.C.ON-L.C.OF /2	On	***2*** (Hi Cool)[a]
7 (On Time)	SPT_SP + DMDLCON < SPT < SPT_SP + DMDLCON + DMDHCON	On	***1*** (Lo Cool)[a]
	SPT > SPT_SP + DMDLCON + DMDHCON remain on till SPT < SPT_SP + DMDLCON - DMDLCOFF/2	On	***2*** (Hi Cool)[a]
8 (IDFS Not On)	Not Applicable	Off	***0*** (Cool Off)[a]
9 (SPT Satisfied)	< SPT_SP + DMDLCON - DMDLCOFF	On	***0*** (Cool Off)[a]
10 (On Local)	SPT_SP + DMDLCON < SPT < SPT_SP + DMDLCON + DMDHCON	On	***1*** (Lo Cool)[b]
	SPT > SPT_SP + DMDLCON + DMDHCON remain on till SPT < SPT_SP + DMDLCON - DMDLCOFF/2	On	***2*** (Hi Cool)[a]

NOTE(S):

a. There is built-in overlap of the High Cool and Low Cool Operation. Actual Space Temperature Control Mode depends on the direction of space temperature change (positive or negative) and its starting point.
b. There is built-in overlap of the High Cool and Low Cool Operation. Actual Space Temperature Control Mode depends on the direction of space temperature change (positive or negative) and its starting point.

38RCD Units

On a call for cooling, Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined. See Lead/Lag Determination on page 117. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the space temperature meets the Control Point (***CTRL_PNT***). If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined and started. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

38RCS

On a call for cooling, Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the space temperature meets the Control Point (***CTRL_PNT***). During operation, controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

C.TYP = 7 (PCT CAP)

This configuration will allow the Carrier Controller to monitor the 4-20 mA cooling demand signal input to the energy management module and translate this into desired percent capacity for the unit.

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage.

If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

Recommended Applications

This configuration is compatible with both standard and digital compressors. This application is intended for direct capacity control by a third-party control system. All safeties remain in effect (minimum run time, time guard, low saturated suction, high condensing temperature, low superheat, etc.).

Hardware Requirements

A 4 to 20 mA generator is required.

Required Configurations

Table 50 lists the configurations required for proper operation.

Wiring

See Fig. 91.

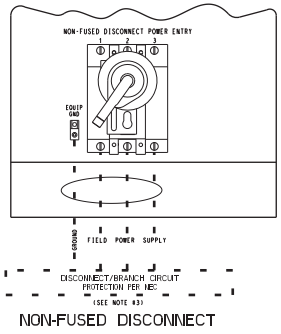
Table 50 — C.TYP=7 (Pct Cap) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k, 10k, None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k, 10k, None
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 7 (Pct Cap)

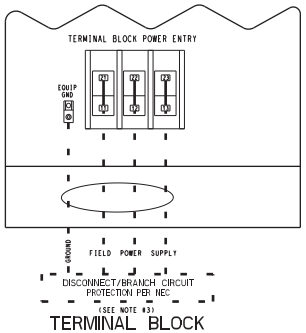
NOTES:
1. FACTORY WIRING IS IN ACCORDANCE WITH UL 60335-40-2 STANDARDS. FIELD MODIFICATIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. ALL UNITS OR MODULES HAVE SINGLE POINT PRIMARY POWER CONNECTION. MAIN POWER MUST BE SUPPLIED FROM A FIELD OR FACTORY SUPPLIED DISCONNECT.
3. WIRING FOR MAIN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

CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	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 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
8. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED METHOD.
9. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.



NON-FUSED DISCONNECT



TERMINAL BLOCK

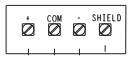
LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE

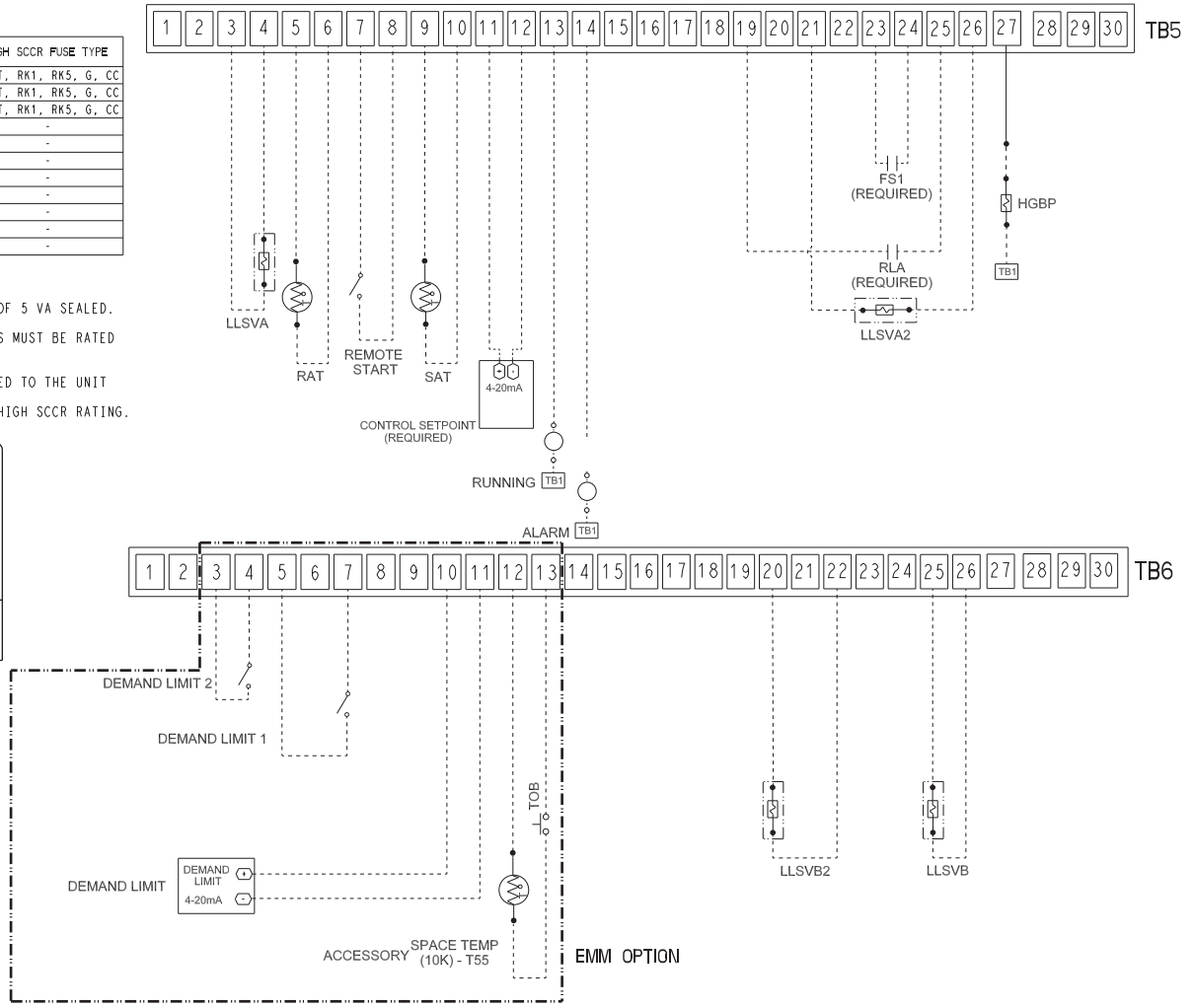
FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

COM WIRING

TB3 **CCN**



CCN DATA COM PORT



C.TYP-7 (PCT CAP) WIRING

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES	38RC 025T-130T ELECTRICAL	38RC60001040	REV
U.S. ECCN:1E998	6 OF 8	09/22/25	-	-		-

Fig. 91 — C.TYP=7 (Pct Cap) Wiring

Sequence of Operation

Capacity control is determined by the signal provided by the Building Management System. The field-supplied 4 to 20 mA signal is converted to a linear scale for percent capacity vs. 4 to 20 mA input as shown in Fig. 92.

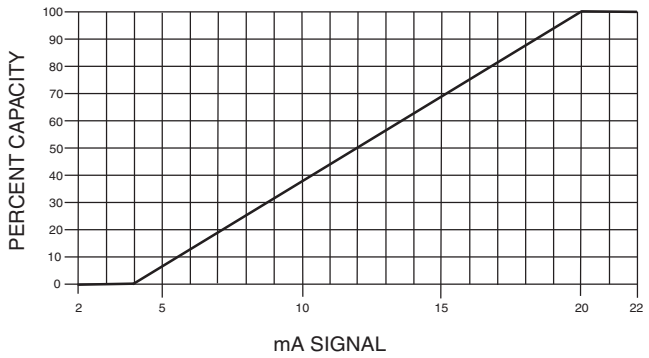


Fig. 92 — Percent Capacity vs. 4 to 20 mA Signal

While using this control method, the control algorithm sending the 4 to 20 mA signal must be properly tuned to avoid rapid cycling or hunting. The machine controls will select the capacity stage with the least amount of error relative to the Building Management System's requested percent capacity. This may result in a capacity stage greater than the requested percent capacity. Circuit loading methods are illustrated on pages 89-109.

Caution must be exercised when using this Control Type. Under certain conditions the unit controls may initiate an oil recovery routine as described in sequence of operation section below. This routine increases the capacity of the unit temporarily and reduces the supply air temperature, It is important not to change the requested capacity signal until at least one minute after the unit has exited the oil recovery routine. Failure to take the oil recovery routine into account will result in erratic unit operation.

If the unit has a digital compressor and the Building Management System is requesting a capacity percentage less than the capacity that the first compressor can provide, the Carrier Controller waits until the error between the requested capacity and the unit's capacity with the first compressor is less than the requested capacity and zero percent capacity before the control will start the digital compressor.

Error is calculated by the following formula:

([% Capacity – Requested % Capacity]/Requested Percent Capacity) x 100

The 38RCD030 is used to illustrate this point. This unit uses two compressors of the same capacity. To get the digital compressor to start, the requested percent capacity signal must be above 8 mA corresponding to 25% capacity. At 8 mA, the error between 0% and 25% is the same as the error between 25% and 50% (the compressor's percent capacity contribution is the same). Once the signal exceeds the 8 mA value, the first compressor is allowed to start. See Fig. 94. The digital compressor will start and operate at full capacity for 90 seconds before reducing the compressor capacity to meet the 25% unit capacity (8 mA) request.

The digital compressor will run at full capacity for 90 seconds before adjusting the capacity to the requested stage, for oil return. Following the 90-second period the control will begin to duty cycle the digital compressor to better match the load. Once the digital compressor reaches full load, the control will begin adding or subtracting compressors every 90 seconds to reach the desired capacity stage. If the 4 to 20 mA signal is lost, the Carrier Controller will reduce the capacity stage to 0, and generate an alarm.

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or when changing from Local Off to Local On, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid Line Solenoid Valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

In this Control Type, Space Temp Control Mode, ***Run Status → VIEW → SPT.M*=0** (Off Cool) as long as ***Main Menu → Status Tables → General Unit Parameters → Control Mode*=1** (Off Local), **2** (Off CCN), **3** (Off Time) or **4** (Off Emrgcy). **SPT.M=3** (Cool On) as long as Control Mode, **STAT=5** (On Local), **6** (On CCN), or **7** (On Time). In this Control Type, if the Indoor Fan Status Switch opens (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA=OFF***), Control Mode (***STAT***) will change to **8** (IDFS Not On) as long as there is no call for cooling (***CL.MA*** < 4 mA). If there is a call for cooling (***CL.MA*** > 4 mA), the unit will alarm and ***STAT*** switch to **4** (Off Emrgcy). Table 51 shows the space temperature control mode response for ***C.TYP*=7**.

Table 51 — Space Temperature Control Mode Response for C.TYP=7

CONTROL MODE STAT	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMPERATURE CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***0*** (Cool Off)
2 (Off CCN)	***Off*** or ***On***	***0*** (Cool Off)
3 (Off Time)	***Off*** or ***On***	***0*** (Cool Off)
4 (Off Emrgcy)	***Off*** or ***On***	***0*** (Cool Off)
5 (On Remote)	On	***3*** (Cool On)
6 (On CCN)	On	***3*** (Cool On)
7 (On Time)	On	***3*** (Cool On)
8 (IDFS Not On)	Off	***0*** (Cool Off)
9 (SPT Satisfied)	Not Applicable	
10 (On Local)	On	***3*** (Cool On)

38RCD Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined. See Lead/Lag Determination on page 117. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded.

The unit will stage compressors every 90 seconds to meet the requested capacity. With every change in capacity that occurs, a 90-second time delay is initiated and the capacity stage is held during this time delay. If the capacity change is a change of the digital compressor only, the compressor will be modulated to the requested capacity without moving in increments. For example, if the requested capacity requires a change to the compressor unload time from 8 to 2 seconds, that change will occur without the intermediate steps of 7, 6, 5, 4, and 3 seconds. If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined and started. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity in response to the requested capacity signal. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

38RCS Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA)*** is checked. The switch must be closed before the capacity routine will start. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded.

The unit will stage compressors every 90 seconds to meet the requested capacity. With every change in capacity that occurs, a 90-second time delay is initiated and the capacity stage is held during this time delay. If the capacity change is a change of the digital compressor only, the compressor will be modulated to the requested capacity without moving in increments. For example, if the requested capacity requires a change to the compressor unload time from 8 to 2 seconds, that change will occur without the intermediate steps of 7, 6, 5, 4, and 3 seconds. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

See Fig. 93-132 for capacity loading, ***C.TYP*=7**.

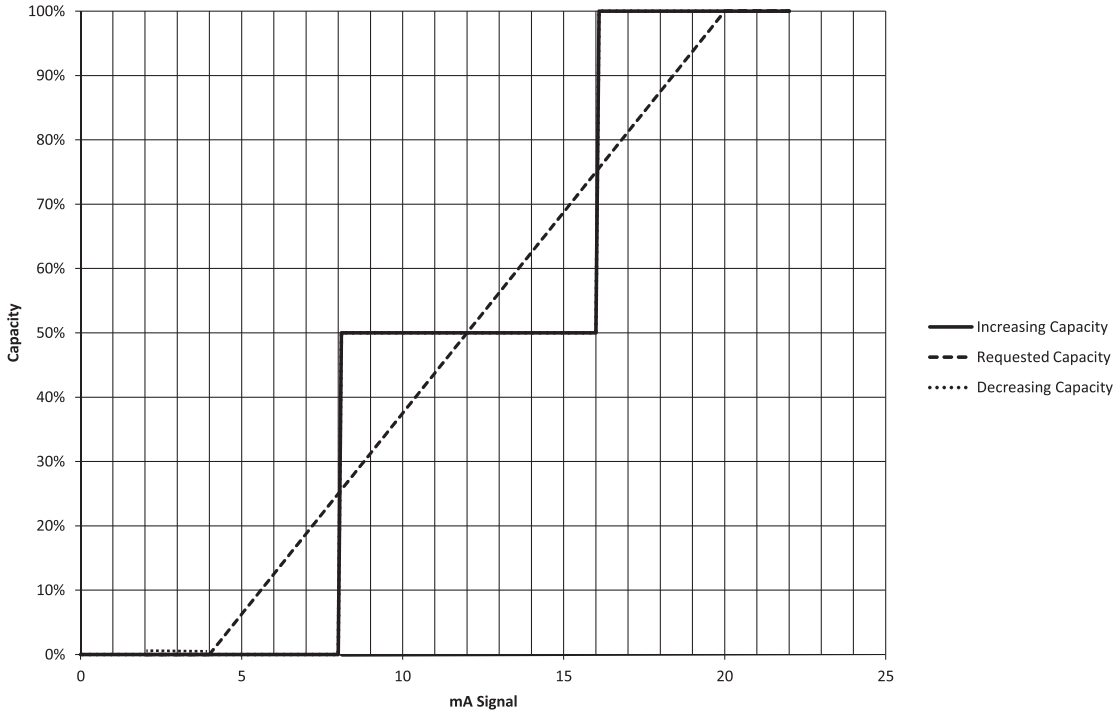


Fig. 93 — Capacity Loading, C.TYP=7
38RCD,RCS025-030, Non-Digital, Equal (Default) or Staged Circuit Loading, Circuit A or B (38RCD Only) Leads

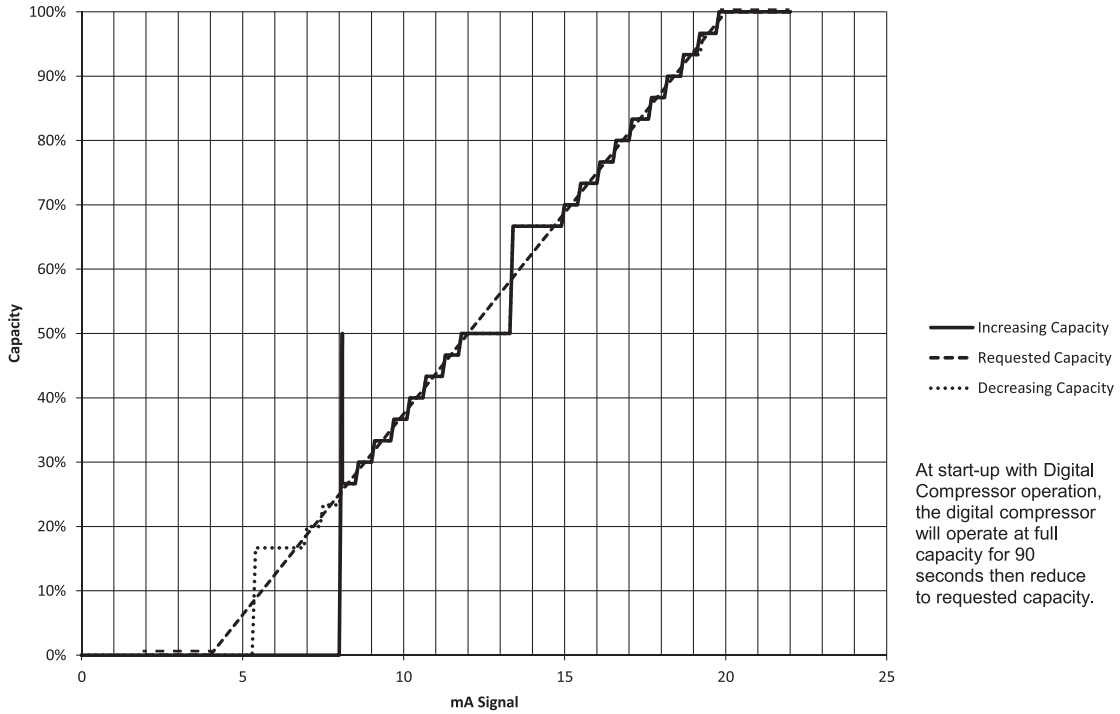


Fig. 94 — Capacity Loading, C.TYP=7 38RCD,RCS025-030, Digital, Equal (Default) or Staged Circuit Loading, Circuit A (38RCD Only) Leads

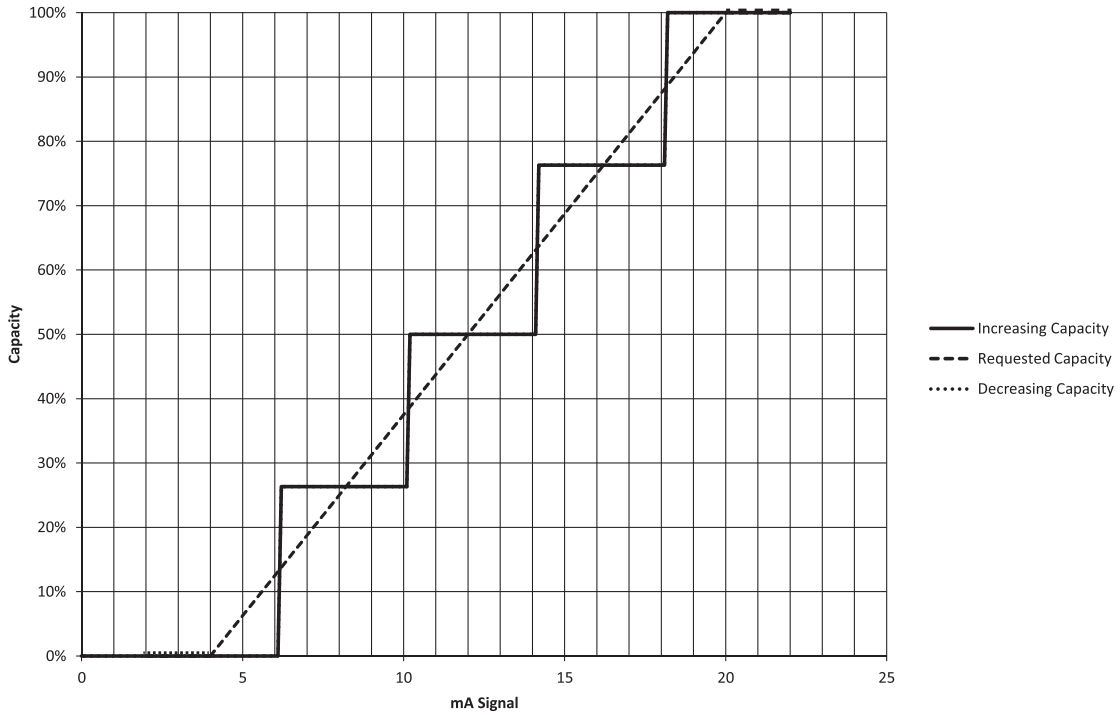


Fig. 95 — Capacity Loading, C.TYP=7 38RCD040, Non-Digital, Equal (Default) Circuit Loading, Circuit A Leads

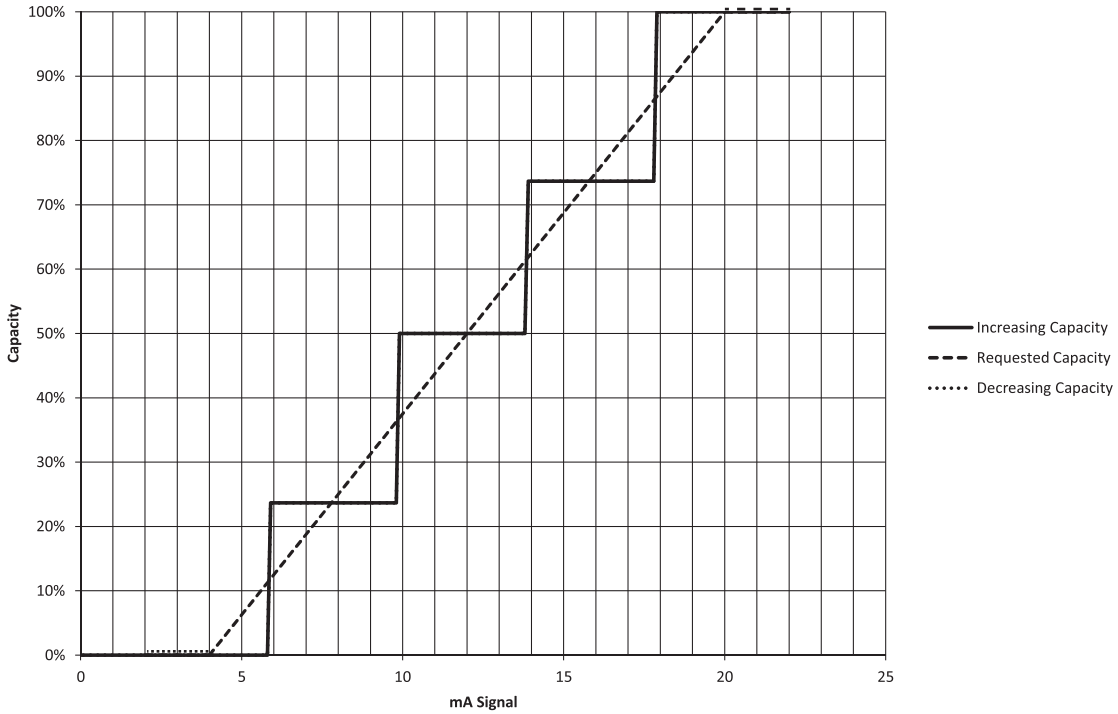
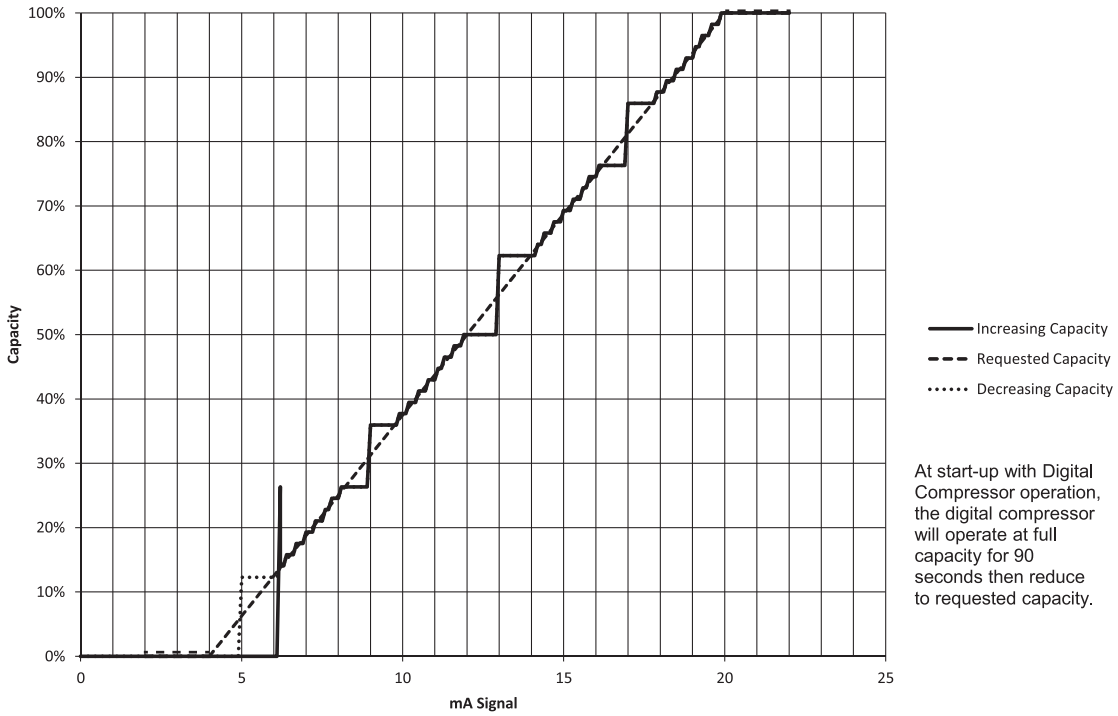


Fig. 96 — Capacity Loading, C.TYP=7 38RCD040, Non-Digital, Equal (Default) Circuit Loading, Circuit B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 97 — Capacity Loading, C.TYP=7 38RCD040, Digital, Equal (Default) Circuit Loading, Circuit A Leads

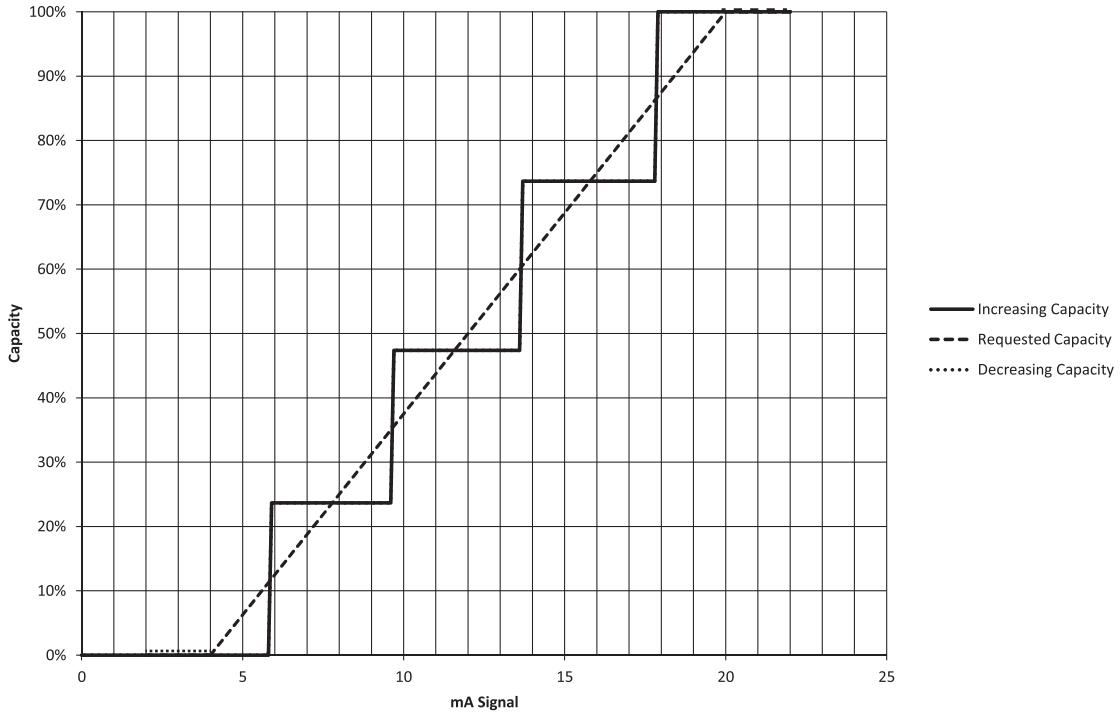


Fig. 98 — Capacity Loading, C.TYP=7
38RCD040, Non-Digital, Staged Circuit Loading,
Circuit A Leads

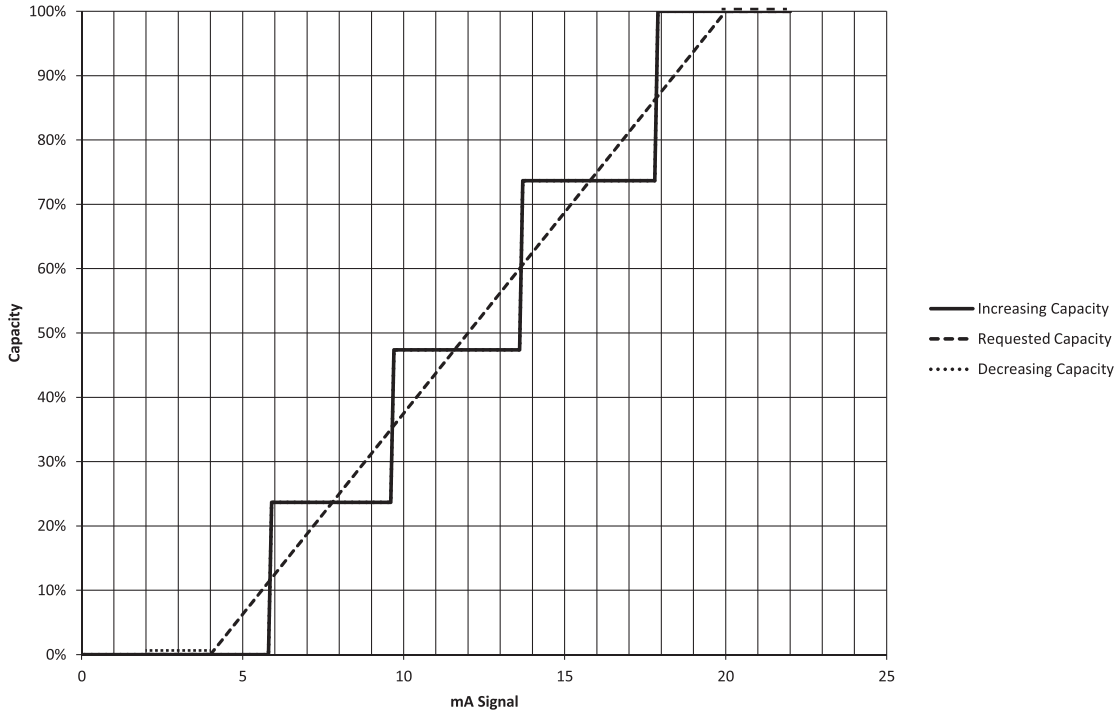


Fig. 99 — Capacity Loading, C.TYP=7
38RCD040, Non-Digital, Staged Circuit Loading,
Circuit B Leads

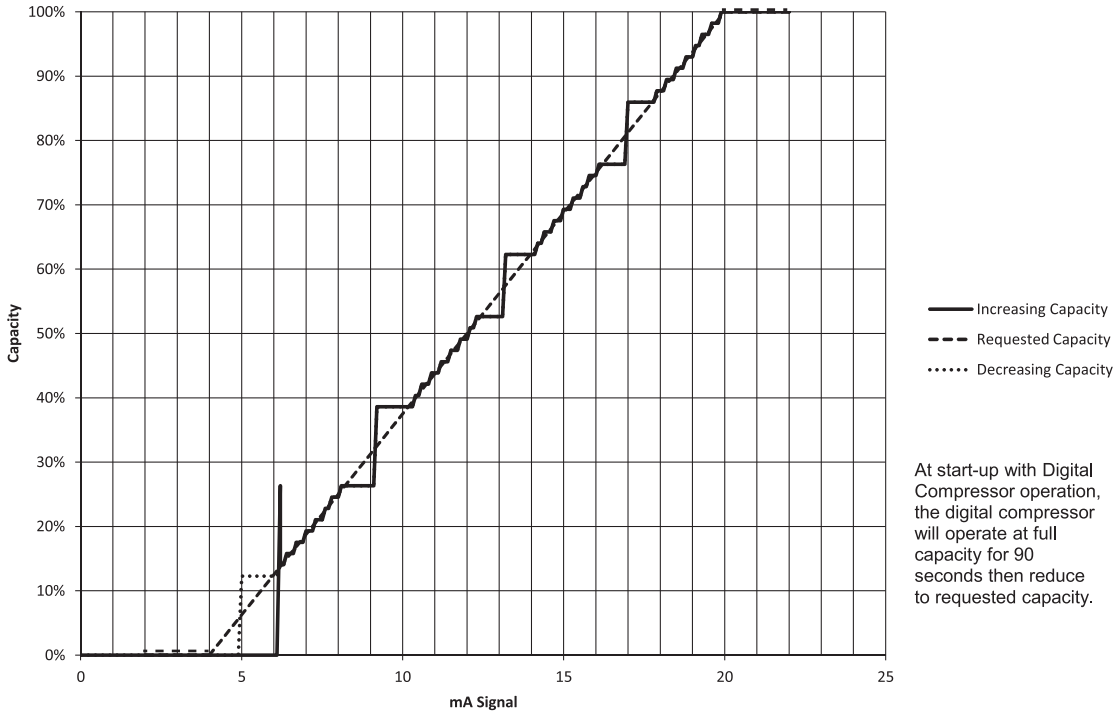


Fig. 100 — Capacity Loading, C.TYP=7 38RCD040, Digital, Staged Circuit Loading, Circuit A Leads

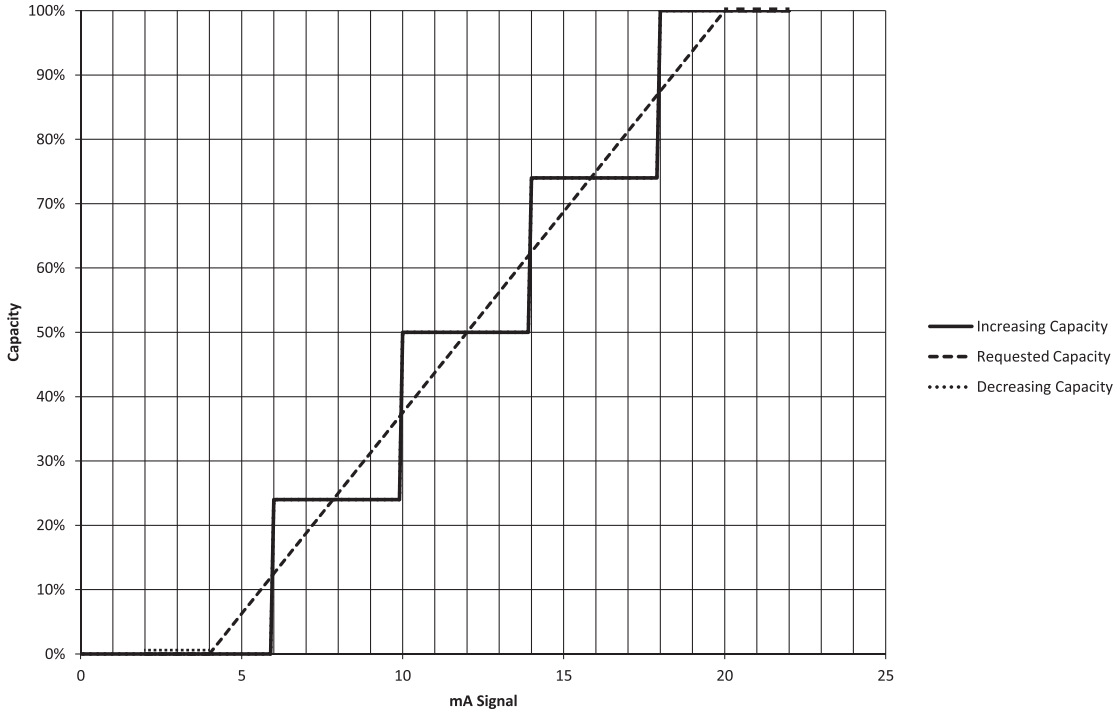


Fig. 101 — Capacity Loading, C.TYP=7 38RCD050, Non-Digital, Equal (Default) Circuit Loading, Circuit A Leads

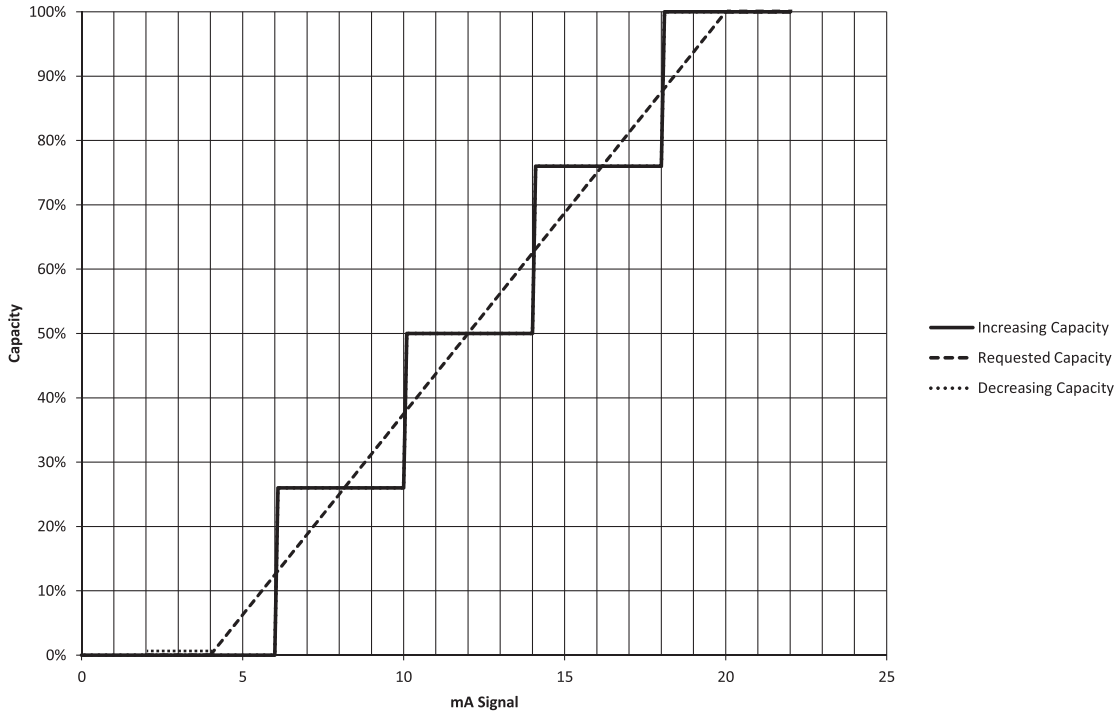
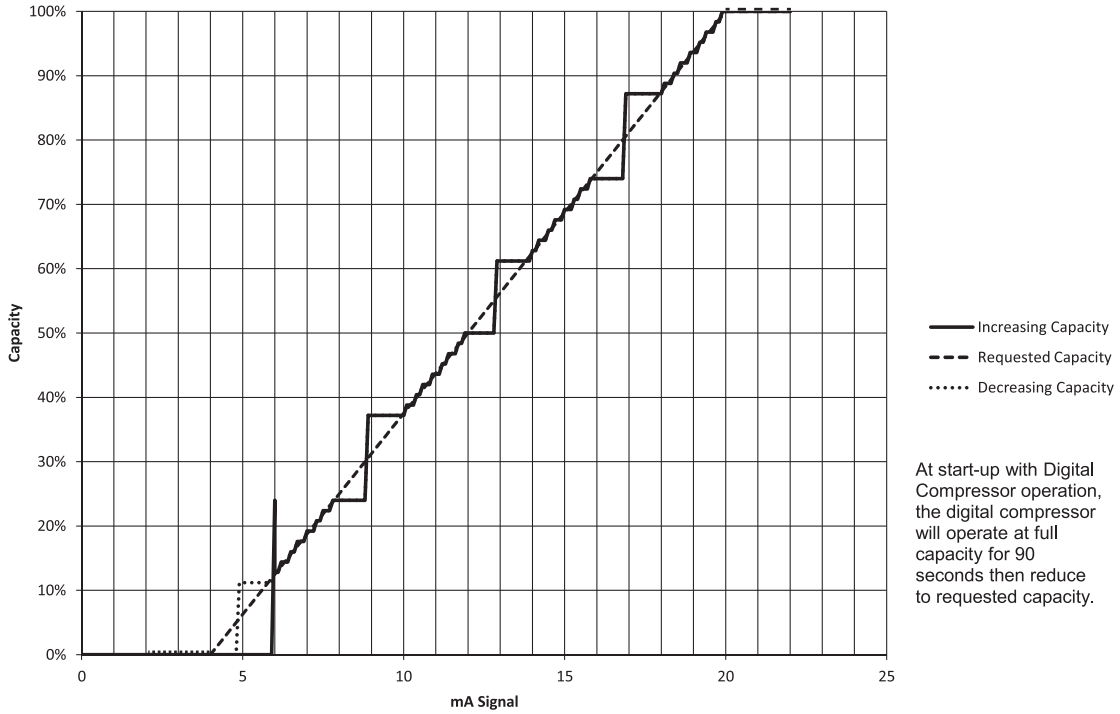


Fig. 102 — Capacity Loading, C.TYP=7
38RCD050, Non-Digital, Equal (Default) Circuit Loading, Circuit B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 103 — Capacity Loading, C.TYP=7
38RCD050, Digital, Equal (Default) Circuit Loading, Circuit A Leads

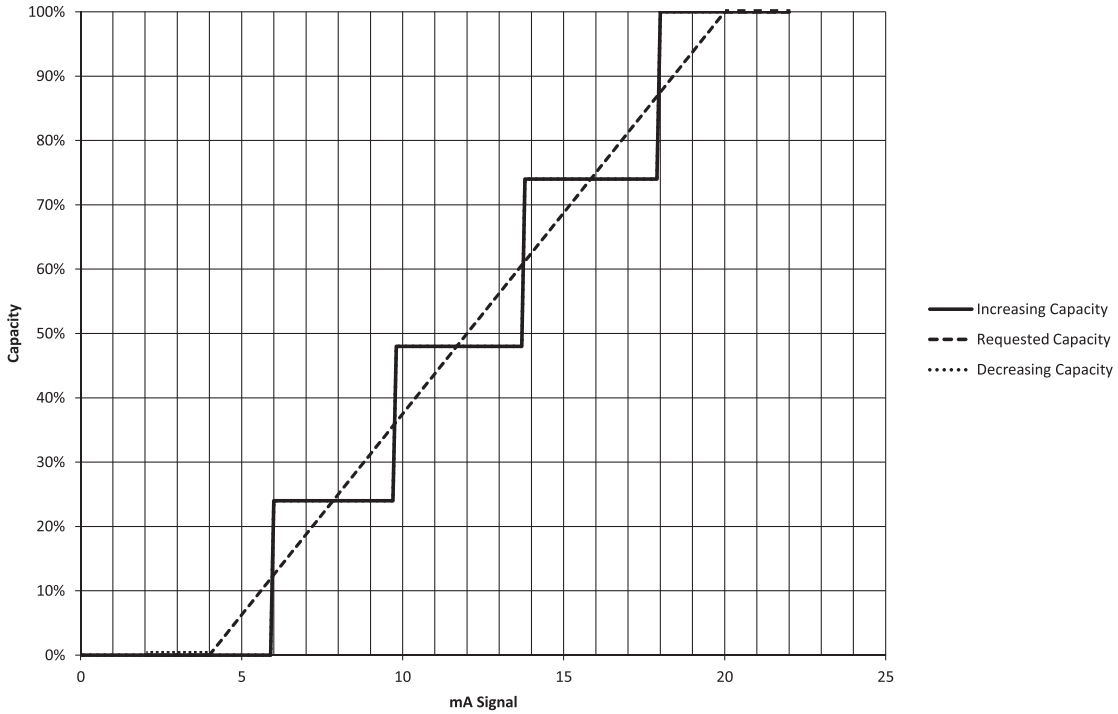


Fig. 104 — Capacity Loading, C.TYP=7
38RCD050, Non-Digital, Staged Circuit Loading,
Circuit A Leads

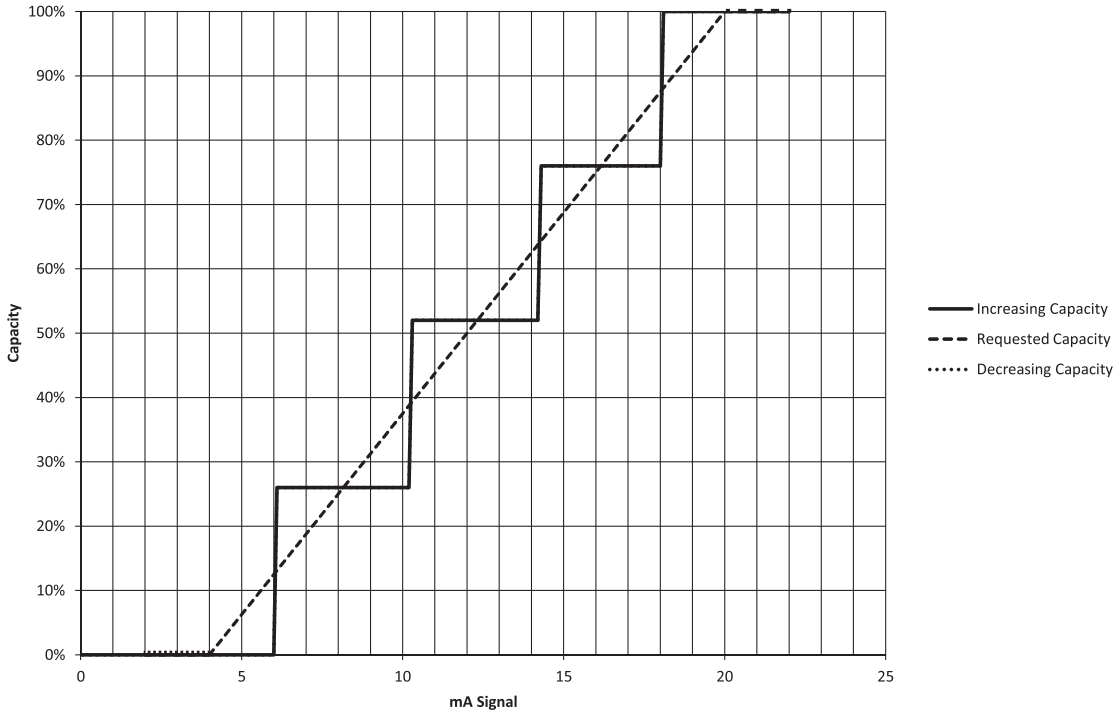


Fig. 105 — Capacity Loading, C.TYP=7
38RCD050, Non-Digital, Staged Circuit Loading,
Circuit B Leads

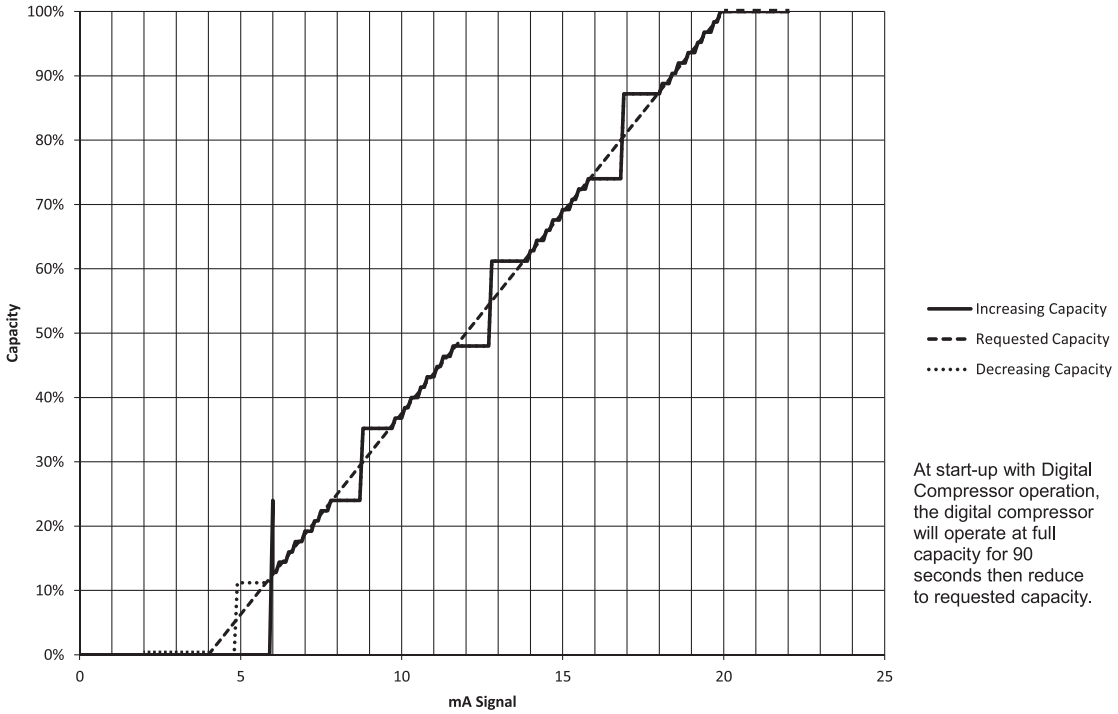


Fig. 106 — Capacity Loading, C.TYP=7 38RCD050, Digital, Staged Circuit Loading, Circuit A Leads

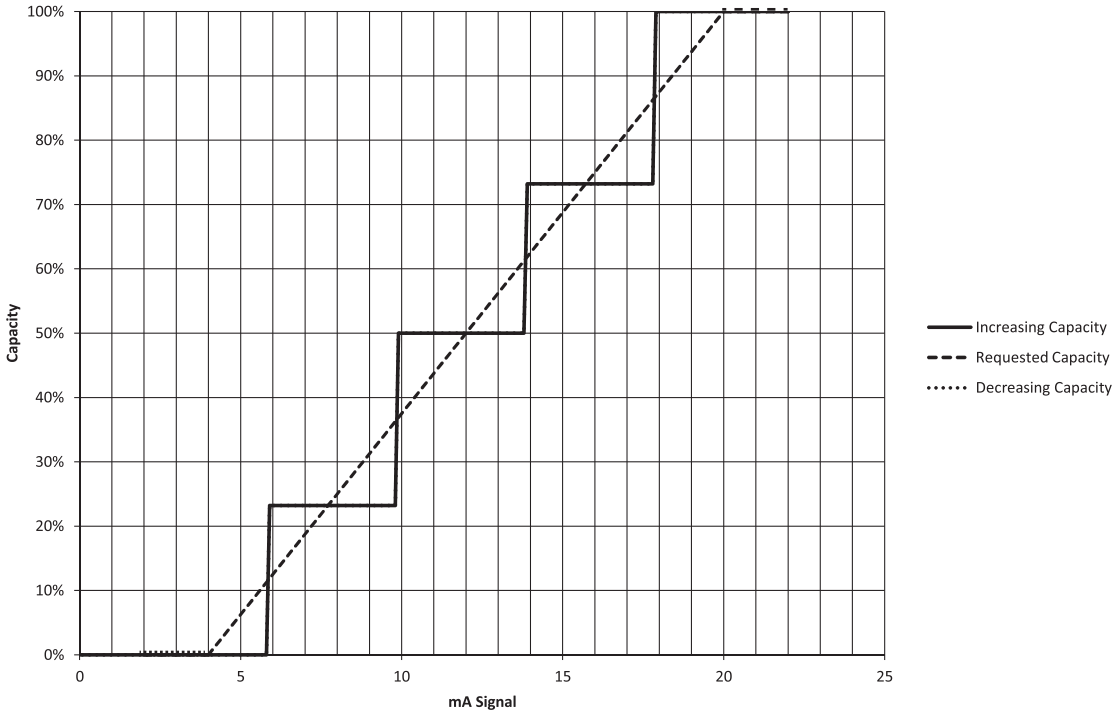


Fig. 107 — Capacity Loading, C.TYP=7 38RCD060, Non-Digital, Equal (Default) Circuit Loading, Circuit A Leads

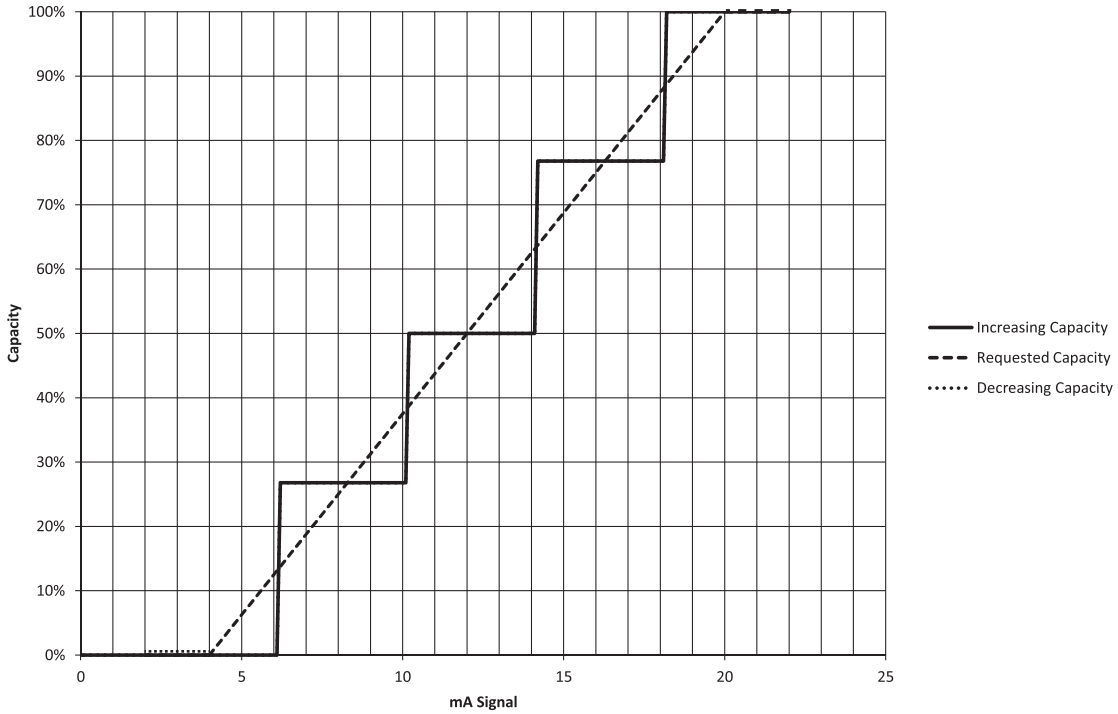
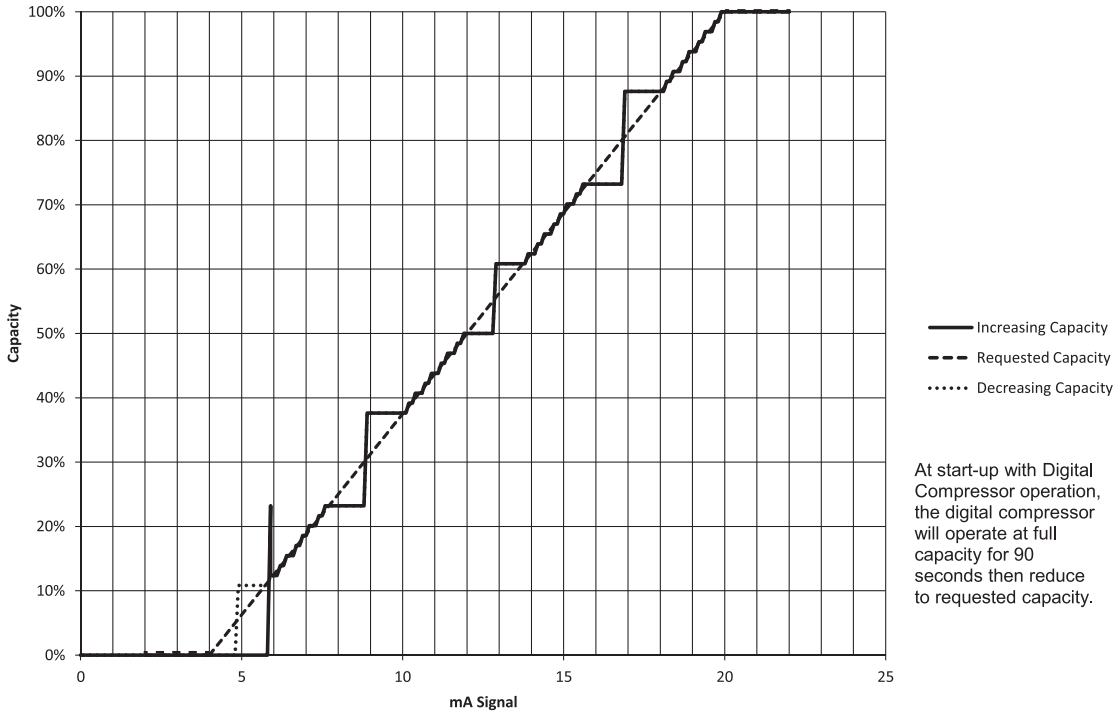


Fig. 108 — Capacity Loading, C.TYP=7 38RCD060, Non-Digital, Equal (Default) Circuit Loading, Circuit B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 109 — Capacity Loading, C.TYP=7 38RCD060, Digital, Equal (Default) Circuit Loading, Circuit A Leads

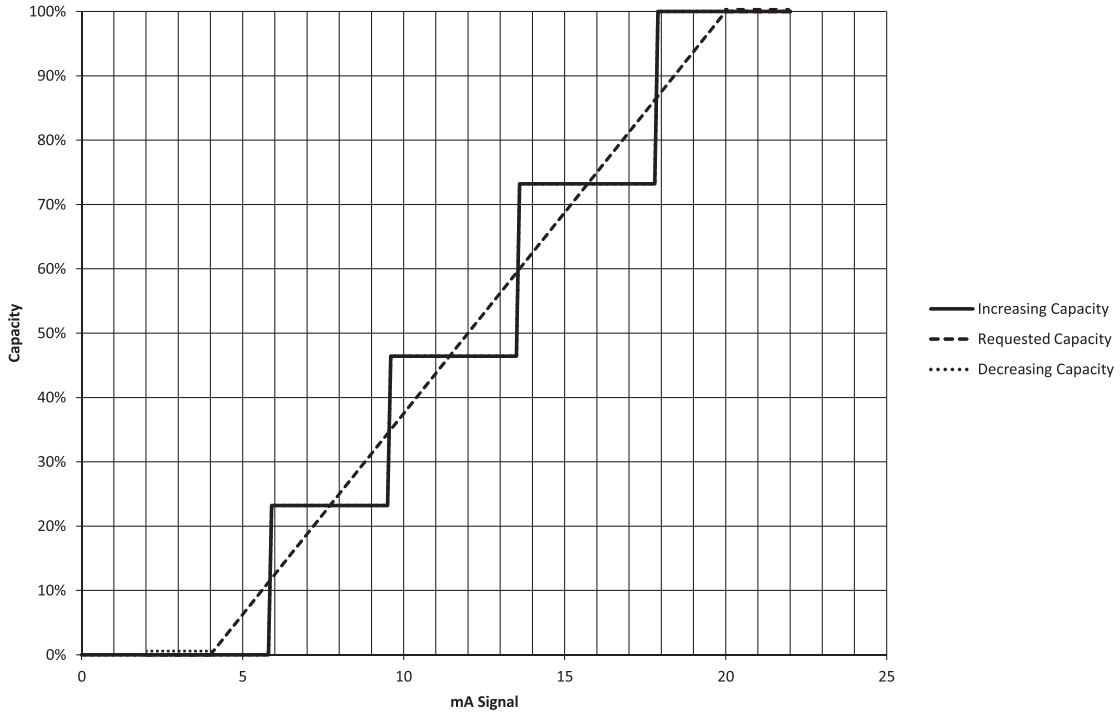


Fig. 110 — Capacity Loading, C.TYP=7 38RCD060, Non-Digital, Staged Circuit Loading, Circuit A Leads

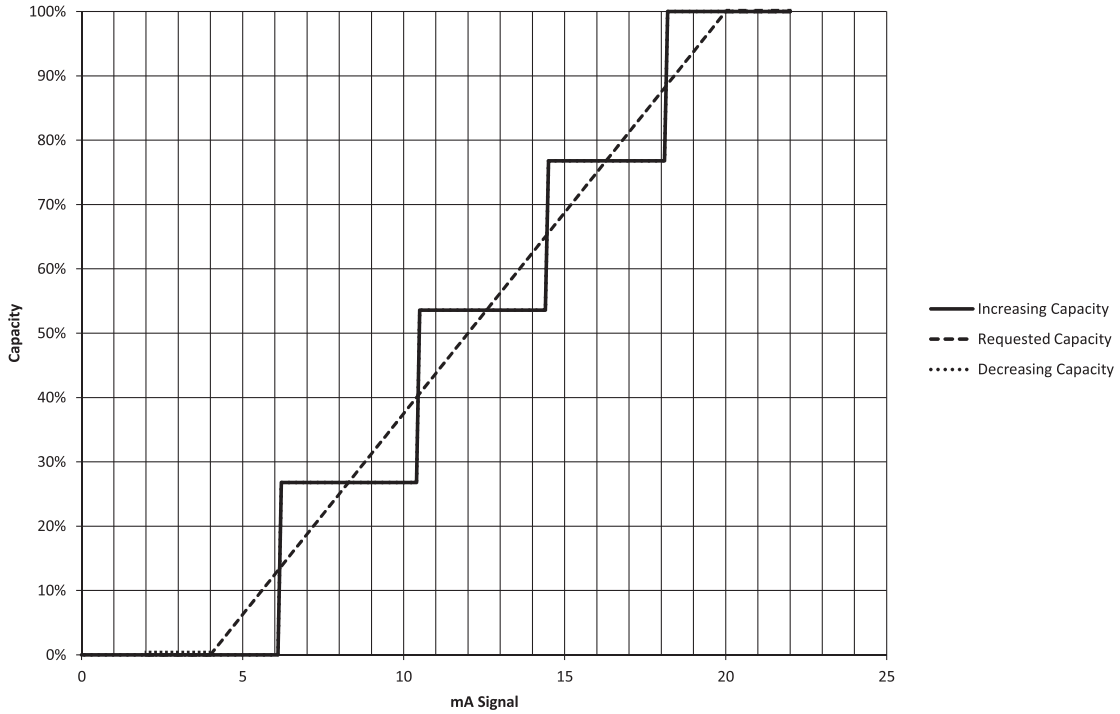


Fig. 111 — Capacity Loading, C.TYP=7 38RCD060, Non-Digital, Staged Circuit Loading, Circuit B Leads

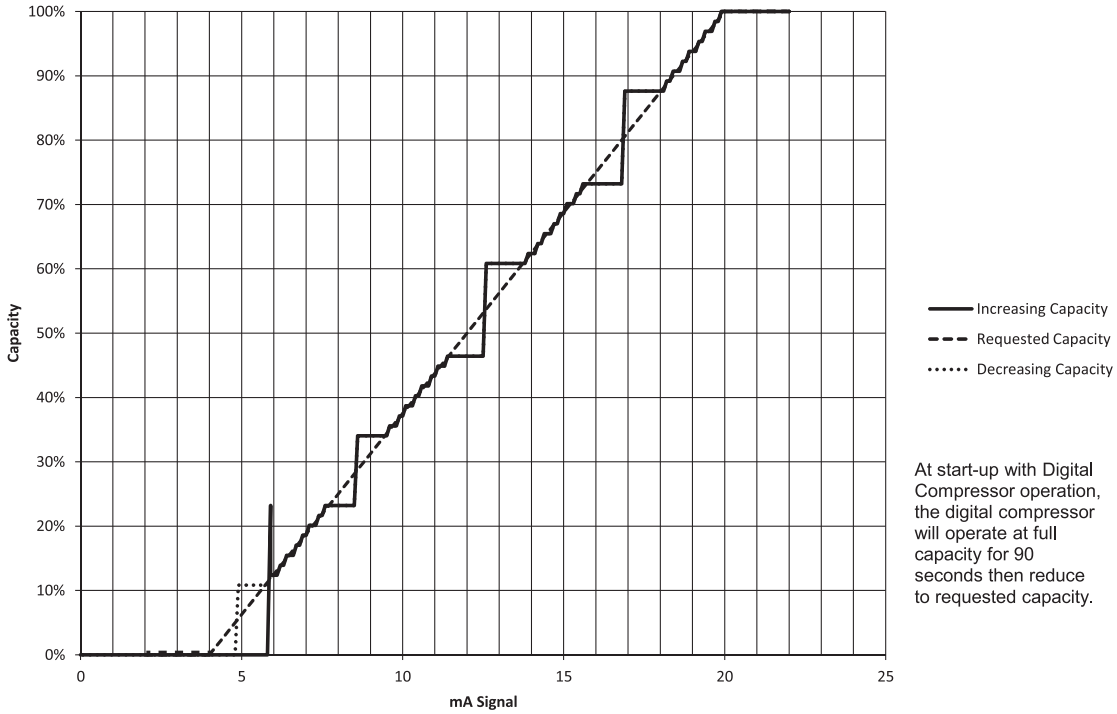


Fig. 112 — Capacity Loading, C.TYP=7
38RCD060, Digital, Staged Circuit Loading, Circuit A Leads

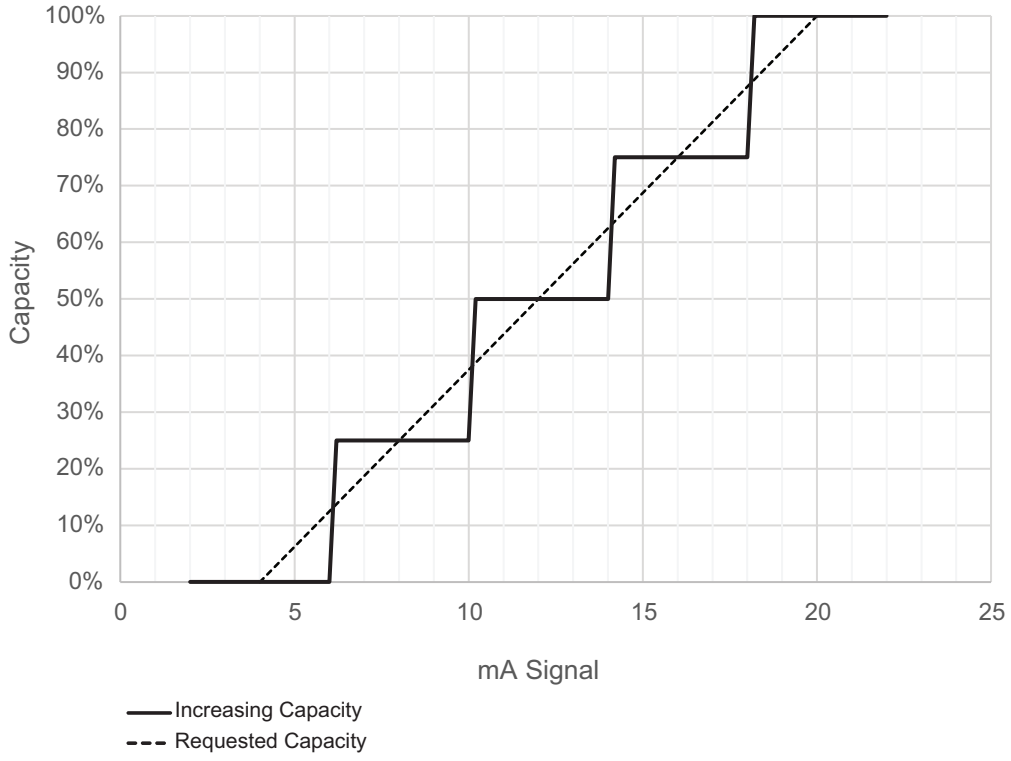


Fig. 113 — Capacity Loading, C.TYP=7
38RCD070, Non-Digital Equal or Staged Circuit Loading, Circuit A or B Leads

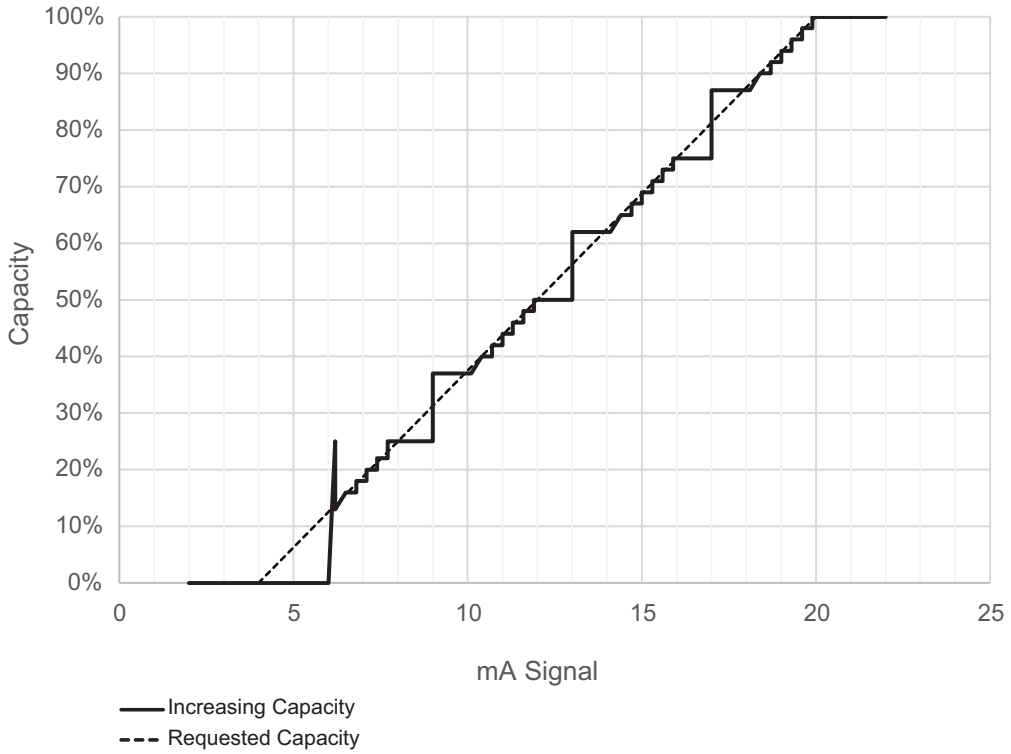


Fig. 114 — Capacity Loading, C.TYP=7
38RCD070, Digital Equal/Staged Circuit Loading, Circuit A Leads

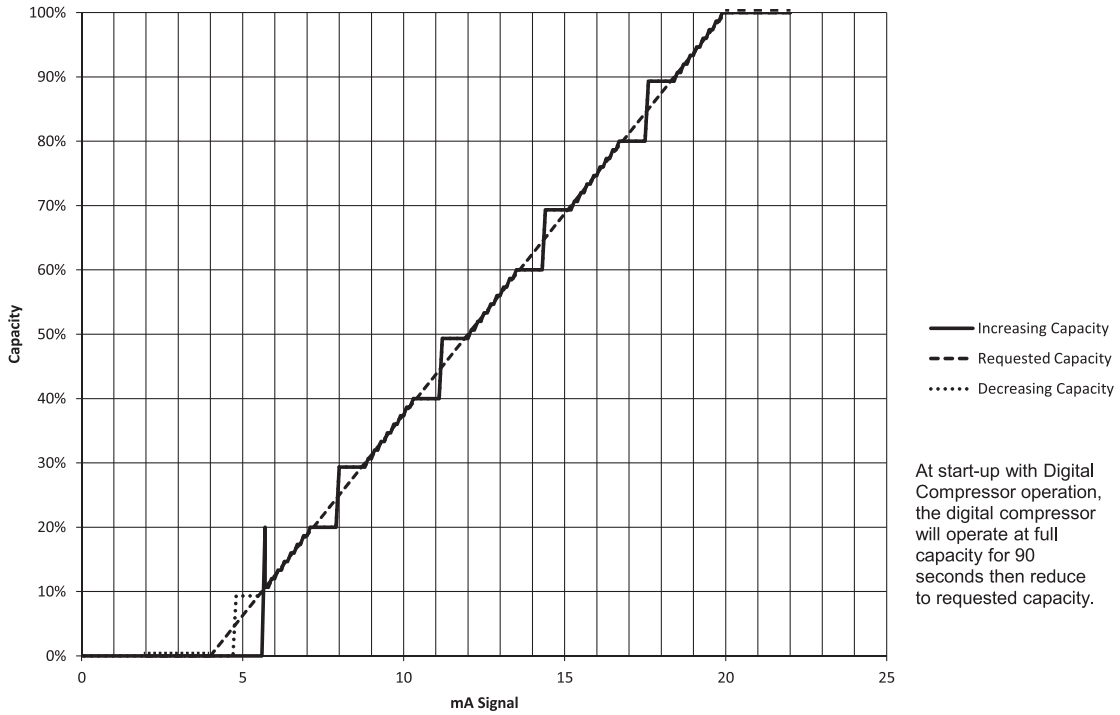


Fig. 115 — Capacity Loading, C.TYP=7
38RCD080, Digital, Equal (Default) or Staged Circuit Loading, Circuit A Leads

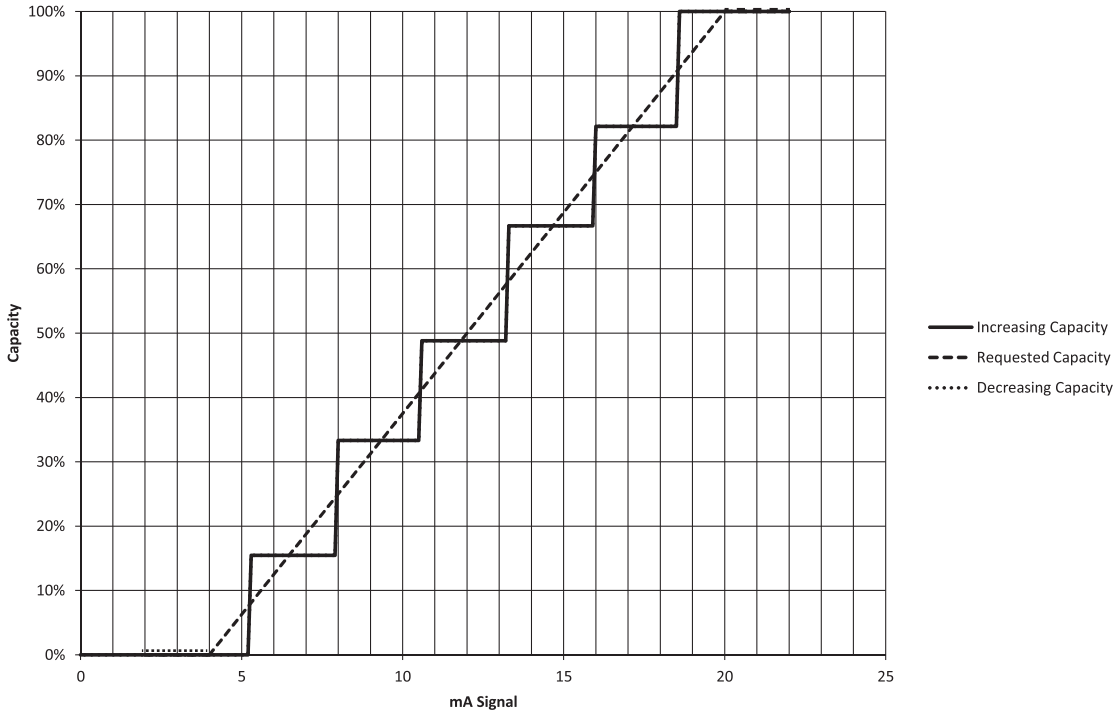


Fig. 116 — Capacity Loading, C.TYP=7
38RCD090, Non-Digital, Equal (Default) Circuit Loading,
Circuit A Leads

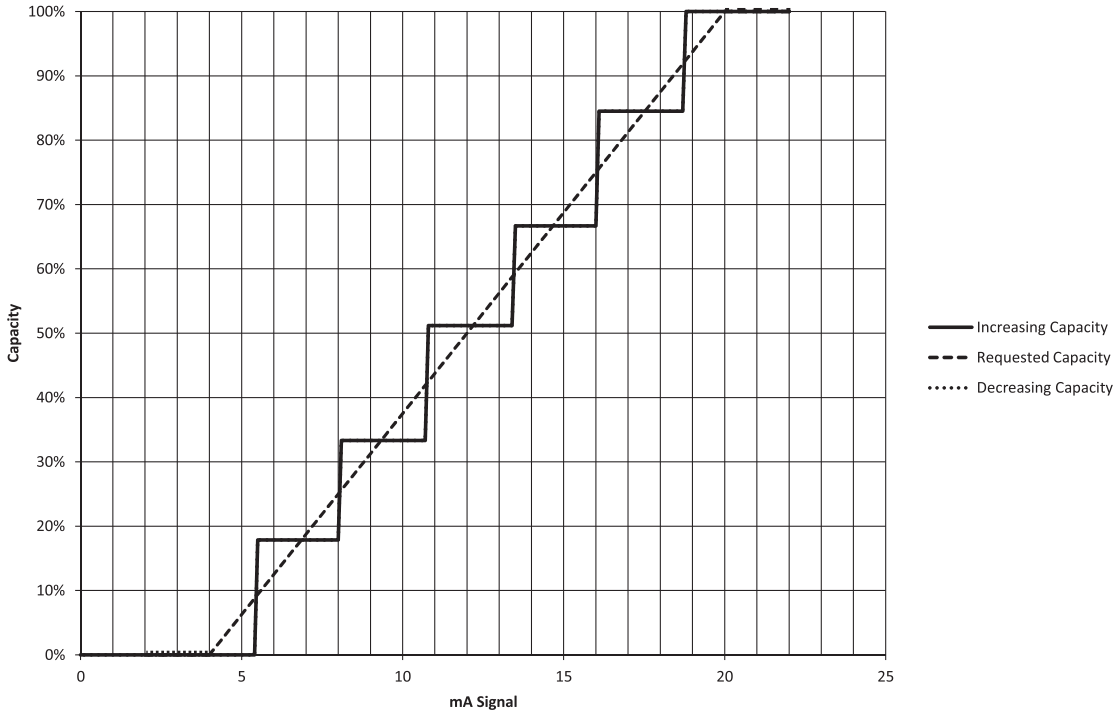


Fig. 117 — Capacity Loading, C.TYP=7
38RCD090, Non-Digital, Equal (Default) Circuit Loading,
Circuit B Leads

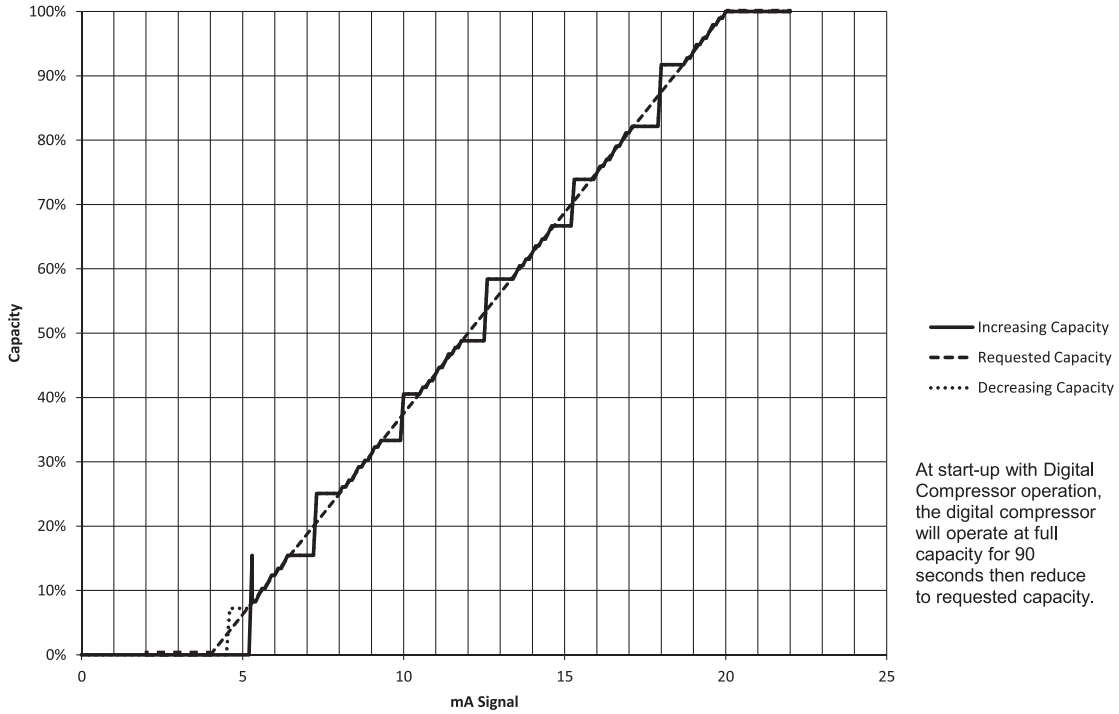


Fig. 118 — Capacity Loading, C.TYP=7 38RCD090, Digital, Equal (Default) Circuit Loading, Circuit A Leads

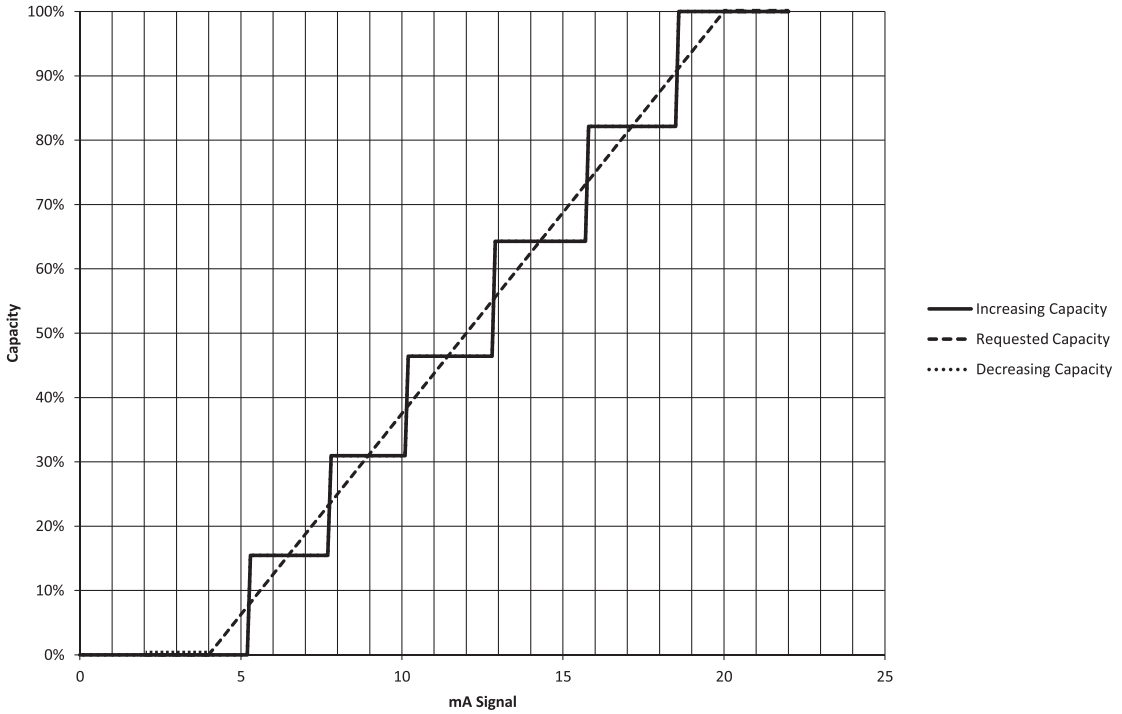


Fig. 119 — Capacity Loading, C.TYP=7 38RCD090, Non-Digital, Staged Circuit Loading, Circuit A Leads

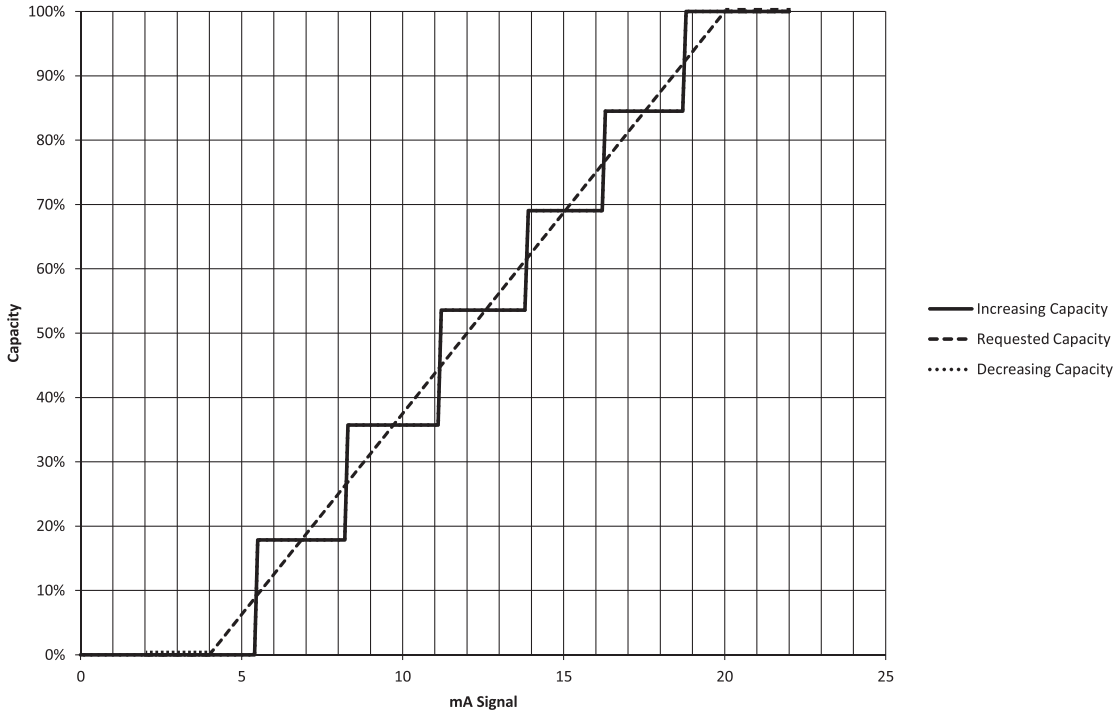
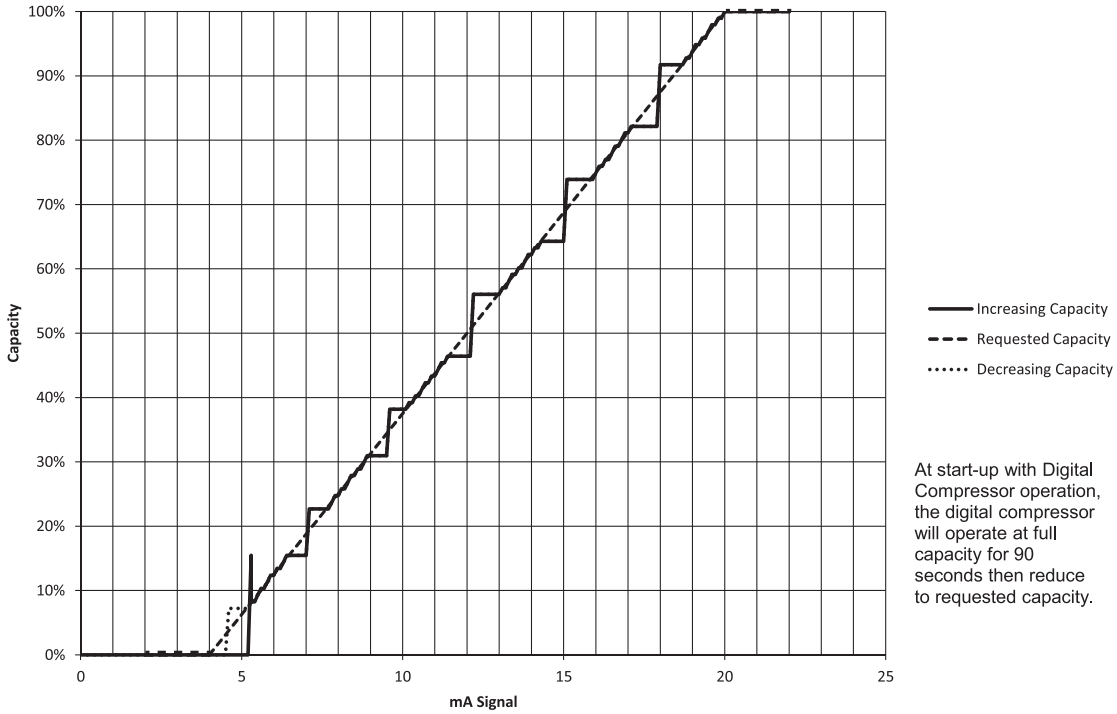


Fig. 120 — Capacity Loading, C.TYP=7 38RCD090, Non-Digital, Staged Circuit Loading, Circuit B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 121 — Capacity Loading, C.TYP=7 38RCD090, Digital, Staged Circuit Loading, Circuit A Leads

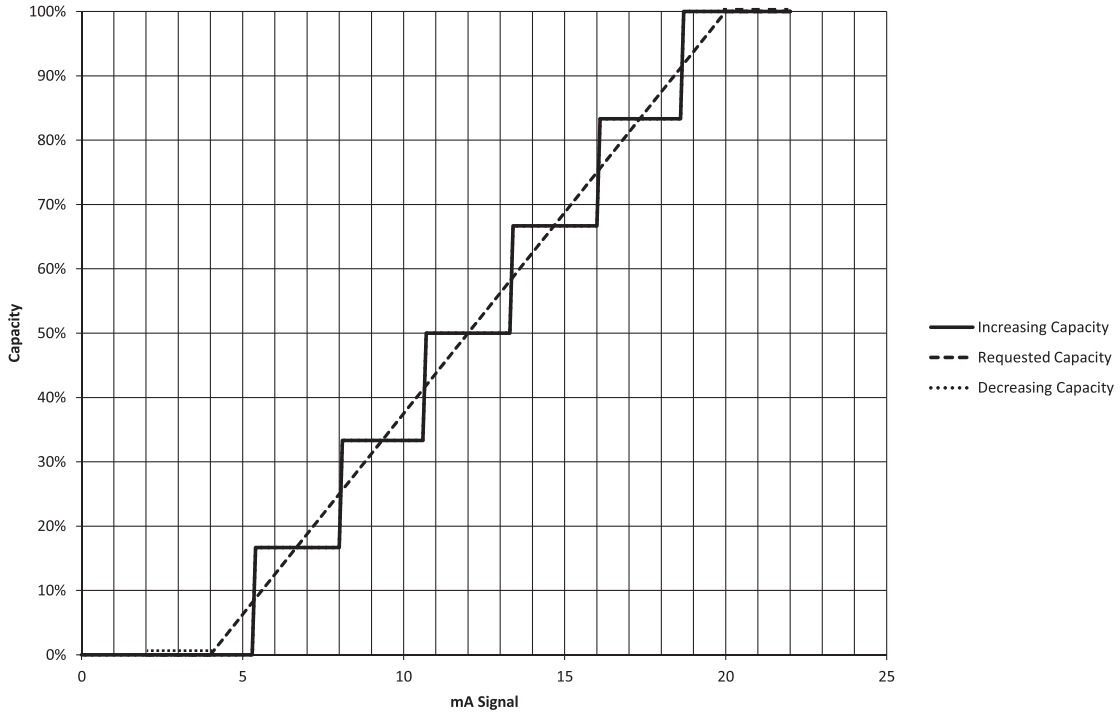
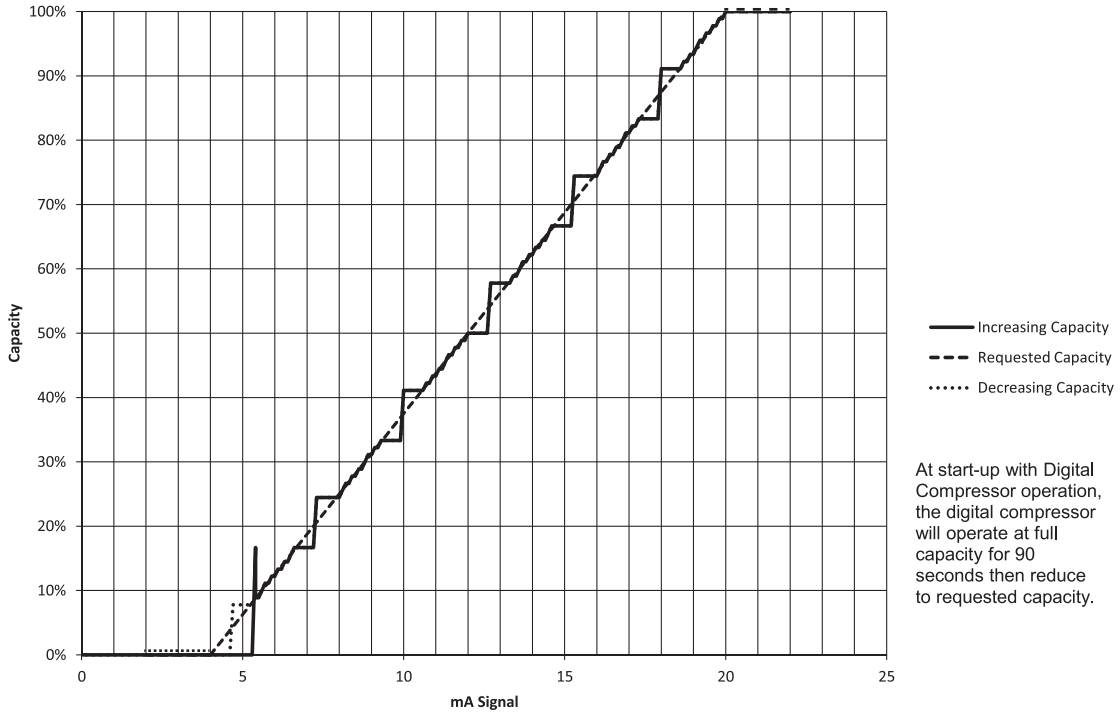


Fig. 122 — Capacity Loading, C.TYP=7
38RCD100, Non-Digital, Equal (Default) or Staged Circuit Loading, Circuit A or B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 123 — Capacity Loading, C.TYP=7
38RCD100, Digital, Equal (Default) or Staged Circuit Loading, Circuit A Leads

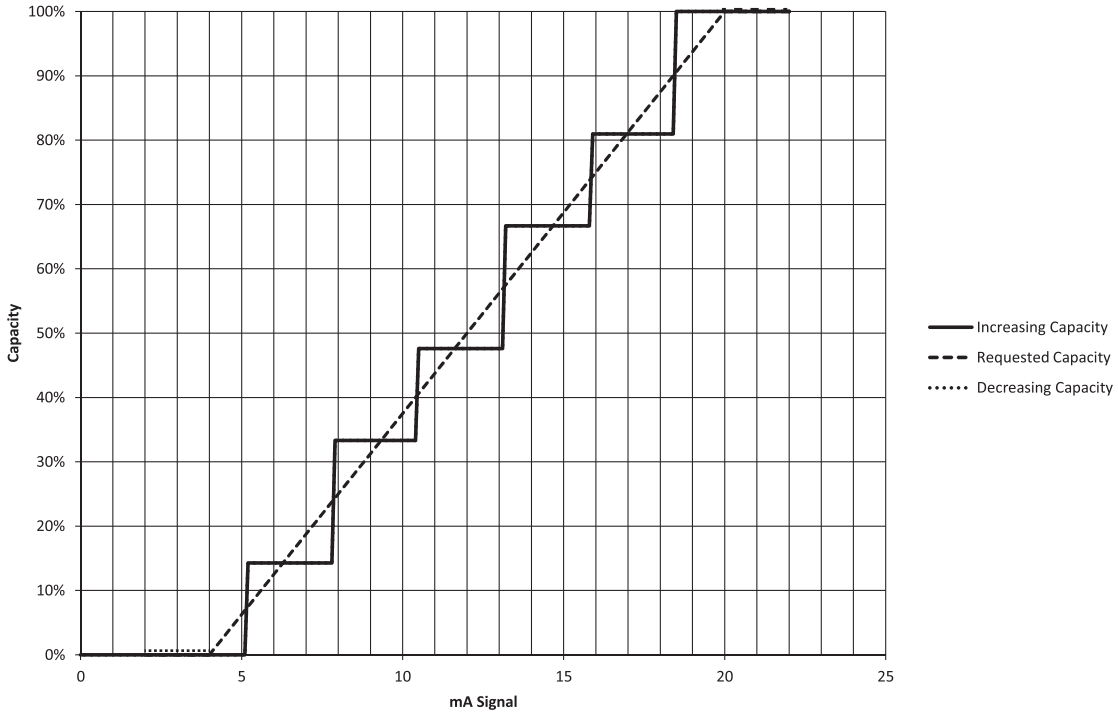


Fig. 124 — Capacity Loading, C.TYP=7 38RCD110, Non-Digital, Equal (Default) Circuit Loading, Circuit A Leads

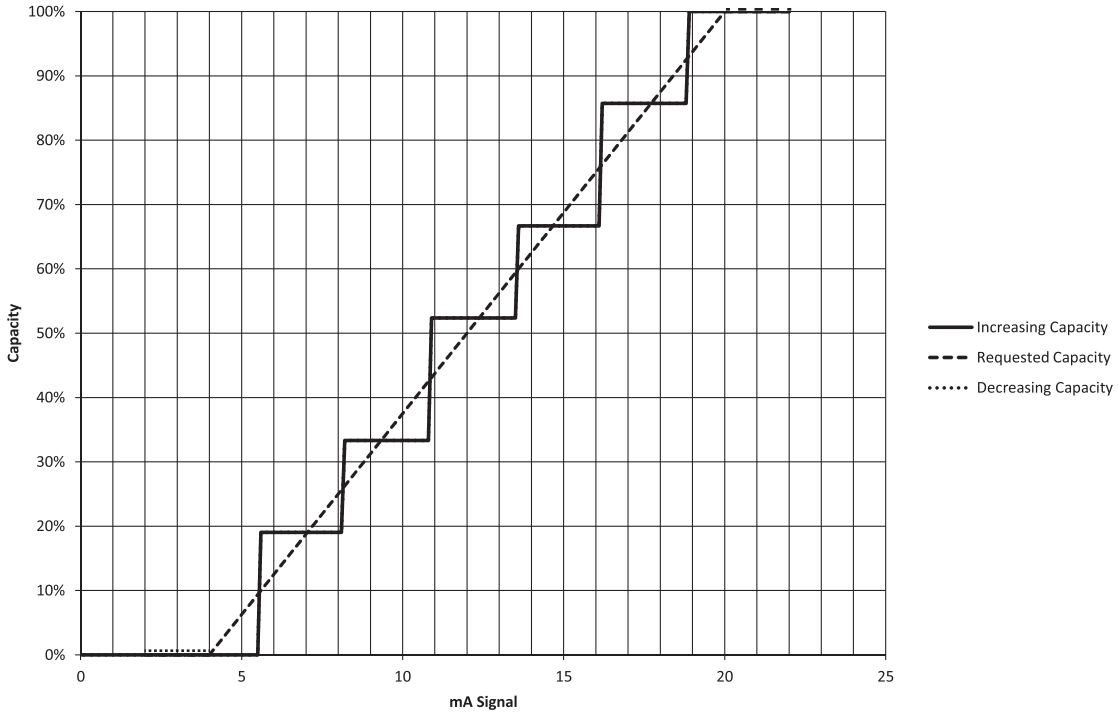


Fig. 125 — Capacity Loading, C.TYP=7 38RCD110, Non-Digital, Equal (Default) Circuit Loading, Circuit B Leads

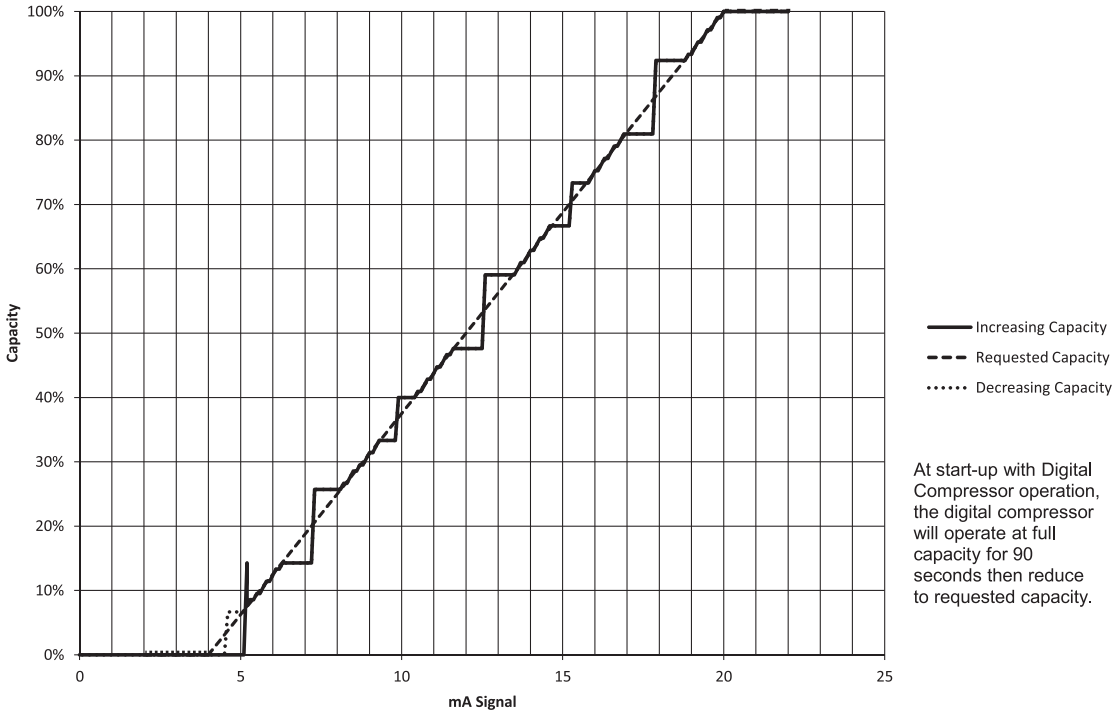


Fig. 126 — Capacity Loading, C.TYP=7 38RCD110, Digital, Equal (Default) Circuit Loading, Circuit A Leads

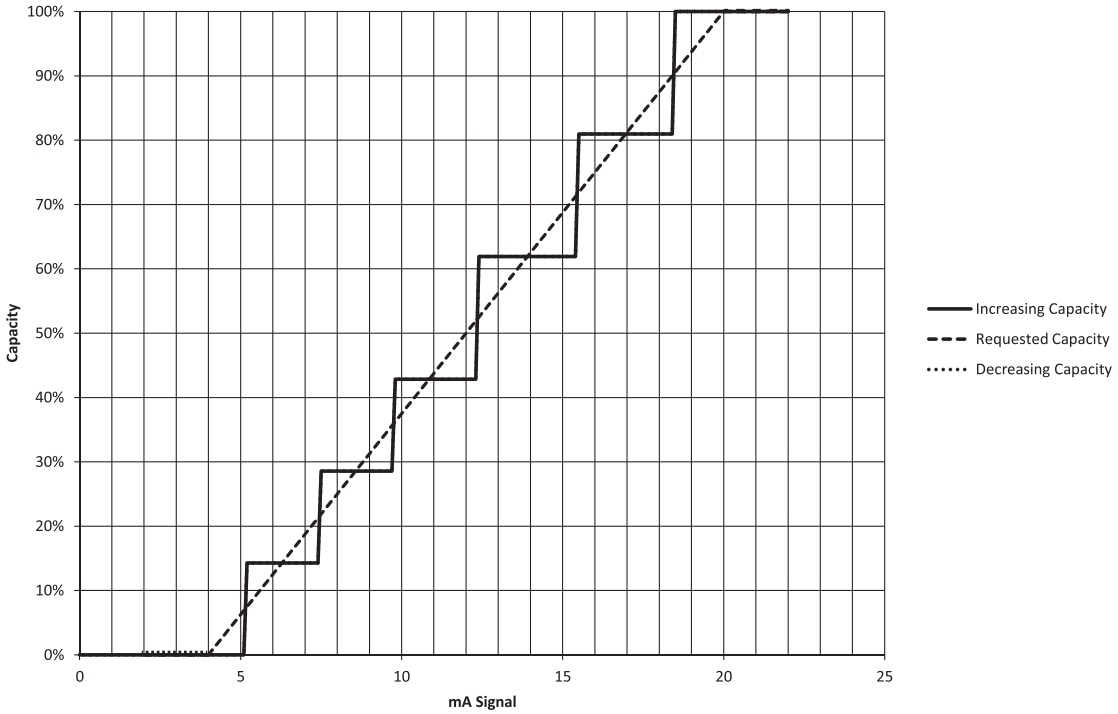


Fig. 127 — Capacity Loading, C.TYP=7 38RCD110, Non-Digital, Staged Circuit Loading, Circuit A Leads

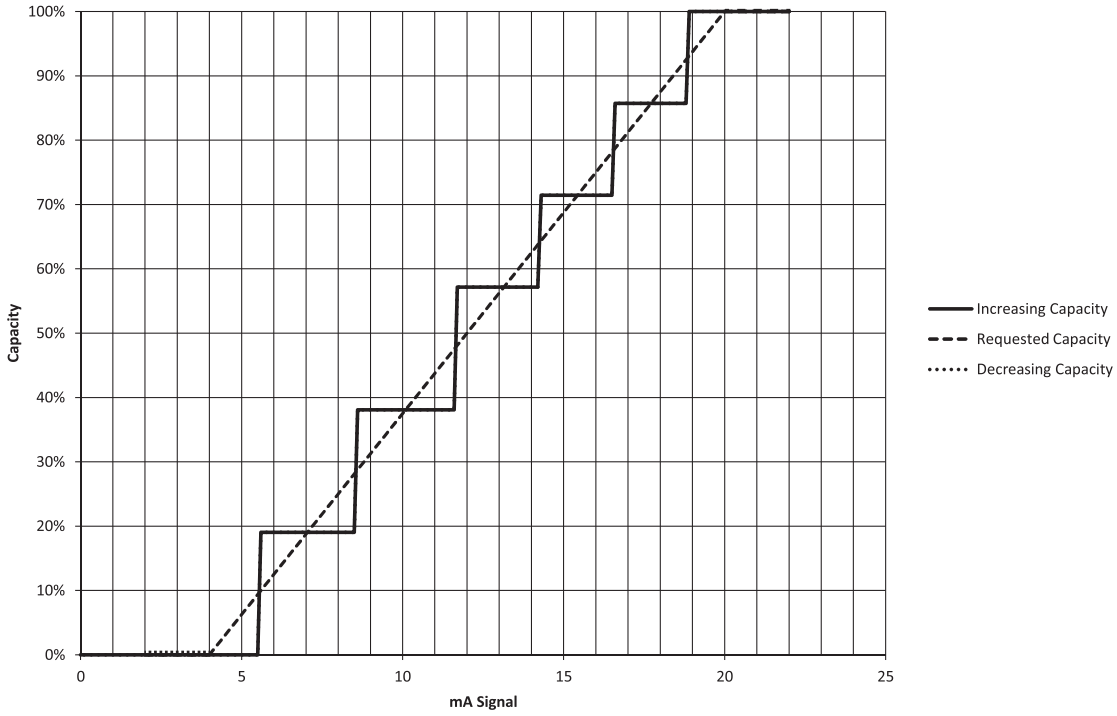
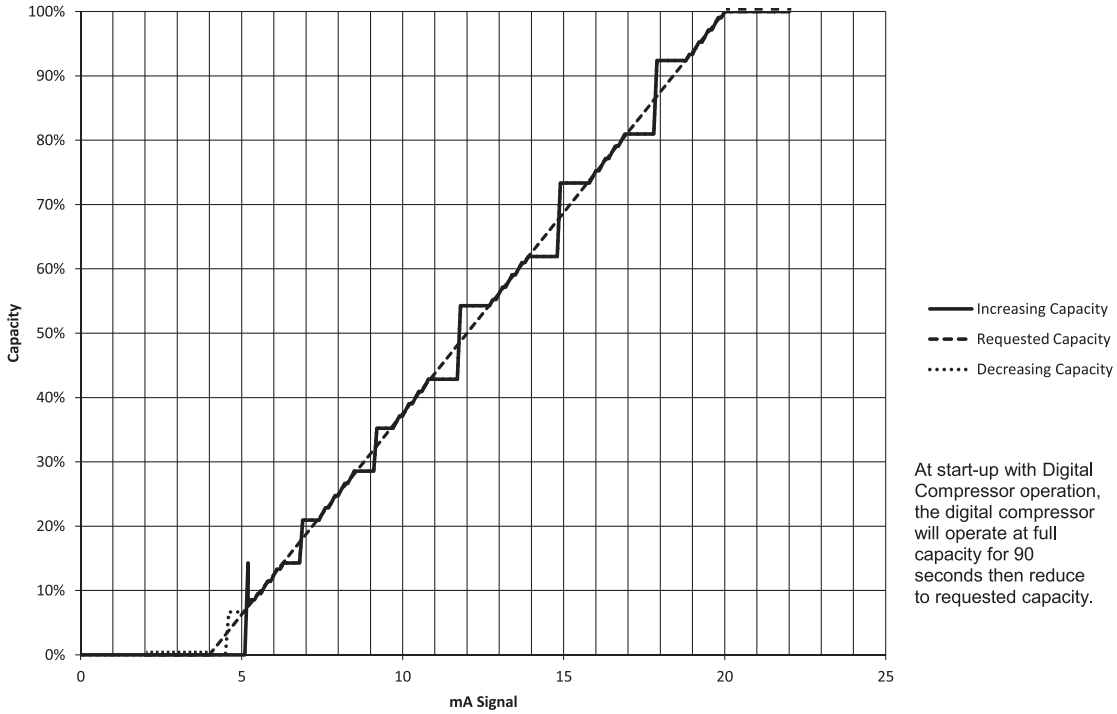


Fig. 128 — Capacity Loading, C.TYP=7 38RCD110, Non-Digital, Staged Circuit Loading, Circuit B Leads



At start-up with Digital Compressor operation, the digital compressor will operate at full capacity for 90 seconds then reduce to requested capacity.

Fig. 129 — Capacity Loading, C.TYP=7 38RCD110, Digital, Staged Circuit Loading, Circuit A Leads

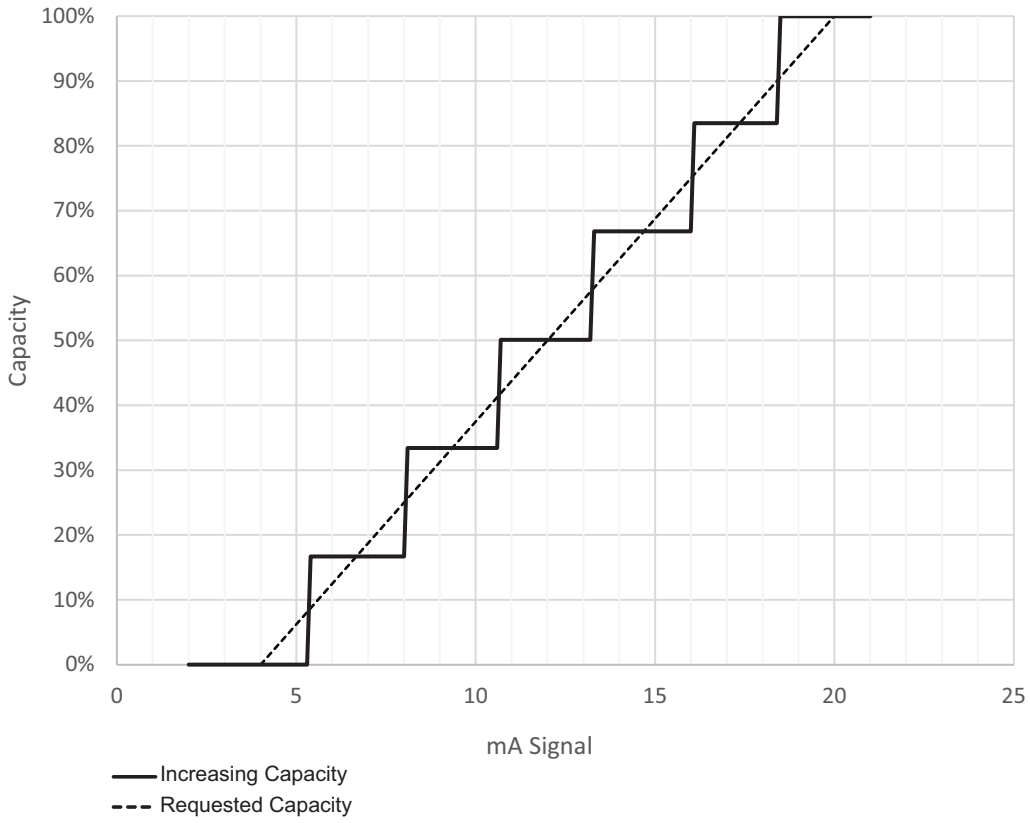


Fig. 130 — Capacity Loading, C.TYP=7
38RCD130, Non-Digital Equal (Default) or Staged Circuit Loading, Circuit A or B Leads

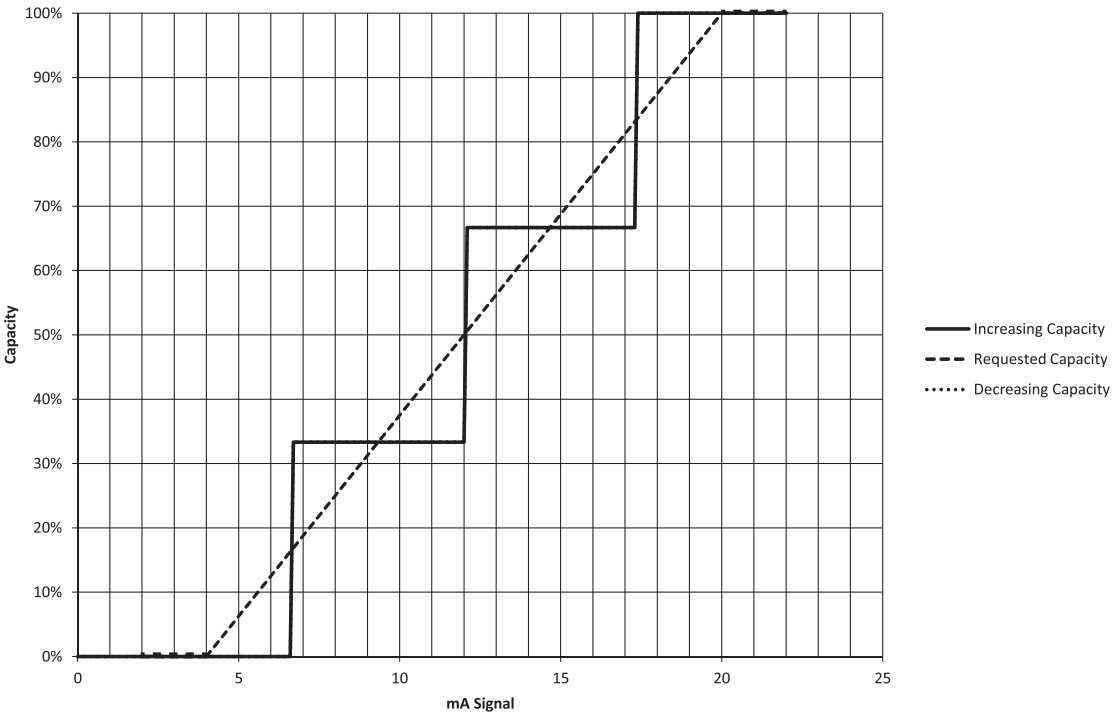


Fig. 131 — Capacity Loading, C.TYP=7
38RCS040-050, Non-Digital, Equal (Default) or Staged Circuit Loading, Circuit A Leads

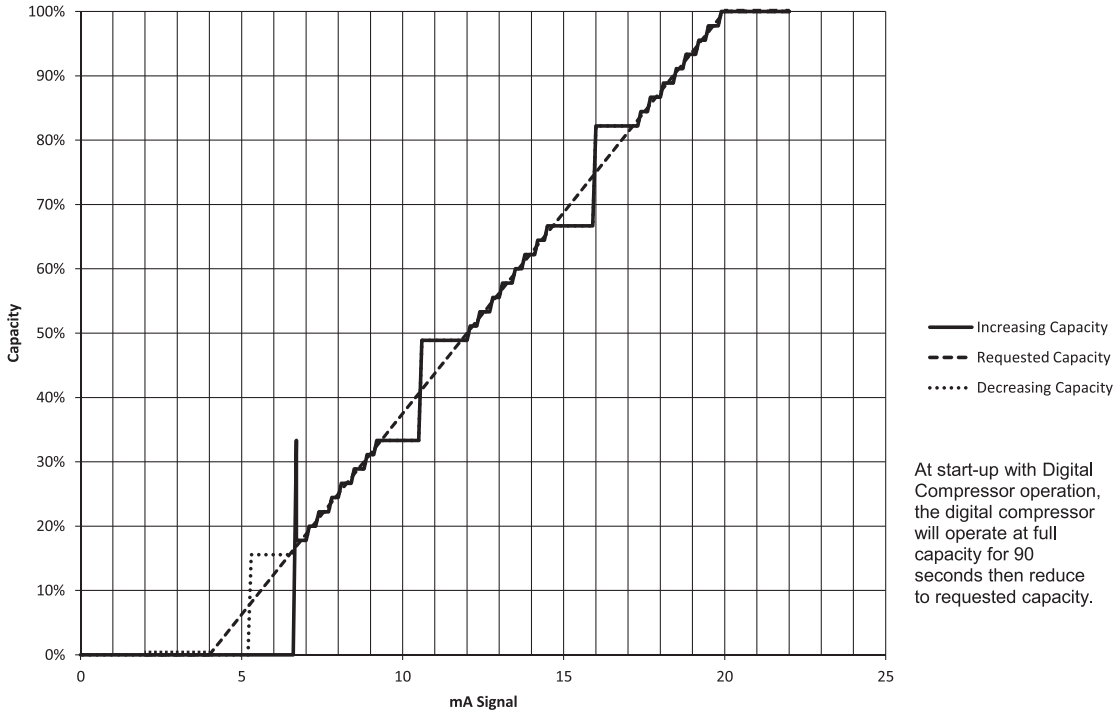


Fig. 132 — Capacity Loading, C.TYP=7
38RCS040-050, Digital, Equal (Default) Circuit Loading

***C.TYP* = 8** (DUAL TSTAT)

This configuration allows for the connection and control of a single 38RCD unit to two separate air handlers. The configuration allows the Carrier Controller to monitor the thermostat inputs from each of two separate thermostats to make a determination of mode and capacity for each circuit of the 38RCD unit. With this control scheme, Thermostat T1, Y1 and Y2 contacts operate circuit A. Thermostat T2, Y3 and Y4 contacts operate circuit B.

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage. If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

Recommended Applications

This control method is recommended for 38RCD dual-circuit units with two separate air handlers connected, one to each circuit. It is recommended for constant volume or 100% outdoor air applications. It can be used with or without digital compressors. This control method is recommended for 38RCD,dual circuit, units with two-stage thermostat control for each AHU. HGBP Control is supported by this control scheme. HGBP Control and digital compressor operation are not supported simultaneously and are only available on circuit A.

Hardware Requirements

- supply air sensor, one for each air handler
- return air sensor, one for each air handler
- energy management module
- 2 two-stage thermostats, one for each air handler
- 4 SPST relays for thermostat input

With this configuration, 4 to 20 mA demand limit is not available; single or 2-step demand limit is available. This control scheme requires a supply air sensor and a return air sensor or mixed air sensor. In lieu of wiring sensors to the 38RC unit, both values can be communicated via CCN. For information on broadcasting values, see Thermistors on page 39. ***Main Menu → Configuration Menu → Options 1 Configuration → RAT Thermistor Type*** (RAT Thermistor Type) and ***Main Menu → Configuration Menu → Options 1 Configuration → SAT Thermistor Type*** (SAT Thermistor Type) must be configured for the same type, either 5k or 10k type sensors, whether they are hardwired or their values are communicated to the controller.

Required Configurations

Table 52 lists the configurations required for proper operation.

Table 52 — C.TYP=8 (Dual Tstat) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPTIONS2	CTRLTYPE	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 8 (Dual Stat)

Recommended Settings

With this Control Type, CSP1 and CSP2 are used for Circuit A and SCP3 and CSP4 are used for Circuit B. ***CSP.2,4*** should be set to design Supply Air Temperature. ***CSP.1,3*** will depend on application. The difference between default values for ***CSP.1,3*** and ***CSP.2,4*** is 5°F (2.8°C). In most cases, the default differential is acceptable, but the application may require a smaller or larger difference. For example, a face split coil may a larger differential. ***CSP.1,3*** should be set to a value that allows unit to operate without rapid cycling. ***CSP.1,3*** should be greater than ***CSP.2,4*** to allow unit to produce a lower supply air temperature when Y2 is made, if unit has the available capacity.

Wiring

See Fig. 133.

Sequence of Operation

The Carrier Controller monitors the thermostat inputs to make a determination of Active Set Point (***Main Menu → Status Tables → General Unit Paramters → Active Set Point***). Active Setpoint2 is used for Circuit B. The control will vary the Active Set Point based on Y1 and Y2 inputs. When Y1 is closed, Y3 for Circuit B, Cooling Setpoint 1 (***Main Menu → Setpoints → Cooling Setpoint 1***) will be used, Cooling Setpoint 3 for Circuit B, and when Y2 is closed, Y4 for Circuit B, Cooling Setpoint 2 (***Main Menu → Setpoints → Cooling Setpoint 2***), Cooling Setpoint 4 for Circuit B, will be used as the basis for the Active Set Point, ***SP***. Thermostat inputs can be monitored at the unit's interface device, Y1Thermostat Input (***Main Menu → Status Tables → General Unit Paramters → Y1 Thermostat Input***) and Y2 Thermostat Input (***Main Menu → Status Tables → General Unit Paramters → Y2 Thermostat Input***). With this type of control, the Carrier Controller capacity control routine stages compressor capacity to attempt to meet the current Control Point (***Main Menu → Status Tables → General Unit Paramters → Control Point***) for each circuit independently. The Control Point is the Active Set Point (***SP***) adjusted for any temperature reset that is applied. See Temperature Reset on page 141 for additional information. Temperature reset is applied to both circuits of the unit. For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) and inputs must allow the machine to run.

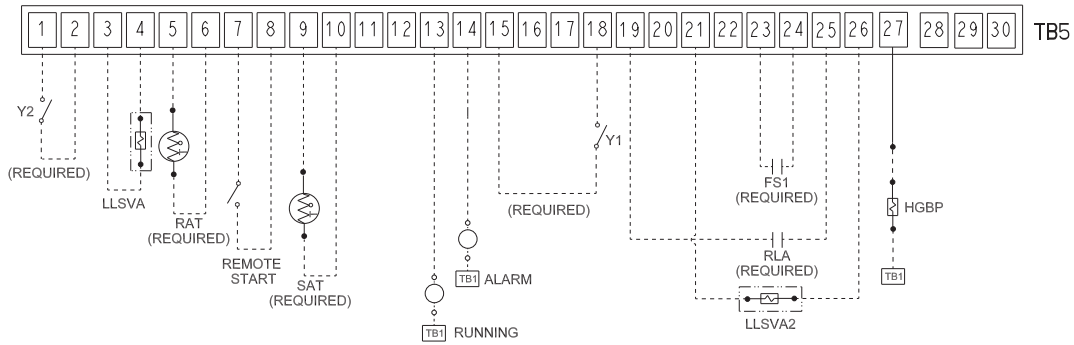
See "Machine Control Methods" on page 35 for additional information. On power up or changing from Off to Enabled, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid line solenoid valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG (Time Guard Active) on page 136.

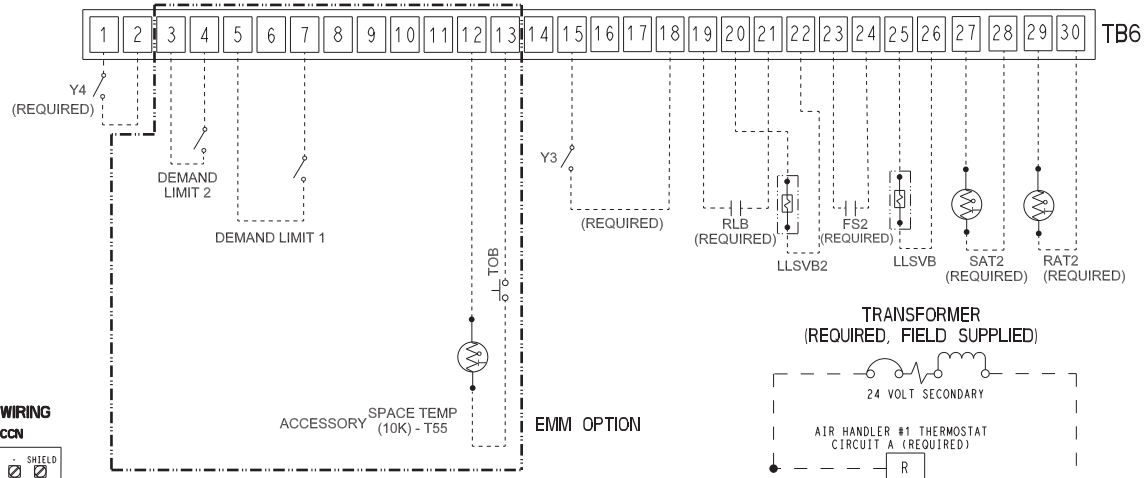
In this Control Type, Space Temp Control Mode, ***Main Menu → Status Tables → General Unit Paramters → Space Temp Control Mode=0*** (Off Cool) as long as Control Mode ***Main Menu → Status Tables → General Unit Paramters → Control Mode=1*** (Off Local), ***2*** (Off CCN), ***3*** (Off Time), or ***4*** (Off Emrgcy). When the Control Mode ***STAT=5*** (On Local), ***6*** (On CCN), or ***7*** (On Time), ***SPT.M=1*** (Lo Cool) if Y1 is closed, ***Main Menu → Inputs → Input Status → Y1 Thermostat Input*** (High Cool) if Y2 is closed, ***Main Menu → Inputs → Input Status → Y2 Thermostat Input***. If Y1 and Y2 are both open, ***Y.1=OFF*** and ***Y.2=OFF***, ***SPT.M=0*** (Off Cool) will be displayed. In this Control Type, if the Indoor Fan Status Switch opens (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA=OFF***), Indoor Fan Status CIRB for circuit B, Control Mode (***STAT***) will change to ***8*** (IDFS Not On) as long as there is no call for cooling, ***Y.1=OFF*** and ***Y.2=OFF***. If there is a call for cooling, ***Y.1=ON*** or ***Y.2=ON*** the unit will alarm and ***STAT*** switch to 4 (Off Emrgcy). Table 53 shows the space temperature control mode response for ***C.TYP=8***, and Table 54 lists the configurations required for proper operation.

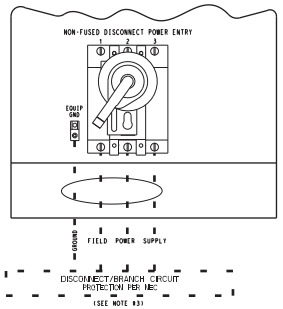
NOTES:
1. FACTORY WIRING IS IN ACCORDANCE WITH UL 60335-40-2 STANDARDS. FIELD MODIFICATIONS MUST BE IN COMPLIANCE WITH ALL APPLICABLE CODES.
2. ALL UNITS OR MODULES HAVE SINGLE POINT PRIMARY POWER CONNECTION. MAIN POWER MUST BE SUPPLIED FROM A FIELD OR FACTORY SUPPLIED DISCONNECT.
3. WIRING FOR MAIN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

CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	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 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-130	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-130	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

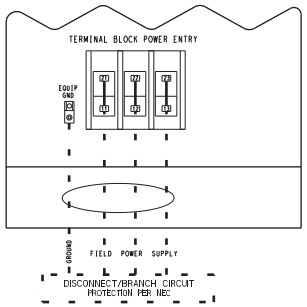
4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCHES (FS1 AND FS2) ARE REQUIRED.
8. ENERGY MANAGEMENT OPTION REQUIRED DEMAND LIMIT SWITCHES.
9. THIS CONTROL SCHEME IS NOT ALLOWED FOR SINGLE CIRCUIT UNITS, 38RCS025-060.
10. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.



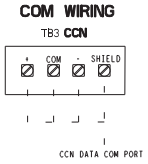


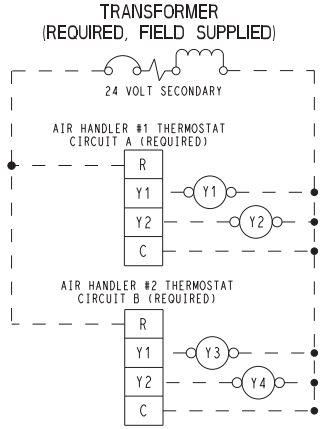


NON-FUSED DISCONNECT



TERMINAL BLOCK





LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE
VAV	- VARIABLE AIR VOLUME
Y1	- STAGE 1 COOLING
Y2	- STAGE 2 COOLING
Y3	- STAGE 3 COOLING (STAGE 1 FOR DUAL AHU)
Y4	- STAGE 4 COOLING (STAGE 2 FOR DUAL AHU)

- - - FIELD POWER WIRING
— — — FIELD CONTOL WIRING
——— FACTORY INSTALLED WIRING
[ ] FACTORY INSTALL OPTION

C.TYP-8 (DUAL AHU/TSTAT) WIRING
(DUAL CIRCUIT UNITS ONLY)

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:1E998	7 OF 8	09/22/25	-	38RC 025T-130T ELECTRICAL -	38RC60001040	-

Fig. 133 — C.TYP=8 (Dual Tstat) Wiring

Table 53 — Space Temperature Control Mode Response for C.TYP=8

CONTROL MODE *STAT*	Y1 STATUS Y.1 AND/OR Y3 STATUS Y.3	Y2 STATUS Y.2 AND/OR Y4 STATUS Y.4	INDOOR FAN STATUS CIR A ID.F.A AND/OR INDOOR FAN STATUS CIR B ID.F.B	SPACE TEMPERATURE CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
2 (Off CCN)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
3 (Off Time)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
4 (Off Emrgcy)	***Off*** or ***On***	***Off*** or ***On***	***Off*** or ***On***	***0*** (Off Cool)
5 (On Remote)	Off	Off	Off or On	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
6 (On CCN)	Off	Off	Off or On	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
7 (On Time)	Off	Off	Off or On	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)
8 (IDFS Not On)	***Off***	***Off***	Off	***0*** (Off Cool)
9 (SPT Satisfied)	Not Applicable			
10 (On Local)	Off	Off	Off or On	***0*** (Off Cool)
	On	Off	On	***1*** (Lo Cool)
	Off or ***On***	On	On	***2*** (Hi Cool)

Table 54 — C.TYP=8 (Tstat Multi w/Dual Air Handlers) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPTIONS1	RAT.T	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SAT.T	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
OPTIONS2	C.TYP	X	Machine Control Type	Default: 4 Range: 1 to 9 (except 2,6) Set Item to 8 (Tstat Multi w/Dual AH)
SETPOINTS MODE				
SETPOINT	CSP.1	XX.X	Cooling Setpoint 1	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 60.0°F (15.6°C) Set for desired Supply Air Temperature with Y1 input.
	CSP.2	XX.X	Cooling Setpoint 2	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 55.0°F (12.8°C) Set for desired Supply Air Temperature with Y2 input. Should be lower than CSP.1
	CSP.3	XX.X	Cooling Setpoint 3	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 60.0°F (15.6°C) Set for desired Supply Air Temperature with Y3 input.
	CSP.4	XX.X	Cooling Setpoint 4	Range: 40.0 to 80.0°F (4.4 to 26.7°C) Default: 55.0°F (12.8°C) Set for desired Supply Air Temperature with Y4 input. Should be lower than CSP.1

38RCD Units

On a circuit A call for cooling, Y1 closure, Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. On a circuit B call for cooling, Y3 closure, Indoor Fan Status Cir B (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRB***) is checked. The circuit fan status switch must be closed before the capacity routine will start for the circuit. The lead compressor of the circuit will be determined and started. See Circuit Compressor Staging on page 117. The solenoid corresponding to the circuit is opened 30 seconds after the Y1 or Y3 closure. The lead compressor is started 20 seconds later. Compressors will be staged at 70-second intervals until the unit's capacity is at 100% or the active setpoint for the circuit is met. When the Y2 or Y4 contact is closed, the controls will adjust the active setpoint based on Cooling Setpoint 2 or 4 depending on the circuit. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

***C.TYP* = 9** (VAV SETPOINT)

With this configuration, the 38RC unit operates as a VAV unit and controls unit capacity in an attempt to meet a field-supplied 4 to 20 mA supply air temperature request, by staging compressors to attempt to meet the current Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***). A field-supplied 4 to 20 mA signal determines the Active Setpoint (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***). The Control Point is the Active Setpoint adjusted for any temperature reset that is applied. See Temperature Reset on page 130 for information on Temperature Reset.

NOTE: For proper operation of this control type, the full face of the evaporator coil must be active any time a circuit is on. If a full face active coil is not supplied, poor capacity control will result and may cause compressor damage.

If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils.

This configuration is compatible with both standard and digital compressors.

Recommended Applications

This control type is used when variable supply air set points are required and determined by a third-party Building Management System.

Hardware Requirements

- 4 to 20 mA generator
- return/mixed air sensor
- supply air sensor

This control scheme requires a supply air sensor and a return air sensor or mixed air sensor. In lieu of wiring sensors to the 38RC unit, both values can be communicated via CCN to the 38RC unit. For information on broadcasting values, see Thermistors on page 39. The Supply air thermistor, ***Main Menu → Configuration Menu → Options 1 Configuration → SAT Thermistor Type*** (SAT Thermistor Type) and ***Main Menu → Configuration Menu → Options 1 Configuration → RAT Thermistor Type*** (RAT Thermistor Type) must be configured for the same type, either 5k or 10k type sensors, whether they are hard wired or their values are communicated to the controller.

Required Configurations

Table 55 lists the configurations required for proper operation.

Recommended Settings

With this Control Type, ***CSP.1*** should be set to the design supply air temperature used most often.

Wiring

See Fig. 134.

Sequence of Operation

The 4-20 mA Cooling Set Point (***Inputs → 4-20 → CL.MA)*** is translated into a desired active set point ranging from 40 to 80°F (4.4 to 26.7°C). The control translates the input linearly with 4 mA equal to 40°F (4.4°C) and 20 mA equal to 80°F (26.7°C) as the basis for the Active Set Point (***Main Menu → Status Tables → Status Input → Active Setpoint***). With the loss of the field-supplied signal, the Active Setpoint will change to Cooling Set Point 1 (***Main Menu → Setpoints → Cooling Setpoint 1***). See Fig. 135 and 136.

The Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) is the Active Set Point (***SP***) or Cooling Set Point 1 (***CSP.1***) adjusted for any temperature reset that is applied. See Temperature Reset on page 130 for additional information.

For mechanical cooling, the unit's Control Method (***Main Menu → Configuration Menu → Options 2 Configuration → Control Method***) and inputs must allow the machine to run. See Machine Control Methods on page 35 for additional information.

On power up or when changing from Local Off to Local On, the machine will remain off until Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) timer has expired. See Minutes Off Time on page 129 for additional information. Liquid line solenoid valve operation is as described in Liquid Line Solenoid Valves on page 50. Time Guard is honored for all compressors. For specific information on Time Guard, see MODE_TG - Time Guard Active on page 136.

In this Control Type, Space Temp Control Mode, ***Main Menu → Status Tables → Status Input → Space Temp Control Mode*=0** (Off Cool) as long as ***Main Menu → Status Tables → Status Input → Control Mode*=1** (Off Local), **2** (Off CCN), **3** (Off Time) or **4** (Off Emrgcy). ***SPT.M*=3** (Cool On) when Control Mode, **STAT=5** (On Local), **6** (On CCN), or **7** (On Time). In this Control Type, if the Indoor Fan Status Switch opens (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA*=OFF**) Control Mode (***STAT***) will change to **8** (IDFS Not On); the unit will alarm and switch to **4** (Off Emrgcy). Table 56 shows the space temperature control mode response for ***C.TYP*=9**.

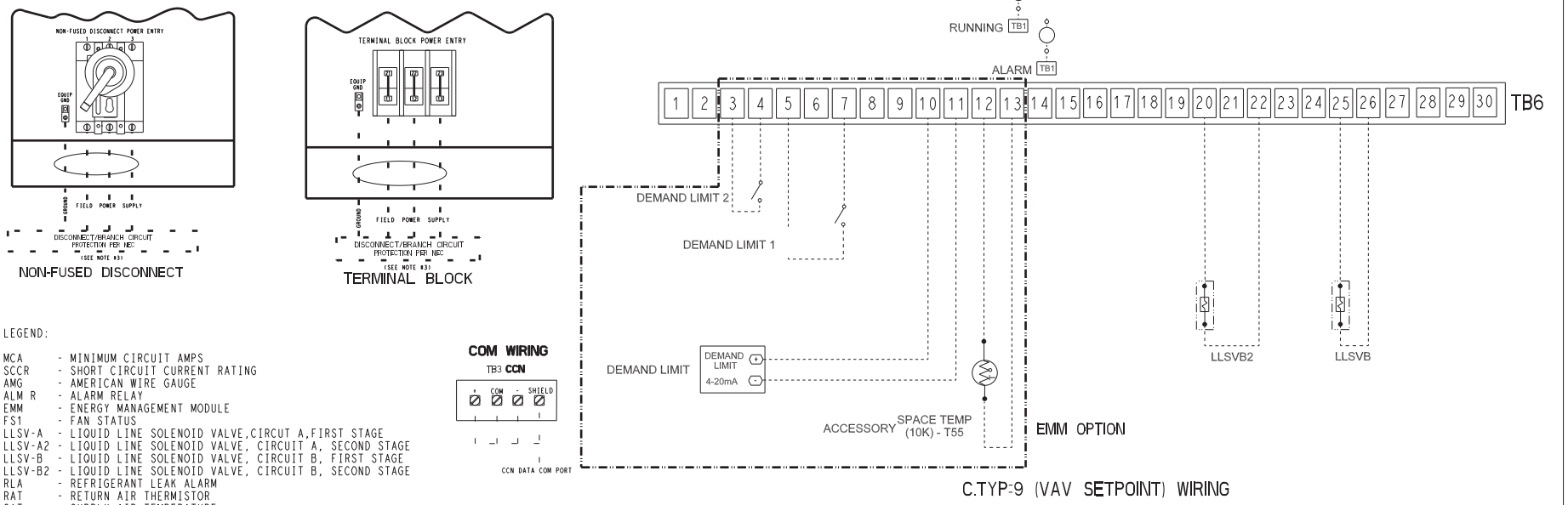
Table 55 — C.TYP=9 (VAV Setpoint) Required Configuration

CONFIGURATION MODE				
SUBMODE	**ITEM**	**DISPLAY**	**ITEM DESCRIPTION**	**COMMENT**
OPT1	RATTYPE	X	RAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	SATTYPE	X	SAT Thermistor Type	Default: 5k Must be set for appropriate value: 5k 10k None
	EMM	YES/NO	EMM Module Installed	Default: YES, if factory installed; NO, if not. EMM must be installed and configured for YES.
OPT2	STAT	X	Machine Control Type	Default: 4 Range: 1 to 9 Set Item to 9 (VAV Setpoint)
SETPOINTS MODE				
COOL	CSP1	XX.X	Cooling Setpoint 1	Default: 60.0°F (15.6°C) Range: 40.0 to 80.0°F (4.4 to 26.7°C)

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 75°C. USE COPPER CONDUCTORS ONLY.

CONNECTION TYPE	38RC UNIT SIZES	MCA RANGE	WIRE SIZE RANGE	MAXIMUM NUMBER OF WIRES PER PHASE	HIGH SCCR FUSE TYPE
TERMINAL BLOCK	020-060	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 600 KCMIL	1	J, T, RK1, RK5, G, CC
	070-150	760A	4 AWG TO 500 KCMIL	2	J, T, RK1, RK5, G, CC
NON-FUSED DISCONNECT	020-60	MCA UP TO 125	14 AWG TO 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 250 KCMIL	2	-
	070-150	UP TO 400A	2/0-500 KCMIL	2	-
		400-600A	2 AWG - 500 KCMIL	2	-
		600-800A	3/0-400 KCMIL	3	-
			500-750 KCMIL	2	-

4. REFER TO CERTIFIED DIMENSIONAL DRAWINGS FOR EXACT LOCATIONS OF THE MAIN POWER AND CONTROL POWER ENTRANCE LOCATION.
5. OUTPUTS FOR ALARM, RUNNING, LLSV, HGBP HAVE A MAXIMUM LOAD FOR THE ALARM RELAY OF 5 VA SEALED. 10 VA INRUSH AT 24V. FIELD POWER SUPPLY IS NOT REQUIRED.
6. THE CONNECTION FOR DEMAND LIMIT AND ICE DONE Y1-Y4, REMOTE START, RL, FS OPTIONS MUST BE RATED FOR DRY CIRCUIT APPLICATION CAPABLE OF HANDLING A 24VAC LOAD UP TO 50 mA.
7. INSTALLATION OF FAN STATUS SWITCH (FS1) IS REQUIRED.
8. ENERGY MANAGEMENT OPTION IS REQUIRED FOR 4-20 mA SETPOINT, 4-20 mA DEMAND LIMIT, SINGLE OR TWO-STEP DEMAND LIMIT.
9. MIXED AIR/RETURN AIR, SUPPLY AIR AND SPACE TEMPERATURE INPUTS CAN BE COMMUNICATED TO THE UNIT CONTROLS. THERMISTOR INPUTS ARE PREFERRED METHOD.
10. UNITS WITH HIGH SCCR OPTION AND TERMINAL BLOCK MUST USE APPROVED FUSES TO MEET HIGH SCCR RATING.



LEGEND:

MCA	- MINIMUM CIRCUIT AMPS
SCCR	- SHORT CIRCUIT CURRENT RATING
AMG	- AMERICAN WIRE GAUGE
ALM R	- ALARM RELAY
EMM	- ENERGY MANAGEMENT MODULE
FS1	- FAN STATUS
LLSV-A	- LIQUID LINE SOLENOID VALVE,CIRCUT A,FIRST STAGE
LLSV-A2	- LIQUID LINE SOLENOID VALVE, CIRCUIT A, SECOND STAGE
LLSV-B	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, FIRST STAGE
LLSV-B2	- LIQUID LINE SOLENOID VALVE, CIRCUIT B, SECOND STAGE
RLA	- REFRIGERANT LEAK ALARM
RAT	- RETURN AIR THERMISTOR
SAT	- SUPPLY AIR TEMPERATURE
SPT	- SPACE TEMPERATURE
VAV	- VARIABLE AIR VOLUME
Y1	- STAGE 1 COOLING
Y2	- STAGE 2 COOLING

FIELD POWER WIRING
FIELD CONTOL WIRING
FACTORY INSTALLED WIRING
FACTORY INSTALL OPTION

TYPICAL MAIN POWER & CONTROL CONNECTIONS

ITC CLASSIFICATION	SHEET	DATE	SUPERCEDES			REV
U.S. ECCN:1E998	8 OF 8	09/22/25	-	38RC 025T-150T ELECTRICAL -	38RC60001040	-

Fig. 134 — C.TYP=9 (VAV Setpoint) Wiring

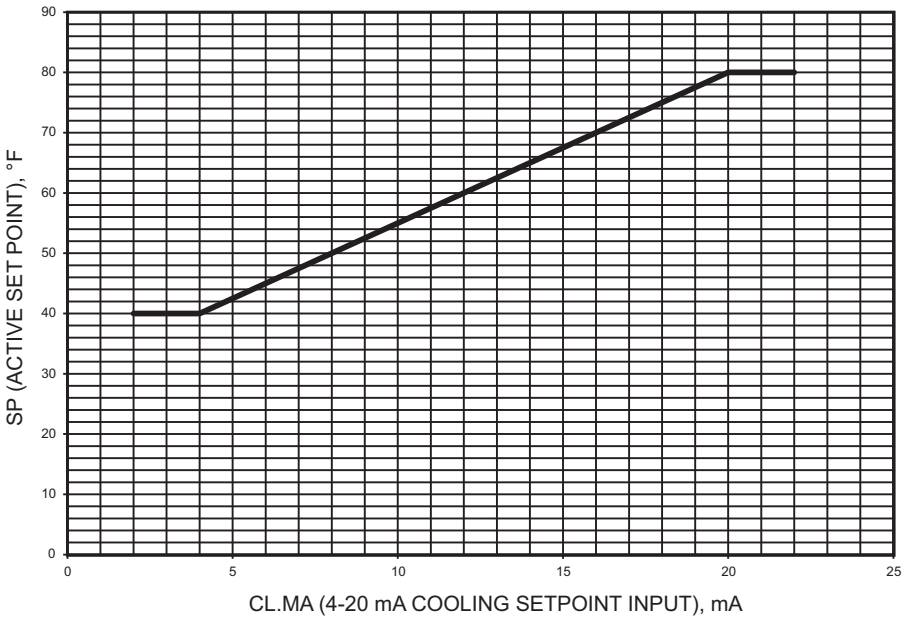


Fig. 135 — Active Setpoint (English)

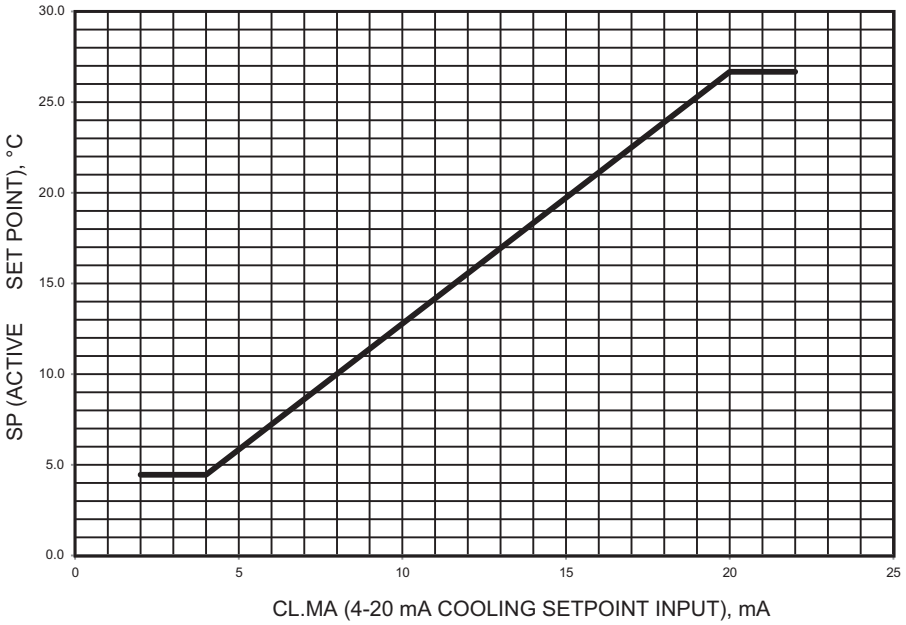


Fig. 136 — Active Setpoint (SI)

Table 56 — Space Temperature Control Mode Response for C.TYP=9

CONTROL MODE STAT	INDOOR FAN STATUS CIR A ID.F.A	SPACE TEMPERATURE CONTROL MODE SPT.M
1 (Off Local)	***Off*** or ***On***	***0*** (Cool Off)
2 (Off CCN)	***Off*** or ***On***	***0*** (Cool Off)
3 (Off Time)	***Off*** or ***On***	***0*** (Cool Off)
4 (Off Emrgcy)	***Off*** or ***On***	***0*** (Cool Off)
5 (On Remote)	On	***3*** (Cool On)
6 (On CCN)	On	***3*** (Cool On)
7 (On Time)	On	***3*** (Cool On)
8 (IDFS Not On)	Off	***0*** (Cool Off)
9 (SPT Satisfied)	Not Applicable	
10 (On Local)	On	***3*** (Cool On)

38RCD Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead circuit is determined. See Lead/Lag Determination on page 117. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's supply air temperature meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. If additional capacity requires the lag circuit to start, the lag circuit's lead compressor will be determined and started. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without oil level sensors, if a single compressor in a multiple compressor circuit (38RCD040) operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. This routine is not used for units with oil level sensors.

As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

38RCS Units

On a call for cooling, the Indoor Fan Status Cir A (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA***) is checked. The switch must be closed before the capacity routine will start. The lead compressor will be determined and started. See Circuit Compressor Staging on page 117. If the lead compressor is a digital compressor and is enabled, the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Compressors will be staged until the unit's supply air temperature meets the Control Point (***CTRL_PNT***) as described in Supply Air Temperature Control on page 116. During operation, the controls will stage the condenser fans to maintain head pressure. See Head Pressure Control on page 122.

For units without an oil level sensor, 38RCS025, if a single compressor operates for the cumulative time of 60 minutes without an increase in circuit capacity, an oil recovery routine is initiated. When this routine is initiated, a second compressor in the circuit is started. Once started, the normal capacity control routine takes priority and will turn off the compressor if needed. As the capacity requirement begins to decrease, the machine controls will reduce the unit's capacity to maintain the Control Point. If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity.

CAPACITY CONTROL ALGORITHMS

Three types of capacity control are available for the 38RC units.

Supply Air Temperature Control

This control algorithm is applicable to Control Types ***Main Menu → Configuration Menu → Options 2 Configuration → Machine Control Type*=1** (VAV), **3** (Tstat Multi), **5** (SPT Multi), ***8*** (Dual Stat), or or **9** (VAV Setpoint).

Capacity control is determined by the difference between the supply air temperature and the Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) and its rate of change. The capacity control routine runs every 30 seconds. The algorithm attempts to maintain the Control Point at the desired set point. Additionally, the control calculates a rise per stage knowing which compressor is on, its capacity and the temperature difference across the evaporator coil (return or mixed air temperature minus supply air temperature) to determine the best time to turn on or off the next compressor, institute HGBP Control, or change the digital response, if equipped. Supply and return air temperatures can be monitored at the unit's interface device on the Home Screen or at ***Main Menu → Inputs → Temperatures → Air Temps → Supply Air Temperature or Return Air Temperature***. With this information, a capacity ratio is calculated to determine whether to make any changes to the current stage of capacity. This ratio, Capacity Load/Unload Factor (***PID_SMZ***) value ranges from –100% to +100% times Deadband Multiplier (***Configuration → Option2 → Deadband Multiplier***). See Deadband Multiplier on page 120 for more information. If the next stage of capacity is a compressor, the control starts (stops) a compressor when the ratio reaches +100% (–100%) times Deadband Multiplier (***Z_GAIN***). Once a change in capacity occurs, a 90-second time delay is initiated and the capacity stage is held during this time delay.

When the unit is at stage zero (***Main Menu → Status Tables → General Unit Parameters → Requested Stage=0***) as part of the capacity control routine, the control adds a 1.2 factor on adding the first stage to reduce cycling.

If the unit is equipped with a digital compressor, it is normally the first compressor started. If the lead compressor is a digital compressor, and is enabled and available (not in alarm or held off by Time Guard), the compressor will start fully loaded for 90 seconds prior to starting to cycle between loaded and unloaded. Once the digital compressor is on, positive changes in ***PID_SMZ*** will cause the compressor to load and negative changes to ***PID_SMZ*** will cause the compressor to unload. This process can occur every 30 seconds. Changes to digital loading are not subject to the 90-second delay.

If the unit is equipped with HGBP Control, it will not be active until the unit is on its last stage of capacity. It too is treated as a stage of compression. As a result, HGBP Control will be activated when capacity is decreasing, Requested Stage ***STAGE*=1**, and Capacity Load/Unload Factor (***PID_SMZ***) is –100% times Deadband Multiplier (***Z_GAIN***).

Similar to increasing ***STAGE*** from 0 to 1, the control adds a 1.2 factor to the capacity control routine when reducing capacity from 1 to 0 to reduce cycling.

Thermostat Capacity Stage Control

This control algorithm is applicable to Control Types ***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=4** (Tstat 2 Stg). This capacity routine relies on inputs from thermostats to control capacity staging. See the Sequence of Operation section for the specific Capacity Control (***CTRLTYPE*=4**, page 78).

4 to 20 mA Capacity Stage Control

This control algorithm is applicable to Control Type ***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=7** (Pct Cap). This capacity routine relies on a 4 to 20 mA input from an external source to control capacity staging. See the Sequence of Operation section for ***CTRLTYPE*=7** (page 86).

Field Configurable Controls

ALARM ROUTING

A CCN feature within 38RC units allows for alarm broadcasting.

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 eight 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. 137. 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™, TeLink, DataLINK™, or BACLink module, 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 the Alarm Configuration table.

The device which is broadcasting cannot also be a broadcast acknowledger.

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 two 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 the 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 the Alarm Configuration table.

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 the 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_ALM*** in the Alarm Configuration table.

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 the 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 the Alarm Configuration table.

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 the 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 the Alarm Configuration table.

COMPRESSOR STAGING

Several factors determine which circuit and compressor to start:

Lead/Lag Determination (38RCD Units)

Lead/Lag determination is a configurable choice and is factory set to be automatic, ***Main Menu → Configuration Menu → Options 2 Configuration → Lead/Lag Circuit Set=Auto*** for all units, and applies specifically to the 38RCD units.

When the 38RCD unit is equipped with a digital scroll compressor and enabled (***Main Menu → Configuration Menu → Unit Configuration → Compressor A1 Digital*=YES**), or Hot Gas Bypass is installed and enabled (***Main Menu → Configuration Menu → Options 1 Configuration → Hot Gas Bypass***), then circuit A is always the lead circuit regardless of the LLCS value. For 38RCD units without digital scroll compressor, or where Hot Gas Bypass is not installed or enabled, the value can be changed to Circuit A leads or Circuit B leads as desired. Set at Auto, the control will sum the current number of logged circuit starts and one-quarter of the current operating hours for each circuit. The circuit with the lowest sum is started first.

Circuit Wear Factor = Circuit Starts + (Circuit Run Hours/4)

Changes to which circuit is the lead circuit and which is the lag are also made when total machine capacity is at 100% or when there is a change in the direction of capacity (increase or decrease) and each circuit's capacity is equal.

Lead/Lag determination will obey the Time Guard function. If a compressor is unavailable due to Time Guard, it will be skipped in the selection process. For additional information on Time Guard, see MODE_TG - Time Guard Active on page 136.

Loading Sequence Select

This feature is configurable as equal circuit loading or staged circuit loading with the default set at equal (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select*=Equal**). The control determines the order in which the steps of capacity for each circuit are changed. Set to equal, the unit will alternate starting compressors in each circuit as the requirement increases, as long as compressor has been disabled, is temporarily stopped from starting due to Time Guard or locked out due to an alert or alarm, staging may be different. Set to staged (***Main Menu → Configuration Menu → Options 2 Configuration → Lead/Lag Circuit Select=Staged***), one circuit will load completely before the second circuit is started. If multiple liquid line solenoid valves are used in a circuit, Loading Sequence Select (***Main Menu → Configuration Menu → Options 2 Configuration → Loading Sequence Select***) must be set to Staged to accomplish full face active coils if any of the supply air temperature Control Types, (***Main Menu → Configuration Menu → Options 2 Configuration → Machine Control Type*** = 1,3,5,7, or 9) are used. This control choice does NOT have any impact on machines with only one circuit or units with 2 compressors, one in each circuit.

Circuit Compressor Staging

The control has an automatic lead-lag feature built in which determines the wear factor for each compressor. Wear factor is calculated for each compressor as 6 times the number of starts plus the number of run hours.

Compressor Wear Factor = 6 x (Compressor Starts + Compressor Run Hours)

If all compressors are off and less than 30 minutes have elapsed since the last compressor was turned off, the wear factor is used to determine which compressor to start next. As additional stages of compression are required, the unit control will add them after the Time Guard timer has expired, if applicable. Time Guard may change the loading sequence. If a circuit is to be stopped, the compressor with the lowest wear factor will be shut off first after its Time Guard timer has expired, if applicable. For additional information on Time Guard, MODE_TG - Time Guard Active on page 136.

Tables 57 and 58 are examples that depict the capacity staging for equal circuit loading and staged circuit loading, without digital compressor. These are two of many possible staging sequences and are only meant to provide examples of staging sequences.

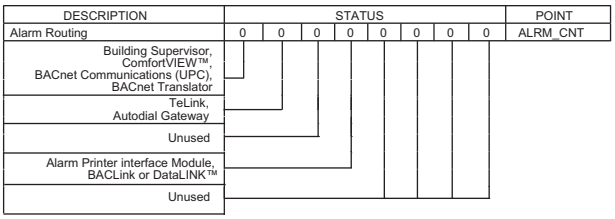


Fig. 137 — Alarm Routing Control

Table 57 — Capacity Staging, Equal Circuit Loading (Example)

UNIT	CAPACITY STEP	LEAD CIRCUIT A		LEAD CIRCUIT B	
		% DISPLACEMENT	COMPRESSOR	% DISPLACEMENT	COMPRESSOR
38RCD025-030	1	50	A1	50	B1
	2	100	A1, B1	100	A1, B1
38RCD040	1	26	A1	24	B1
	2	50	A1, B1	50	A1, B1
	3	76	A1, A2, B1	74	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD050	1	24	A1	26	B1
	2	50	A1, B1	50	A1, B1
	3	74	A1, A2, B1	76	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD060	1	23	A1	27	B1
	2	50	A1, B1	50	A1, B1
	3	73	A1, A2, B1	77	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD070	1	25	A1	25	B1
	2	50	A1, B1	50	A1, B1
	3	75	A1, A2, B1	75	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD080	1	20	A1	20	B1
	2	40	A1, B1	40	A1, B1
	3	60	A1, A2, B1	60	A1, B1, B2
	4	80	A1, A2, B1, B2	80	A1, A2, B1, B2
	5	100	A1, A2, B1, B2, B3	100	A1, A2, B1, B2, B3
38RCD090	1	16	A1	18	B1
	2	33	A1, B1	33	A1, B1
	3	49	A1, A2, B1	51	A1, B1, B2
	4	67	A1, A2, B1, B2	67	A1, A2, B1, B2
	5	82	A1, A2, A3, B1, B2	85	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCD100/130	1	17	A1	17	B1
	2	33	A1, B1	33	A1, B1
	3	50	A1, A2, B1	50	A1, B1, B2
	4	67	A1, A2, B1, B2	67	A1, A2, B1, B2
	5	83	A1, A2, A3, B1, B2	83	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCD110	1	14	A1	19	B1
	2	33	A1, B1	33	A1, B1
	3	48	A1, A2, B1	52	A1, B1, B2
	4	67	A1, A2, B1, B2	67	A1, A2, B1, B2
	5	81	A1, A2, A3, B1, B2	86	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCS025-030	1	50	A1	—	—
	2	100	A1, A2		
38RCS040-050	1	33	A1	—	—
	2	67	A1, A2		
	3	100	A1, A2, A3		

Table 58 — Capacity Staging, Staged Circuit Loading (Example)

UNIT	CAPACITY STEP	LEAD CIRCUIT A		LEAD CIRCUIT B	
		% DISPLACEMENT	COMPRESSOR	% DISPLACEMENT	COMPRESSOR
38RCD025-030	1	50	A1	50	B1
	2	100	A1, B1	100	A1, B1
38RCD040	1	26	A1	24	B1
	2	53	A1, A2	47	B1, B2
	3	76	A1, A2, B1	74	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD050	1	24	A1	26	B1
	2	48	A1, A2	52	B1, B2
	3	74	A1, A2, B1	76	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD060	1	23	A1	27	B1
	2	46	A1, A2	54	B1, B2
	3	73	A1, A2, B1	77	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD070	1	25	A1	25	B1
	2	50	A1, A2	50	A1, B1
	3	75	A1, A2, B1	75	A1, B1, B2
	4	100	A1, A2, B1, B2	100	A1, A2, B1, B2
38RCD080	1	20	A1	20	B1
	2	40	A1, B1	40	A1, B1
	3	60	A1, A2, B1	60	A1, B1, B2
	4	80	A1, A2, B1, B2	80	A1, A2, B1, B2
	5	100	A1, A2, B1, B2, B3	100	A1, A2, B1, B2, B3
38RCD090	1	16	A1	18	B1
	2	31	A1, A2	36	B1, B2
	3	46	A1, A2, A3	54	B1, B2, B3
	4	64	A1, A2, A3, B1	69	A1, B1, B2, B3
	5	82	A1, A2, A3, B1, B2	85	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCD100/130	1	17	A1	17	B1
	2	33	A1, A2	33	B1, B2
	3	50	A1, A2, A3	50	B1, B2, B3
	4	67	A1, A2, A3, B1	67	A1, B1, B2, B3
	5	83	A1, A2, A3, B1, B2	83	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCD110	1	14	A1	19	B1
	2	29	A1, A2	38	B1, B2
	3	43	A1, A2, A3	57	B1, B2, B3
	4	62	A1, A2, A3, B1	71	A1, B1, B2, B3
	5	81	A1, A2, A3, B1, B2	86	A1, A2, B1, B2, B3
	6	100	A1, A2, A3, B1, B2, B3	100	A1, A2, A3, B1, B2, B3
38RCS025-030	1	50	A1	—	—
	2	100	A1, A2		
38RCS040-050	1	33	A1	—	—
	2	67	A1, A2		
	3	100	A1, A2, A3		

DEADBAND MULTIPLIER

The user configurable Deadband Multiplier (***Main Menu → Configuration Menu → Options 2 Configuration → Deadband Multiplier***) has a default value of 1.0. The range is 1.0 to 4.0. When set to a value other than 1.0, this factor is applied to the Capacity Load/Unload Factor. The configuration affects the cycling rate of the cooling stages by raising or lowering the threshold that capacity Load/Unload Factor must build to in order to add or subtract a stage of cooling. The larger this value is set, the longer the control will delay between adding or removing stages of capacity.

Normally this configuration should not require any tuning or adjustment. If there is an application where the unit may be significantly oversized and there are indications of high compressor cycles, then the Deadband Multiplier (***Z.GN***) can be used to adjust the overall logic gain. As the value of (***Z.GN***) is increased, the cycling of cooling stages will be slowed.

DEMAND LIMIT

Demand limit is a feature that allows the unit capacity to be limited during periods of peak energy usage. Depending on the load profile for the space and the demand limit placed on the machine, the unit may not be able to satisfy the cooling requirements while demand limit is active.

For units with a digital compressor, digital operation is ignored when determining capacity limit of the machine. Since Demand Limit controls the number of compressors operating, the requested demand limit must allow for the corresponding capacity of the full digital compressor capacity plus any remaining compressors. For example, a 38RCS040 unit with a digital compressor will require a demand limit of at least 33% for the first compressor to be energized. No compressor operation will be allowed prior to this demand limit level. Digital operation below 33% will require a demand limit of at least 33% to allow a compressor to start. Digital operation between 33 and 67% will require a demand limit of at least 67% to allow 2 compressors to be operating. Finally, for digital operation above 67%, demand limit must be at 100% to allow for all compressors to be operating. For other unit capacity steps, see Tables 57 and 58.

The control will indicate the active demand limit value in percent, ***Main Menu → Status Tables → General Unit Parameter → Active Demand Limit***.

Three types of demand limiting can be configured. The first type is through 2-stage switch control, which will reduce the maximum capacity to 2 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 the user configurable level at a 20 mA input signal. The third type utilizes communications to write directly to the demand limit point.

NOTE: The 2-stage switch control and 4 to 20 mA input signal types of demand limiting require the energy management module.

To use demand limit, select the type of demand limiting to use, then configure demand limit set points based on the type selected.

2-Stage Switch Controlled Demand Limit

NOTE: 4 to 20 mA input signal type of Demand Limit is not available when using Dual Thermostat Control Type, ***C.TYP*=8**.

To configure Demand Limit for 2-stage switch control, set the Demand Limit Select (***Main Menu → Configuration Menu → Reset Configuration → Demand Limit Select***) to Switch. Then configure the 2 Demand Limit Switch points (***Main Menu → Configuration Menu → Reset Configuration → Demand Limit Switch 1*** and ***2***) to the desired capacity limit. See Table 59. Capacity steps are controlled by 2 relay switch inputs field-wired to low voltage terminal, TB6-5 and 7 for Demand Limit Switch 1 and TB6-3 and 4 for Demand Limit Switch 2. Refer to the specific control type wiring diagrams or unit wiring diagram for these connections. Demand Limit Switch status can be monitored at the unit's display, Demand Limit Switch 1 and Demand Limit Switch 2 (***Main Menu → Status Tables → Unit Parameters → Demand Limit Switch 1 and 2***) respectively.

For demand limit by 2-stage switch control, closing the first stage demand limit contact will put the unit on the first demand limit level. The unit will not exceed the percentage of capacity entered as Demand Limit Switch 1 set point. Closing contacts on the second demand limit switch prevents the unit from exceeding the capacity entered as Demand Limit Switch 2 set point. The demand limit stage that is set to the lowest demand takes priority if both demand limit inputs are closed. If the demand limit percentage does not match unit staging, the unit will limit capacity to the closest capacity stage.

As an example, 2-stage demand limit is planned with Demand Limit Switch 1 to allow the unit to operate to 80% capacity. Demand Limit Switch 2 is to allow the unit to operate to 50% capacity. See Table 59 for programming requirements. When Demand Limit Switch 1 closes, the unit's capacity will not exceed 80%. If Demand Limit Switch 2 closes, the unit's capacity will not exceed 50%. The Operating Mode, Demand Limited (***MD15***) will remain active as long as either Demand Limit Switch 1 or Demand Limit Switch 2 is closed.

Table 59 — Configuring 2-Stage Demand Limit

CONFIGURATION → OPT2			
ITEM	**EXPANSION**	**COMMENTS**	**EXAMPLE VALUE**
STAT	Machine Control Type	Range: 1 to 9 1 (VAV) 3 (Tstat Multi) 4 (Tstat 2stg) 5 (SPT Multi) 7 (PCT Cap) 8 (Dual Tstat) 9 (VAV Setpoint) Default: 4 Value must not be set to 8.	1, 3, 4, 5, 7, 8, or 9
CONFIGURATION → RSET			
DMD_CTRL	Demand Limit Select	0=None (Default) 1=Switch 2=4 to 20 mA Input	1
DLSWSP1	Demand Limit Switch 1	Range: 0 to 100% Default: 80%	80%
DLSWSP2	Demand Limit Switch 2	Range: 0 to 100% Default: 50%	50%

4-20 mA Controlled Demand Limit

To configure demand limit for 4 to 20 mA control, set the Demand Limit Select (***Main Menu → Configuration Menu → Reset Configuration → Demand Limit Select***) to **2**. Then configure the Demand Limit at 20 mA (***Main Menu → Configuration Menu → Reset Configuration → Demand Limit at 20 mA***) to the maximum loadshed value desired. Connect the output from an externally powered 4 to 20 mA signal to terminal block TB6-10 (+) and 11 (–). The external signal can be monitored at the controller display, 4-20 mA Demand Signal (***Main Menu → Status Tables → Unit Parameters → 4-20 ma Demand Signal***). Refer to the specific control type wiring diagrams or unit wiring diagram for these connections. The control will reduce allowable capacity to this user-programmed level for the 20 mA signal. See Table 60 and Fig. 138.

⚠ CAUTION

To avoid unit damage, care should be taken when interfacing with other manufacturer's control systems due to power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. Carrier controls use half wave rectification. A signal isolation device should be utilized if a full wave bridge signal generating device is used.

The 4-20 mA Input Demand Limit example (Fig. 138) will allow the unit to operate at full capacity if required with ***DMND*** **=4 mA** or 100% Demand Limit. At ***DMND*****=20 mA** the unit is not allowed to operate, with a Demand Limit of 0%. Between ***DMND*****=4 mA** and ***DMND*****=20 mA** a proportional demand limit amount will be applied to the machine.

Table 60 — Configuring 4 to 20 mA Demand Limit

CONFIGURATION → RSET			
ITEM	**DISPLAY**	**COMMENTS**	**EXAMPLE**
DMD_CTRL	Demand Limit Select	0=None (Default) 1=Switch 2=4 to 20 mA Input	2
DMT20MA	Demand Limit at 20 mA	Range: 0 to 100% Default: 100%	0%

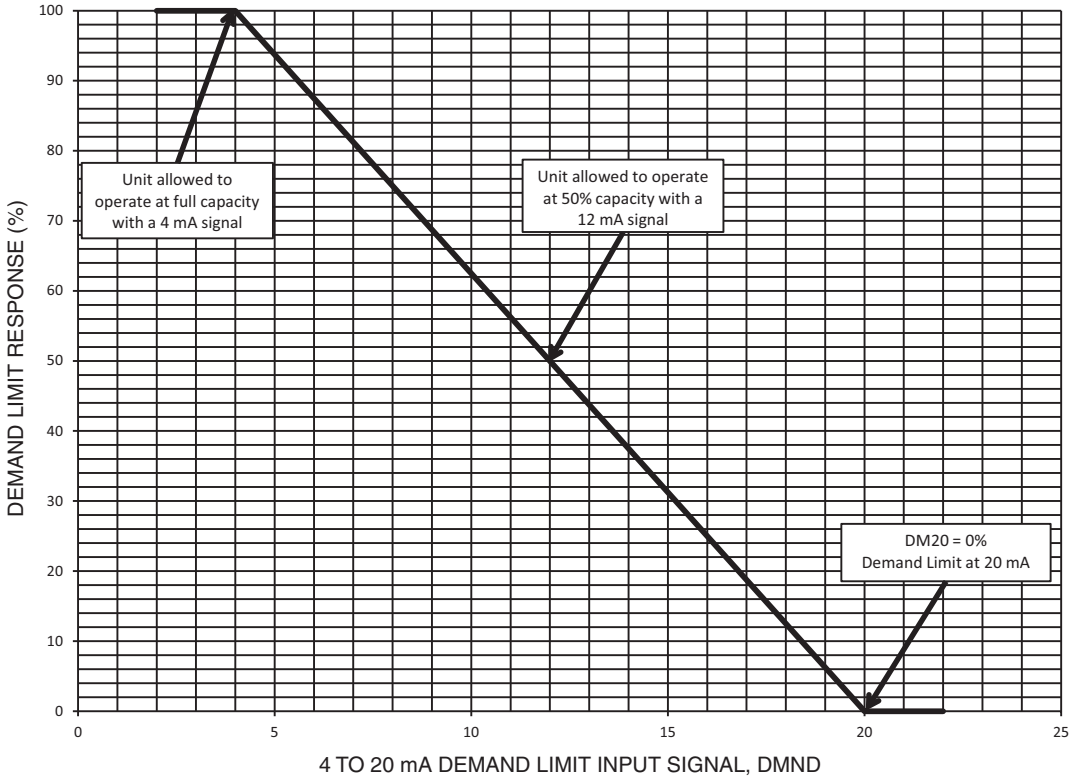


Fig. 138 — 4 to 20 mA Demand Limit, Demand Limit Select *DMDC*=2

CCN Controlled Demand Limit

The demand limit can be written to the CCN Point, DEM_LIM. No other configuration is required. Any value less than 100% written to this point will limit the capacity to this value. Units controlled via communications by a separate third-party building automation system through a translator or UPC Open Controller must write to DEM_LIM, CCN Point. When written from CCN, this will force the Unit to the written value and other two Demand Limit Features of 4-20mA or Switch Select will be overwritten.

DIGITAL COMPRESSOR

The 38RC units have a factory-installed option for a digital scroll compressor which provides additional capacity control for the unit. If equipped, the digital compressor is always installed in the A1 compressor location. When a digital compressor is installed, a digital unloader solenoid (DUS) is used on the digital compressor.

Digital Scroll Operation

A digital scroll operates in two states: the "loaded state" when the digital unloader solenoid valve (DUS) is normally closed, and the "unloaded state" when the DUS is open. During the loaded state, the compressor operates like a standard scroll and delivers full capacity and mass flow. However, during the unloaded state, there is no capacity and no mass flow through the compressor. The capacity of the system is varied by varying the time the compressor operates in an unloaded and loaded state during a 15-second period. If the DUS is energized for 7.5 seconds, the compressor will be operating at 50% capacity. If the DUS is energized for 11 seconds, the compressor will be operating at approximately 25% of its capacity. Capacity is the time-averaged summation of loaded and unloaded states, and its range is continuous from 10% to 100%. Regardless of capacity, the compressor always rotates with constant speed. As the compressor transitions from a loaded to unloaded state, the discharge and suction pressures will fluctuate and the compressor sound will change.

When a digital compressor is started, it will run at full load for 90 seconds prior to beginning the digital operation. This is for oil return.

The Carrier controller controls and integrates the operation of the DUS into the compressor staging routine to maintain temperature control. When a digital compressor is installed, an AUX board is installed for control of the DUS.

Digital Compressor Configuration

When a digital compressor is installed, the configuration parameter ***Main Menu → Configuration Menu → Unit Configuration → Compressor A1 Digital*** is configured to **YES**. There is also a maximum unload time configuration, ***Main Menu → Configuration Menu → Unit Configuration → Maximum A1 Unload Time***, that is set based on unit size, which indicates the maximum unloading for the digital compressor. The factory default for ***MAX.T*** is **8**. These numbers can be lowered, but cannot be increased more than the factory default. The upper limit for the maximum unload time is preset based on the unit and is set for oil return. See Table 61 for required configurations.

HEAD PRESSURE CONTROL

The Carrier controller controls the condenser fans to maintain the highest unit efficiency. Two options exist for this process. They are: Discrete Fan Staging and Greenspeed (High Efficiency Variable Condenser Fans). Discrete Fan Staging (***Main Menu → Configuration Menu → Unit Configuration → VFD Selection=No)*** stages fans to control the head pressure. Greenspeed (High Efficiency Variable Condenser Fans), (***Main Menu → Configuration Menu → Unit Configuration → VFD Selection=Yes*** (Greenspeed)) controls all fans in the circuit with a variable frequency drive. The Carrier controller uses saturated condensing temperature input from the discharge pressure transducer and outside air temperature (OAT) sensor to control the fans.

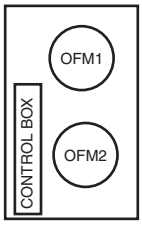
Head pressure control is maintained through a calculated setpoint which is automatically adjusted based on actual saturated condensing and saturated suction temperatures so that the compressor(s) always operate within the manufacturer's specified envelope (see Fig. 145). The control will automatically reduce the unit capacity as the saturated condensing temperature approaches an upper limit. See capacity overrides MODE_21/22 in Table 78. The control will turn off a fan stage when the condensing temperature is below the minimum head pressure requirement for the compressor. Fan sequences and the condenser fan layout are shown in Tables 62-69.

During normal shutdown, the fans may stay on for some time to reduce the high side pressure when the ambient is above 65°F. The maximum fan on time should not exceed 2 minutes.

Table 61 — Digital Compressor Required Configurations

CONFIGURATION MENU → UNIT CONFIGURATION			
ITEM	**DISPLAY**	**EXPANSION**	**COMMENTS**
CPA1TYPE	NO/YES	A1 Compressor Digital?	YES = Factory Equipped (Default) NO = Not Equipped
MAXULTME	XX Sec	Maximum A1 Unload Time	Range: 0 to 8 Default: 8

Table 62 — 38RCD,RCS025-030 Fan Staging

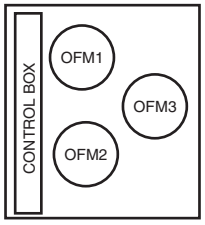


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD025,027,030 **38RCS025,027,030**	A (38RCS) A or B (38RCD)	1	FAN1	FC1	OFM1
		2	FAN1 FAN2	FC1 FC2	OFM1 OFM2

NOTE(S):

a. Items in ***Main Menu → Outputs → General Outputs***.

Table 63 — 38RCD,RCS040-050 Fan Staging

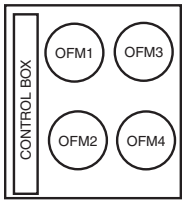


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD040,050 **38RCS040,050**	A (38RCS) A or B (38RCD)	1	FAN1	FC1	OFM3
		2	FAN2	FC2	OFM1, OFM2
		3	FAN1 FAN2	FC1 FC2	OFM3 OFM1, OFM2

NOTE(S):

a. Items in ***Main Menu → Outputs → General Outputs***.

Table 64 — 38RCD060 Fan Staging

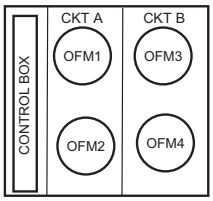


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD060	A or B	1	FAN1	FC1	OFM3
		2	FAN1 FAN2	FC1 FC2	OFM3 OFM1, OFM2
		3	FAN1 FAN3	FC1 FC3	OFM3, OFM4
		4	FAN1 FAN2 FAN3	FC1 FC2 FC3	OFM3 OFM1, OFM2 OFM4

NOTE(S):

a. Items in ***Main Menu → Outputs → General Outputs***.

Table 65 — 38RCD070 Fan Staging

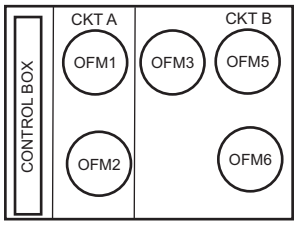


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD070	A	1[b]	FAN1	FC1	OFM2
		2	FAN1 FAN2	FC1 FC2	OFM2 OFM1
	B	1[b]	FAN3	FC3	OFM4
		2	FAN3 FAN4	FC3 FC4	OFM4 OFM3

NOTE(S):

a. Items in ***Main Menu*** → ***Outputs*** → ***General Outputs***.
b. Fan Stage 1 is used only when ambient temperature is less than 32°F (0°C) and circuit A or B is running alone.

Table 66 — 38RCD080,090 Fan Staging

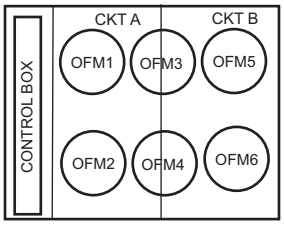


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD080,090	A	1	FAN1	FC1	OFM2
		2	FAN1 FAN2	FC1 FC2	OFM2 OFM1
	B	1	FAN5	FC5	OFM6
		2	FAN5 FAN3	FC5 FC3	OFM6 OFM3
		3	FAN5 FAN3 FAN6	FC5 FC3 FC6	OFM6 OFM3 OFM5

NOTE(S):

a. Items in ***Main Menu*** → ***Outputs*** → ***General Outputs***.

Table 67 — 38RCD100 Fan Staging

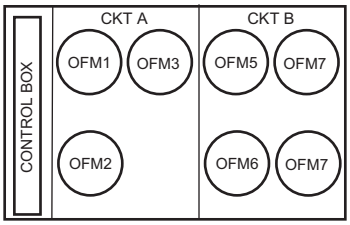


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD0100	A	1	FAN1	FC1	OFM2
		2	FAN1 FAN4	FC1 FC4	OFM2 OFM3
		3	FAN1 FAN4 FAN2	FC1 FC4 FC2	OFM2 OFM3 OFM1
		4	FAN1 FAN4 FAN2 FAN3	FC1 FC4 FC2 FC3	OFM2 OFM3 OFM1 OFM4
	B	1	FAN5	FC5	OFM6
		2	FAN5 FAN3	FC5 FC3	OFM6 OFM4
		3	FAN5 FAN3 FAN6	FC5 FC3 FC6	OFM6 OFM4 OFM5
		4	FAN5 FAN3 FAN6 FAN4	FC5 FC3 FC6 FC4	OFM6 OFM4 OFM5 OFM3

NOTE(S):

a. Items in ***Main Menu → Outputs → General Outputs***.

Table 68 — 38RCD110 Fan Staging

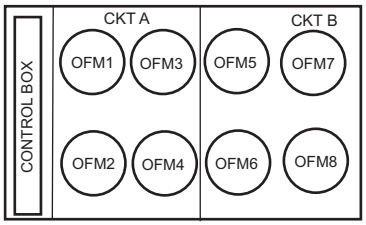


UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD110	A	1	FAN1	FC1	OFM2
		2	FAN1 FAN3	FC1 FC3	OFM2 OFM3
		3	FAN1 FAN3 FAN2	FC1 FC3 FC2	OFM2 OFM3 OFM1
	B	1	FAN5	FC5	OFM6
		2	FAN5 FAN4	FC5 FC4	OFM6 OFM8
		3	FAN5 FAN6	FC5 FC6	OFM6 OFM5/7
		4	FAN5 FAN6 FAN4	FC5 FC6 FC4	OFM6 OFM5/7 OFM8

NOTE(S):

a. Items in ***Main Menu → Outputs → General Outputs***.

Table 69 — 38RCD130 Fan Staging



UNIT	OPERATING CIRCUIT	FAN STAGE	OUTPUT POINT NAME[a]	CONTACTOR	FANS ENERGIZED
38RCD130	A	1	FAN1	FC1	OFM2
		2	FAN1 FAN3	FC1 FC3	OFM2 OFM4
		3	FAN1 FAN2	FC1 FC2	OFM2 OFM1/3
		4	FAN1 FAN2 FAN3	FC1 FC2 FC3	OFM2 OFM1/3 OFM4
	B	1	FAN5	FC5	OFM6
		2	FAN5 FAN4	FC5 FC4	OFM6 OFM8
		3	FAN5 FAN6	FC5 FC6	OFM6 OFM5/7
		4	FAN5 FAN6 FAN4	FC5 FC6 FC4	OFM6 OFM5/7 OFM8

NOTE(S):

a. Items in ***Main Menu*** → ***Outputs*** → ***General Outputs***.

Greenspeed Option Parameters

For the Greenspeed option, the following parameters should be configured from the factory exactly as shown in Tables 70-73.

⚠ CAUTION

It is strongly recommended that the user NOT change any programming without consulting Carrier service personnel. Unit damage may occur from improper programming.

Table 70 — 38RC025-060 Fan — Common VFD Parameters (FC102)

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	38RC025 - 38RC030	38RC040 - 38RC050	38RC060
0-02	motor speed	Hz	1	1	1
1-03	torque profile	fan torque	1	1	1
1-20	motor kW	size dependent	4.6	6.9	9.2
1-22	motor volts	motor dependent			
1-23	motor frequency	motor dependent	60	60	60
1-24	motor amperage	size dependent			
1-25	motor rpm	size dependent	850	850	850
1-39	motor poles		8	8	8
1-73	flying Restart	Disabled	0	0	0
1-80	function at stop	coast	0	0	0
1-90	motor thermal protection	no	0	0	0
1-91	motor external fan	no	0	0	0
1-93	thermistor src	no	0	0	0
3-02	min ref	0	0	0	0
3-03	max reference	size dependent	60	60	60
3-13	type reference	remote	0	0	0
3-15	src ref#1	no function	0	0	0
3-16	src ref#2	no function	0	0	0
3-41	ramp up	s	20	20	20
3-42	ramp down	s	20	20	20
4-10	motor speed direct	Clockwise	0	0	0
4-12	motor speed low limit	Hz	2	2	2
4-14	motor speed high limit	size dependent	60	60	60
4-16	torque limit	size dependent	150	150	150
4-18	current limit	size dependent	110	110	110
4-19	max output frequency	size dependent	61	61	61
5-12	DI #27	no operation	0	0	0
8_01	control site	digital & control word	2	2	2
8-02	control source	FC port=RS485	1	1	1
8-03	control timeout	s	10	10	10
8-04	control time out function	stop	2	2	2
8-05	function at time out	resume setup	1	1	1
8-10	function at time end	fc profile	0	0	0
8-30	protocol	LEN	20	20	20
8-31	address	184	184	184	184
8-32	baud rate	38400	4	4	4
8-33	parity/stop bit	2=no parity, 1 stop parity	2	2	2
8-34	estimated cycle time	msec	0	0	0
8-37	max intercharacter delay	msec	5	5	5
14-01	switching frequency	4kHz	6	6	6
14-03	overmodulation	yes	1	1	1
14-40	VT level zero mag level		66	66	66
14-60	function at overtemp	derate	1	1	1
14-61	function at inverter overload	derate	1	1	1

Table 71 — 38RC025-060 Fan — Voltage Specific VFD Parameters

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	38RC025 - 38RC030	38RC040 - 38RC050	38RC060
		Voltage: 208V-60Hz			
1-22	motor volts	motor dependent	208	208	208
1-24	motor amperage	size dependent	12	18	24
		Voltage:380V-60Hz			
1-22	motor volts	motor dependent	380	380	380
1-24	motor amperage	size dependent	7.8	11.7	15.6
		Voltage: 460V-60Hz			
1-22	motor volts	motor dependent	460	460	460
1-24	motor amperage	size dependent	5.8	8.7	11.6
		Voltage:575V-60Hz			
1-22	motor volts	motor dependent	575	575	575
1-24	motor amperage	size dependent	4.8	7.2	9.6

Table 72 — 38RC070-130 Fan — Common VFD Parameters (FC101)

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	38RC070	38RC080 - 38RC090		38RC100		38RC130
			Ckt A/B	Ckt A	Ckt B	Ckt A	Ckt B	Ckt A/B
0-03	Regional Setting	International	0	0	0	0	0	0
0-06	Grid Type	Supply Voltage/Freq.	Refer to Table 73 for voltage-specific parameters					
1-01	Motor Control Principle	U/F	0	0	0	0	0	0
1-03	torque profile	fan torque	1	1	1	1	1	1
1-20	motor kW	size dependent	Refer to Table 73 for voltage-specific parameters					
1-22	motor volts	motor dependent	Refer to Table 73 for voltage-specific parameters					
1-23	motor frequency	motor dependent	60	60	60	60	60	60
1-24	motor amperage	motor dependent	Refer to Table 73 for voltage-specific parameters					
1-25	motor rpm	rpm	1140	1140	1140	1140	1140	1140
1-39	motor poles		6	6	6	6	6	6
1-73	flying Restart	Disabled	0	0	0	0	0	0
1-80	function at stop	coast	0	0	0	0	0	0
1-90	motor thermal protection	no	0	0	0	0	0	0
1-93	thermistor src	no	0	0	0	0	0	0
3-02	min ref	0	0	0	0	0	0	0
3-03	max reference	size dependent	60	60	60	60	60	60
3-15	src ref#1	no function	0	0	0	0	0	0
3-16	src ref#2	no function	0	0	0	0	0	0
3-41	ramp up	s	20	20	20	20	20	20
3-42	ramp down	s	20	20	20	20	20	20
4-10	motor speed direct	Clockwise	0	0	0	0	0	0
4-12	motor speed low limit	Hz	2	2	2	2	2	2
4-14	motor speed high limit	size dependent	60	60	60	60	60	60
4-18	current limit	size dependent	110	110	110	110	110	110
4-19	max output frequency	size dependent	61	61	61	61	61	61
5-12	DI #27	no operation	0	0	0	0	0	0
8_01	control site	digital & control word	2	2	2	2	2	2
8-02	control source	FC port=RS485	1	1	1	1	1	1
8-03	control timeout	s	10	10	10	10	10	10
8-04	control time out function	stop	2	2	2	2	2	2
8-30	protocol	LEN	20	20	20	20	20	20
8-31	address	181/183	181/183	181	183	181	183	181/183
8-32	baud rate	38400	4	4	4	4	4	4
8-33	parity/stop bit	2=no parity, 1 stop parity	2	2	2	2	2	2
8-37	max intercharacter delay	msec	5	5	5	5	5	5
14-01	switching frequency	2kHz	2	2	2	2	2	2
14-03	overmodulation	yes	1	1	1	1	1	1
14-40	VT level zero mag level		66	66	66	66	66	66
14-61	function at inverter overload	derate	1	1	1	1	1	1

Table 73 — 38RC070-130 Fan — Voltage Specific VFD Parameters

PARAMETER NO.	PARAMETER DESCRIPTION	SETTING DESCRIPTION	38RC070	38RC080 - 38RC090		38RC100		38RC130
			Ckt A/B	Ckt A	Ckt B	Ckt A	Ckt B	Ckt A/B
Voltage: 208/230V-60 Hz, Grid Type 0-06 - 102								
I-20	Motor KW	size dependent	15	15	16	16	16	18
I-22	Motor Volts	motor dependent	230	230	230	230	230	230
I-24	Motor amperage	motor dependent	21.2	21.2	31.8	31.8	31.8	42.4
Voltage: 380V-60 Hz, Grid Type 0-06 - 112								
I-20	Motor KW	size dependent	15	15	16	16	16	17
I-22	Motor Volts	motor dependent	380	380	380	380	380	380
I-24	Motor amperage	motor dependent	11.6	11.6	17.4	17.4	17.4	23.2
Voltage: 460V-60 Hz, Grid Type 0-06 - 122								
I-20	Motor KW	size dependent	14	14	16	16	16	17
I-22	Motor Volts	motor dependent	460	460	460	460	460	460
I-24	Motor amperage	motor dependent	9.6	9.6	14.4	14.4	14.4	19.2
Voltage: 575V-60 Hz, Grid Type 0-06 - 132								
I-20	Motor KW	size dependent	14	14	17	17	17	18
I-22	Motor Volts	motor dependent	575	575	575	575	575	575
I-24	Motor amperage	motor dependent	7.6	7.6	11.4	11.4	11.4	15.2

FAN DRIVE OPERATION

The Greenspeed option uses Danfoss VLT 102 variable frequency drives. Drives are connected to the LEN communication bus. Fan speed is determined by the unit controller and communicated to the drive. The drive must be set at Auto On Mode.

Fan speed is controlled to maintain SCT set point. The set point is calculated from conditions and adjusted to the most efficient operating point.

Drive parameters are set by the unit control each time the unit power is cycled with the exception of the drive address. The drive address is set at the factory to 184 at Drive Parameter 8-31 for 38RC020-060. For 38RCD070-130, the address for FVFD A1 is 184 and the address for FVFDB1 is 185. In case of drive replacement, the drive address must be set for proper communication with the Carrier Controller. If the drive address is not set correctly, the control would display Alarm A179.

The address is configured using the display on the drive. See drive manual for detailed instructions. Once the address is set, the power is cycled to reset all other parameters in the drive. Drive must be in "Auto" mode to operate. Push the "Auto" button at the bottom of the drive; the light above it will be on.

The drive front cover is secured by a T-20 screw; the nominal torque is 18 inch-pounds (2 N-m). Refer to the power and control wiring diagrams for all wiring requirements. Note the shield from the LEN cable shall be attached to VFD ground.

Fan motor troubleshooting should be done at the main control box. Disconnect power from the unit. All fan motors are connected to Terminal Block 2 for 38RC020-060. For 38RCD070-130, Ckt A fan motors are connected to TB11 and Ckt B fan motors are connected to TB13. Disconnect each fan cable and check resistance of motor. An open or short reading between two phases or a phase and ground could signify a failed fan motor. Verify reading at motor before replacing. Reconnect wires using label coding L1, L2, and L3. Replace main control box cover, and power up the unit to test fan operation.

Drive alarms are shown on the unit controls as A179, A412, and A 413. Refer to Alarms and Alerts section starting on page 157 for a complete list of alarms and the common alarms with possible causes. For more details see drive manual supplied with unit.

Drives and motors are protected by fuses for short circuit protection. Fan motor overload protection is provided by an overload device internal to the motor. The motor overload responds to a combination of temperature and current. On overload condition, the device breaks all 3 phases to the motor. It will reset automatically once the motor temperature cools.

Greenspeed (38RCS025-050 / 38RCD025-130 with Greenspeed Intelligence)

This option controls the speed of all fans for improvement in part load efficiency and sound levels. All fans run at the same speed. Greenspeed is configured in VFD Selection (***Main Menu → Configuration Menu → Unit Configuration → VFD Select***).

LOW AMBIENT LOCKOUT

The control software has a feature that allows the user to select an outdoor air temperature (OAT) at which mechanical cooling will be disabled. To use this feature, set OAT Lockout Temperature (***Main Menu → Set Points → OAT Lockout Temperature***) to a value between –19 and 80°F (–28.3 and 26.7°C). This value should be set to the desired temperature at which no mechanical cooling is required. Any time the feature is active due to the outdoor air temperature being below the field programmed value, the machine will indicate OAT Below Lockout Temp (***Main Menu → Maintenance → Current Operating Modes → OAT Below Lockout Temp=ON***). Mechanical cooling will be enabled once the Outdoor Ambient is 3°F (1.6°C) above the ***OAT.L*** set point.

The factory default is –20°F (–28.9°C) and indicates that this feature is disabled. If an Outdoor Air Temperature Sensor failure is declared, this feature must be disabled by setting the ***OAT.L*** to –20°F (–28.9°C), to allow the unit to operate.

HOT GAS BYPASS

Hot gas bypass is generally not recommended for split systems. If installed, the feature must be enabled in the controls. Hot gas bypass cannot be used in conjunction with the digital scroll option.

Hot gas bypass can only be added to standard compressor units in the field. This feature will not operate with an optional digital compressor and when the digital function is enabled (***Main Menu → Configuration Menu → Unit Configuration → Compressor A1 Digital = Yes)***. To enable the hot gas bypass valve, confirm that the digital compressor option is disabled and set HGBP Valve Select to YES, (***Main Menu → Configuration Menu → Options 1 Configuration → Hot Gas Bypass = Enable***). See Table 74.

Table 74 — Configuring Hot Gas Bypass

CONFIGURATION MENU → UNIT CONFIGURATION		
ITEM	**EXPANSION**	**COMMENTS**
CPA1TYPE	Compressor A1 Digital?	Range: NO/YES Default: Depends on product configuration NO = Not Equipped Value must be set to NO
CONFIGURATION MENU → OPTIONS1 CONFIGURATION		
Hot Gas Bypass	Hot Gas Bypass Vlv Select	Range: DISABLE/ENABLE Default: DISABLE Set to ENABLE to activate

NOTE: Hot Gas Bypass and Digital Compressor operation cannot be used together.

If equipped and enabled, the Hot Gas Bypass valve is active as the last stage of capacity when the unit is unloading.

MINUTES OFF TIME

The Minutes Off Time feature (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***) is a user-configurable time period used by the control to determine how long unit operation is delayed after the unit has been enabled. This delay is initiated following the Enable/Off/Remote Control Switch being placed in "Enable" position or "Remote" with remote contacts closed, or if power is applied/restored to the unit with the Enable/Off/Remote Control Switch in a position that would allow the unit operate. Typically, this time period is configured when multiple machines are located on a single site. For example, this gives the user the ability to prevent all the units from restarting at once after a power failure. A value of zero for this variable does not mean that the unit should be running.

If Minutes Off Time is active, the control will indicate Operating Mode, Minutes Off Time Active (***Main Menu → Maintenance → Current Operating Modes → Minutes Off Time Active*** will indicate YES).

RAMP LOADING

The Ramp Loading Select feature (***Main Menu → Configuration Menu → Options 2 Configuration → Ramp Load Select***) limits the rate of change of supply air temperature. This feature is only available for Machine Control Types (***Main Menu → Configuration Menu → Options 2 Configuration → Machine Control Type Ma***) ***C.TYP*=1** (VAV), ***C.TYP*=3** (Tstat Multi), ***C.TYP*=5** (SPT Multi), and ***C.TYP*=9** (VAV Setpoint). This feature is not available for Machine Control Types ***C.TYP*=4** (2 Stg Tstat), ***C.TYP*=7** (Pct Cap) and ***C.TYP*=8** (Dual Tstat).

If the unit is in a cooling mode and configured for ramp loading, the control makes 2 comparisons before deciding to change stages of capacity. The control calculates a temperature difference between the control point and supply temperature. If the difference is greater than 4°F (2.2°C) and the rate of change (°F or °C per minute) is more than the configured Cooling Ramp Loading

value at the current capacity stage, the control does not allow any change to the current stage of capacity.

If Ramp Loading is active, the control will indicate Operating Mode, Ramp Load Limited (***Main Menu → Maintenance → Current Operating Modes → Ramp Load Limited*** will indicate ***YES***). See Table 75.

Table 75 — Configuring Ramp Loading Control

CONFIGURATION → OPT2		
ITEM	**EXPANSION**	**COMMENTS**
STAT	Machine Control Type	Range: 1 to 9 1 (VAV) 3 (Tstat Multi) 4 (Tstat 2stg) 5 (SPT Multi) 7 (PCT Cap) 8 (Dual Tstat) 9 (VAV Setpoint) Default: 4 Value must be set to 1, 3, 5 or 9
RAMP_ENA	Ramp Loading Enable	Range: DSBL/ENBL Default: ENBL Set to ENBL to activate
COOL_RMP	Cooling Ramp Loading	Range: 0.2 to 2°F/min Default: 1°F/min

TEMPERATURE RESET

The control system is capable of changing the controlling set point based on several different methods: space temperature (SPT), outside air temperature (OAT), and from an externally powered 4 to 20 mA signal. The set point can be adjusted up or down depending on how it is configured. If Temperature Reset is active, the control will indicate Operating Mode, Temperature Reset (***Main Menu → Maintenance → Current Operating Modes → Temperature Reset*** will indicate YES).

NOTE: Temperature Reset is available for a Control Type (***Main Menu → Configuration Menu → Options 2 Configuration → Machine Control Type***) that uses a Supply Air Temperature set point, such as ***C.TYP*=1** (VAV), ***C.TYP*=3** (TSTAT MULTI), ***C.TYP***=8 (Dual Tstat), or ***C.TYP*=5** (SPT MULTI). While Temperature Reset will operate with ***C.TYP*=9** (VAV Setpoint), since the set point temperature is being supplied to the control, Temperature Reset should be accomplished by the building management system incorporating any required reset in the set point signal.

Space Temperature Reset

Space temperature must be available to the unit controls, either by communication via a network connection or by a wired sensor. Any one of the accessory space temperature sensors (T55, T56, or T59) can be installed for space temperature reset. On single circuit unit, EMM option must be enabled for T55, T56, or T59.

To use space temperature reset, four variables must be configured. In ***Configuration Menu → Reset Configuration***, set these items:

- Cooling Reset Type (***CRST_TYP***): Configure for the type of reset desired, Space Temperature
- Remote – No Reset Temp (***REM_NO***): Set to the temperature that no reset should occur
- Remote – Full Reset Temp (***REM_FULL***): Set to the temperature that maximum reset is to occur
- Remote – Degrees Reset (***REM_DEG***): Set to the maximum amount of reset desired

The space temperature reset example shown in Table 76 and Fig. 139 and 140 provides 0°F (0°C) reset to the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***) if Space Temperature (***Main Menu → Inputs → Temperatures → Air Temps → Space Temperature***) =72°F (22.2°C), and 6°F (3.3°C) reset if ***SPT***=68°F (20.0°C). Using these values, if ***SP***=55°F (12.8°C) and SPT=68°F (20.0°C) or less, the Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) will reflect 6°F (3.3°C) reset or 61°F (16.1°C). If ***SPT***=72°F (22.2°C) or more, the Control Point will reflect 0°F (0.0°C) reset or 55°F (12.8°C). Between ***SPT***=68°F (20.0°C) and ***SPT***=72°F (22.2°C) a proportional reset amount will be applied to ***CTRL_PNT***.

Table 76 — Configuring Space Temperature Reset

CONFIGURATION → OPT2			
ITEM	**EXPANSION**	**COMMENTS**	**EXAMPLE VALUE**
STAT	Machine Control Type	Range: 1 to 9 1 (VAV) 3 (Tstat Multi) 4 (Tstat 2stg) 5 (SPT Multi) 7 (PCT Cap) 8 (Dual Tstat) 9 (VAV Setpoint) Default: 4 Value must be set to 1, 3, 5, or 9	1, 3, 5, or 9
CONFIGURATION → RSET			
CRST_TYP	Cooling Reset Type	0=No Reset (Default) 1=4-20 Input 2=Out Air Temp 3=Return[a] 4=Space Temp	4
REM_NO	Remote – No Reset Temp	Range: 0.0 to 125.0°F (–17.8 to 51.7°C) Default:125.0°F (51.7°C)	72.0°F (22.2°C)
REM_FULL	Remote – Full Reset Temp	Range: 0.0 to 125.0°F (–17.8 to 51.7°C) Default:0.0°F (–17.8°C)	68.0°F (20.0°C)
REM_DEG	Remote – Degrees Reset	Range: –30.0 to 30.0 ΔF (–16.7 to 16.7 ΔC) Default: 0.0 ΔF (0.0 ΔC)	6.0 ΔF (3.3 ΔC)

NOTE(S):

a. Not supported.

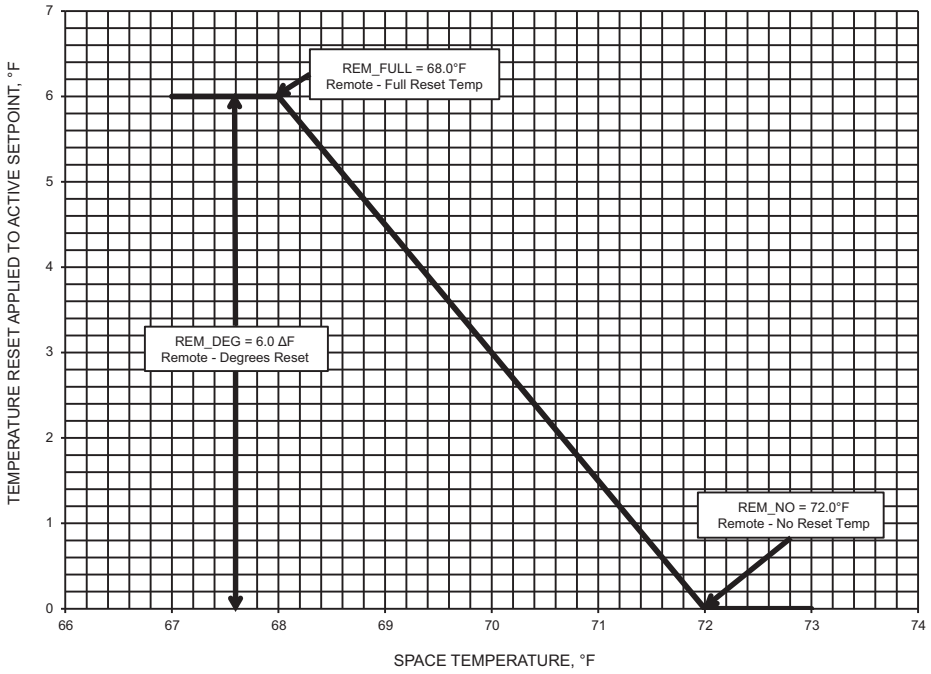


Fig. 139 — Space Temperature Reset, °F (CRST_TYP=4)

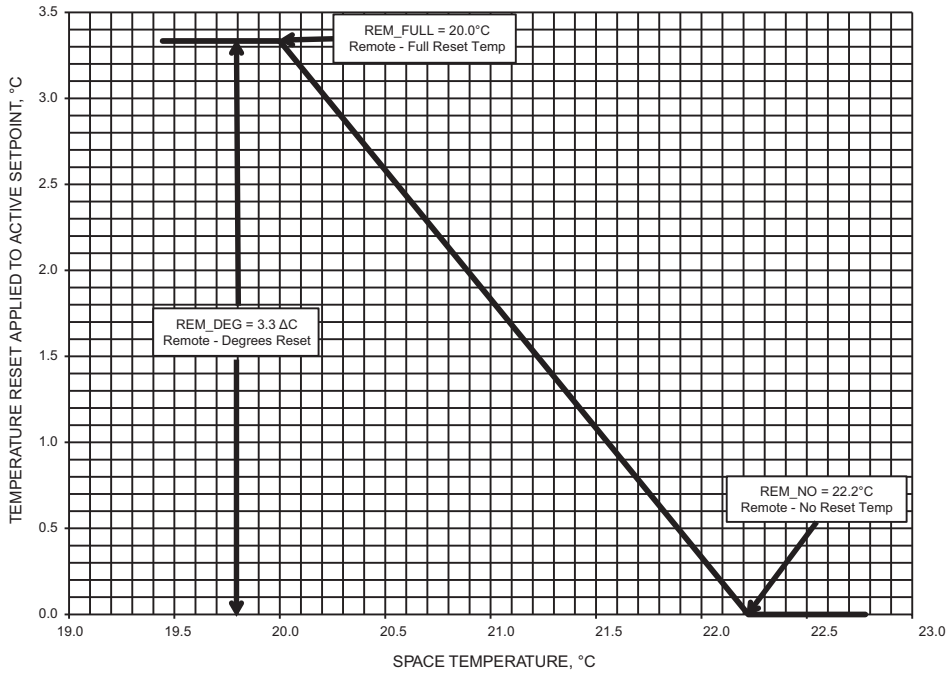


Fig. 140 — Space Temperature Reset, °C (CRST_TYP=4)

Outside Air Temperature Reset

The 38RC units are shipped with an outside air sensor, so no additional sensors are required.

To use Outside Air Temperature Reset, four variables must be configured. In ***Main Menu → Configuration Menu → Reset Configuration***, set these items:

- Cooling Reset Type (***CRST_TYP***): Configure for the type of reset desired, Outside Air Temperature
- Remote – No Reset Temp (***RTN_NO***): Set to the temperature that no reset should occur
- Remote – Full Reset Temp (***RTN_FULL***): Set to the temperature that maximum reset is to occur
- Remote – Degrees Reset (***RTN_DEG***): Set to the maximum amount of reset desired

The Outside Air Temperature Reset example shown in Table 77 and Fig. 141 and 142 provides 0°F (0°C) reset to the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***) if Outside Air Temperature (***Main Menu → Inputs → Temperatures → Air Temps → Outside Air Temperature***)=85°F (29.4°C) and 6°F (3.3°C) reset if ***OAT***=55°F (12.8°C). Using these values, if ***SP***=55°F (12.8°C) and ***OAT***=55°F (12.8°C) or less, the Control Point (***Main Menu → Status Tables → General Unit Parameter → Control Point***) will reflect 6°F (3.3°C) reset or 61°F (16.1°C). If ***OAT***=85°F (29.4°C) or more, the control point will reflect 0°F (0.0°C) reset or 55°F (12.8°C). Between ***OAT***=55°F (12.8°C) and ***OAT***=85°F (29.4°C) a proportional reset amount will be applied to ***CTRL_PNT***.

4-20 mA Temperature Reset

The energy management module (EMM) must be used for temperature reset using a 4 to 20 mA signal. The signal can be monitored to the control at the Carrier controller point 4-20 mA Reset Signal (***Main Menu → Inputs → Input Status →***).

To use 4-20 mA temperature reset, two variables must be configured. In ***Main Menu → Configuration Menu → Reset Configuration***, set these items:

- Cooling Reset Type (***CRST_TYPE***): Configure for the type of reset desired, 4-20 mA Input
- ***REM_DEG***: Set to the amount of reset desired with a 20 mA signal. The control will interpolate between 0 degrees reset at 4 mA and the value entered for ***REM_DEG*** at 20 mA.

⚠ CAUTION

To avoid unit damage, care should be taken when interfacing with other manufacturer's control systems due to power supply differences, full wave bridge versus half wave rectification. The two different power supplies cannot be mixed. Carrier controls use half wave rectification. A signal isolation device should be utilized if a full wave bridge signal generating device is used.

The 4-20 mA input temperature reset example shown in Table 78 and Fig. 143 and 144 provides 0°F (0°C) reset to the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***) if ***RSET*** =**4 mA** and 6°F (3.3°C) reset if ***RSET***=**20 mA**. Using these values, if ***SP***=55°F (12.8°C) and ***RSET*** =**4 mA**, the Control Point (***Main Menu → Configuration Menu →***) will reflect 0°F (0.0°C) reset or 55°F (12.8°C). If ***RSET***=**20 mA**, the Control Point will reflect 6°F (3.3°C) reset or 61°F (16.1°C). Between ***RSET*** =**4 mA** and ***RSET***=**20 mA** a proportional reset amount will be applied to ***CTRL_PNT***.

Table 77 — Configuring Outside Air Temperature Reset

CONFIGURATION MENU → OPTIONS2 CONFIGURATION			
ITEM	**EXPANSION**	**COMMENTS**	**EXAMPLE VALUE**
STAT	Machine Control Type	Range: 1 to 9 1 (VAV) 3 (Tstat Multi) 4 (Tstat 2stg) 5 (SPT Multi) 7 (PCT Cap) 8 (Dual Tstat) 9 (VAV Setpoint) Default: 4 Value must be set to 1, 3, 5 or 9	1, 3, 5 or 9
CONFIGURATION MENU → RESET CONFIGURATION			
CRST_TYP	Cooling Reset Type	0=No Reset (Default) 1=4-20 Input 2=Out Air Temp 3=Return[a] 4=Space Temp	2
RM.NO	Remote – No Reset Temp	Range:0.0 to 125.0°F (–17.8 to 51.7°C) Default:125.0°F (51.7°C)	85.0°F (29.4°C)
REM_FULL	Remote – Full Reset Temp	Range:0.0 to 125.0°F (–17.8 to 51.7°C) Default:0.0°F (–17.8°C)	55.0°F (12.8°C)
REM_DEG	Remote – Degrees Reset	Range:–30.0 to 30.0 ΔF (–16.7 to 16.7 ΔC) Default:0.0 ΔF (0.0 ΔC)	6.0 ΔF (3.3 ΔC)

NOTE(S):

a. Not supported.

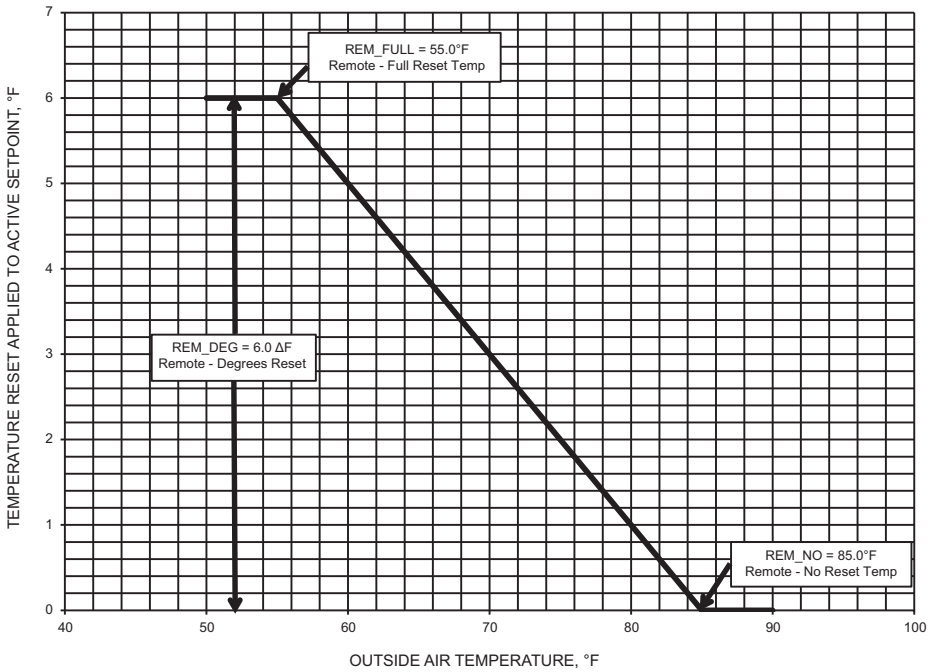


Fig. 141 — Outside Air Temperature Reset, °F (CRST_TYP=2)

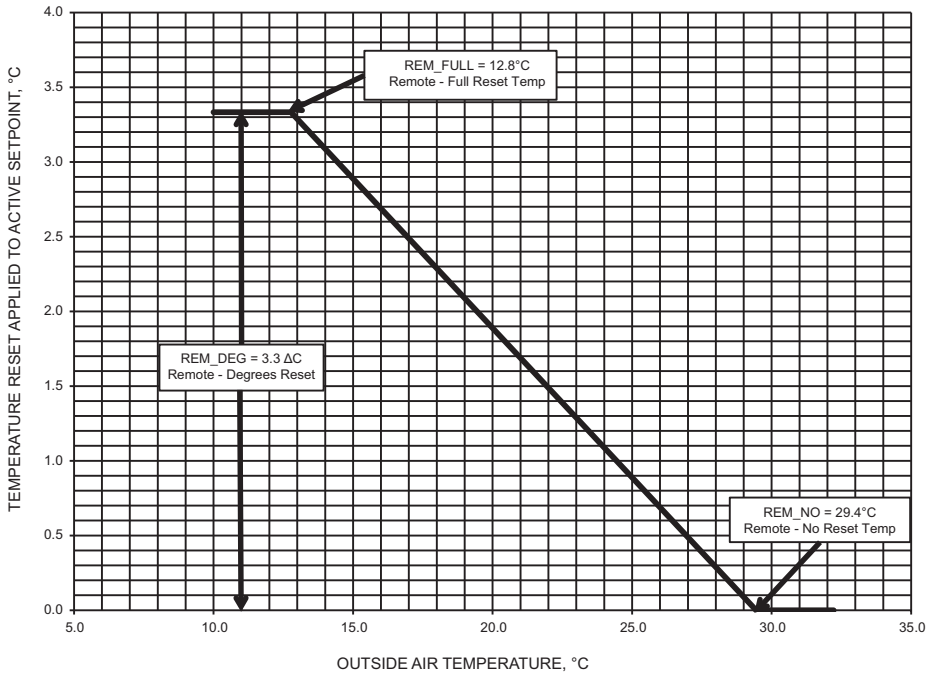


Fig. 142 — Outside Air Temperature Reset, °C (CRST_TYP=2)

Table 78 — Configuring 4 to 20 mA Temperature Reset

CONFIGURATION MENU → OPTIONS2 MENU			
ITEM	**EXPANSION**	**COMMENTS**	**EXAMPLE VALUE**
STAT	Machine Control Type	Range: 1 to 9 1 (VAV) 3 (Tstat Multi) 4 (Tstat 2stg) 5 (SPT Multi) 7 (PCT Cap) 8 (Dual Tstat) 9 (VAV Setpoint) Default: 4 Value must be set to 1, 3, 5 or 9	1, 3, 5, or 9
CONFIGURATION MENU → RESET CONFIGURATION			
CRST_TYP	Cooling Reset Type	0=No Reset (Default) 1=4-20 Input 2=Out Air Temp 3=Return[a] 4=Space Temp	1
ma.DG	4-20 – Degrees Reset	Range:–30.0 to 30.0 ΔF (–16.7 to 16.7 ΔC) Default:0.0 ΔF (0.0 ΔC)	6.0 ΔF (3.3 ΔC)

NOTE(S):

a. Not supported.

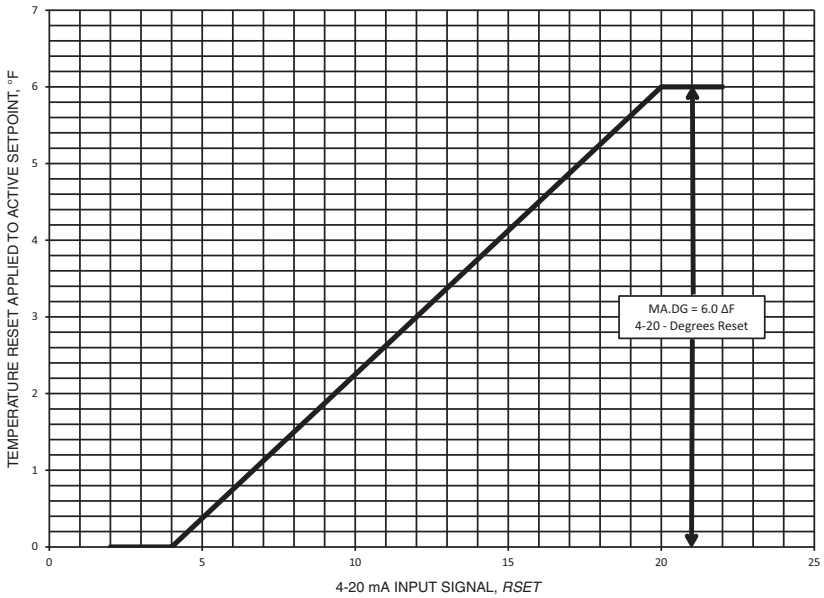


Fig. 143 — 4-20 mA Temperature Reset, °F (CRST_TYP=1)

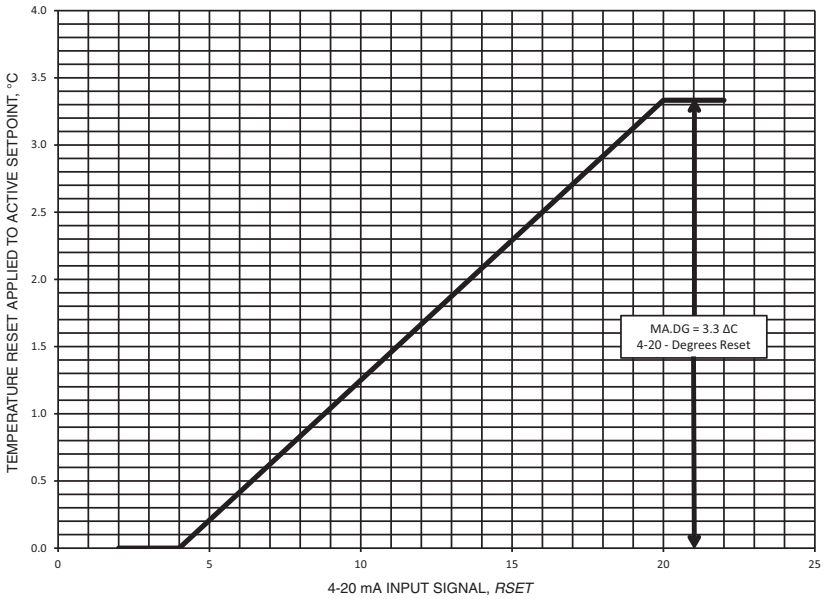


Fig. 144 — 4-20 mA Temperature Reset, °C (CRST_TYP=1)

Operating Modes

Operating Modes are capacity overrides that override the normal operation of the unit control. See Table 79.

D.OIL (Oil Recover Mode)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Oil Recover Mode*=YES**) the unit is ON and the digital compressor has been operating at less than the standard Maximum A1 Unload Time (***Main Menu → Configuration Menu → Unit Configuration → Maximum A1 Unload Time***) for more than 30 minutes of cumulative time without an increase in circuit capacity. During this oil recovery mode, the compressor will load fully for 30 seconds. The mode is also active if a single compressor on a circuit without oil sensing, or with oil sensing disabled (***Main Menu → Configuration Menu → Options 1 Configuration → OLS Sensor Switch***), for more than an hour, an additional compressor is started for 2 minutes. The unit capacity may exceed system requirements. For more information, contact your Carrier representative.

OATLMODE (OAT Below Lockout Temp)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → OAT Below Lockout Temp*=YES**) the unit is ON and the ambient temperature is below the field programmed OAT Lockout Temperature. See Low Ambient Lockout on page 129 for additional details.

MODE_05 (Ramp Load Limited)

When this mode is active (***OpMain Menu → Maintenance → Current Operating Modes → Ramp Load Limited*=YES**) the unit capacity is limited. See Ramp Loading on page 129 for details.

MODE_06 (Timed Override in Effect)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Timed Override in Effect*=YES**) the unit is operating under normal capacity control during a scheduled unoccupied time. See Timed Override on page 70 for additional information.

MODE_09 (Slow Change Override)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Slow Change Override*=YES**) the supply air temperature is close to and is moving toward the Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***). While this mode is active, the control is prohibited from making capacity stage changes.

MODE_10 (Minimum Off Time Active)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Minimum Off Time Active*=YES**) the unit is prohibited from starting by Minutes Off Time (***Main Menu → Configuration Menu → Options 2 Configuration → Minutes Off Time***). See Minutes Off Time on page 129 for additional information.

MODE_14 (Temperature Reset)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Temperature Reset*=YES**) Temperature Reset is in effect. In this mode, unit is using Temperature Reset to adjust Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***) and is currently controlling to the modified set point, (***Main Menu → Status Tables → General Unit Parameters → Control Point***). The set point can be modified based on outdoor air temperature, space temperature, or a 4 to 20 mA signal. See Temperature Reset on page 130 for additional information.

MODE_15 (Demand Limited)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Demand Limited*=YES**) Demand Limit is in effect. This indicates that the capacity of the unit is being limited by the demand limit control option. Because of this limitation, the unit may not be able to produce the desired supply air temperature. Demand limit can be controlled by switch inputs or a 4 to 20 mA signal. See Demand Limit on page 120 for additional information.

MODE_17 (Low Temperature Cooling)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Low Temperature Cooling*=YES**) unit is ON and the rate of change of the supply air temperature is negative and decreasing faster than –0.5°F (0.5°C) per minute. Error between Supply Air Temperature (***Main Menu → Inputs → Temperatures → Air Temps → Supply Air Temperature***) and Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) exceeds fixed amount. Control will automatically unload the unit if necessary.

Table 79 — Operating Modes

MODE	ITEM EXPANSION	DESCRIPTION	SYSTEM EFFECT
D.OIL	Digital Oil Recover Mode	Digital compressor has been running below standard Maximum A1 Unload Time (***Main Menu → Configuration Menu → Unit Configuration →Maximum A1 Unload Time***) for more than 30 minutes. Digital compressor will load to 100% for 30 seconds.	Digital compressor will load completely. supply air temperature may be lower than Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***).
OATLMODE	OAT Below Lockout Temp	Ambient temperature is below field configurable setting, causing mechanical cooling to be disabled.	Unit is not allowed to start.
MODE_5	Ramp Load Limited	Prevents rapid staging of compressors at start-up	May not be able to supply air at the Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***)
MODE_6	Timed Override in Effect	Unit is operating outside of normal occupied time period	Normal capacity control is enabled.
MODE_9	Slow Change Override	Supply air temperature is close to and moving toward the Control Point ***(Main Menu → Status Tables → General Unit Parameters → Control Point***)	Capacity stage changes are prohibited. Unit may not supply air at the Control Point ***(Main Menu → Status Tables → General Unit Parameters → Control Point***)
MODE_10	Minutes Off Time Active	Unit is prohibited from starting until the timer has expired	Unit is not allowed to start.
MODE_14	Temperature Reset	Unit is operating with a modified set point	Unit is operating with a modified set point under normal capacity control.
MODE_15	Demand Limited	Unit capacity is being limited by a Demand Limit command	Unit may not be able to deliver the desired supply air temperature.
MODE_17	Low Temperature Cooling	Supply Air Temperature is decreasing faster than 0.5°F (0.3°C) and the difference between the Supply Air Temperature and Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) exceeds a calculated value.	Unit may unload.
MODE_18	High Temperature Cooling	Supply Air Temperature and its rate of change are increasing, and the difference between the Supply Air Temperature and Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) exceeds a calculated value.	Unit will automatically load.
MODE_21	High SCT Circuit A	Circuit SCT exceeds a calculated limit	No additional stages of capacity will be added. Unit may unload to lower SCT.
MODE_22	High SCT Circuit B		
MODE_23	Minimum Comp On Time	Compressor has not completed its minimum run time	Compressor will remain running. Supply Air Temperature may be lower than Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***).
MODE_25	Low Sound Mode	Not supported	Not Supported
MODE_TG	Time Guard Active	Prevents rapid cycling of a compressor	May allow the unit to overshoot the set point or not allow a compressor to start if required.

MODE_18 (High Temperature Cooling)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → High Temperature Cooling*=YES**) unit is ON and the rate of change of the supply air temperature is positive and increasing. Error between Supply Air Temperature (***Main Menu → Inputs → Temperatures → Air Temps → Supply Air Temperature***) and Control Point (***Main Menu → Status Tables → General Unit Parameters → Control Point***) exceeds fixed amount. Control will automatically load the unit if necessary to better match the increasing load.

MODE_21 (High SCT Circuit A), MODE_22 (High SCT Circuit B)

When these modes are active (***Main Menu → Maintenance → Current Operating Modes → High SCT Circuit A*=YES** and/or ***High SCT Circuit B*=YES**) unit is ON and the saturated condensing temperature (SCT) of the circuit is greater than the calculated maximum limit. No additional stages of capacity will be added. Unit capacity may be reduced if SCT continues to rise to avoid high-pressure switch trips by reducing condensing temperature. If this condition is encountered, check items listed for alerts T122 – Circuit A High Pressure Trip and T123 – Circuit B High Pressure Trip on page 172.

MODE_23(Minimum Comp On Time)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Minimum Comp On Time*=YES**) the unit is ON, a compressor has just started, and the Minimum Compressor On Time timer of 60 seconds is active. Although the cooling load may be satisfied, control continues to operate compressor to ensure proper oil return. This may be an indication of oversized application or low airflow.

MODE_25 (Low Sound Mode)

This mode is not supported.

MODE_TG (Time Guard Active)

When this mode is active (***Main Menu → Maintenance → Current Operating Modes → Time Guard Active*=YES**) at least one compressor is affected by a Time Guard timer. Any time a compressor is started, it must remain on for 120 seconds. If a compressor is shut off, it must remain off for 180 seconds. Unit capacity or compressor staging sequence may be affected if this mode is active. This is part of the compressor protection algorithm to prevent rapid cycling of a compressor.

SERVICE

IMPORTANT: Intrinsically safe and sealed components must be replaced. Repair of these components is not allowed.

Quick Test (Test Mode)

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

To use Test Mode (***Main Menu → Maintenance → Test Mode***), the unit must be in local OFF mode and the Enable/Off/Remote Switch(SW1) must be in the OFF position. The unit must be in Local Off mode to adjust parameters in the table. The Test Mode function is not available remotely and can only be used from the Carrier Controller display. When a compressor relay is selected, the unit will operate all systems to start the compressor. Indoor fan must be on for the compressor to start. See the Start-Up Checklist at the end of this document for a list of the parameters in the Test Mode tables.

EXAMPLE: TEST THE FUNCTION OF THE CIRCUIT A CONDENSER FANS

- Power must be applied to the unit. The Enable-Off-Remote Contact switch must be in the OFF position.
- Press the Start/Stop button and ensure the unit is in Local Off.
- Navigate to the Test Mode table and set Quick Test Enable to Enable.
- For a unit with variable speed fans, select Fan Speed from the menu. Using the pop up menu, enter the desired percent fan speed desired and select the green checkmark. Then select the save icon in the lower left corner. Confirm all fans are running.

Test component function by turning the item values from OFF to ON or adjusting the actuated percentage. These discrete outputs are then turned off if there is no keypad activity for 10 minutes.

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

Compressors

⚠ WARNING

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

⚠ WARNING

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

⚠ CAUTION

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

Figure 145 shows the location of each compressor within the unit. Figures 146 and 147 show the compressor operating envelope.

ENABLING AND DISABLING COMPRESSORS

Compressors in the 38RC units can be enabled or disabled in the controls. To enable or disable a compressor, toggle the value in the ***Main Menu → Service*** menu for each individual compressor.

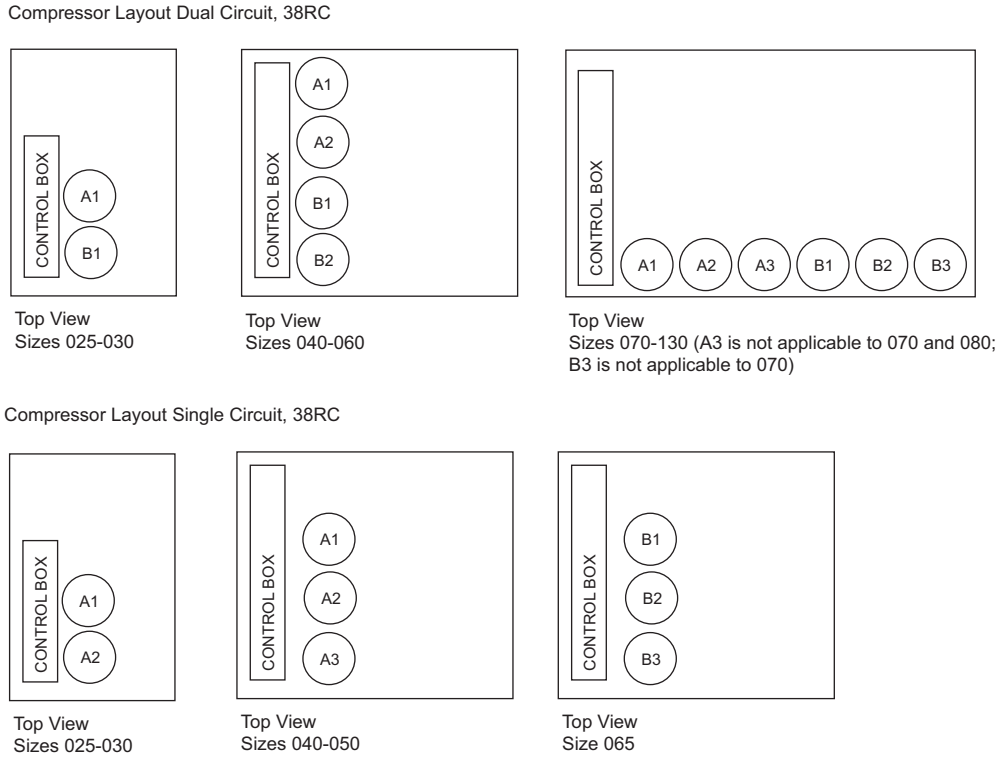


Fig. 145 — Compressor Locations

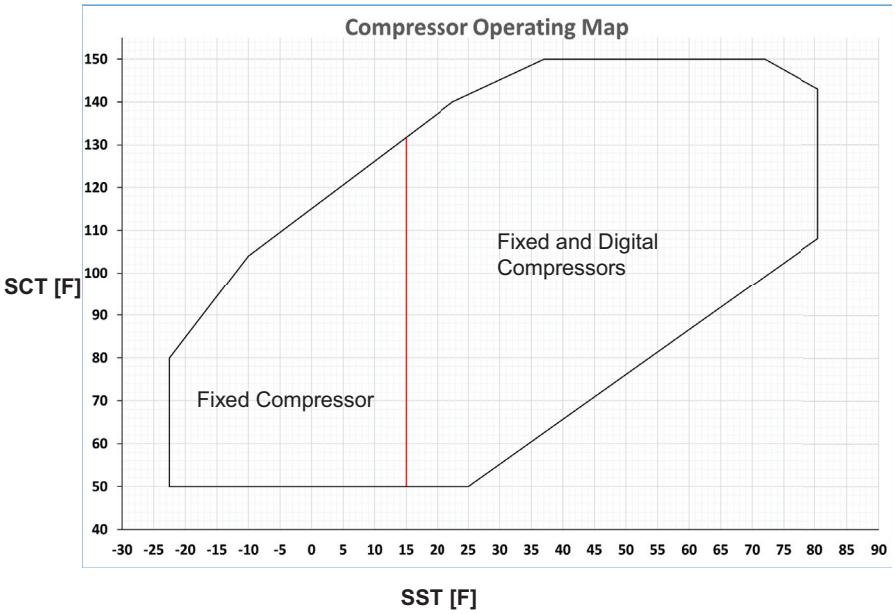


Fig. 146 — Compressor Operating Envelope, °F

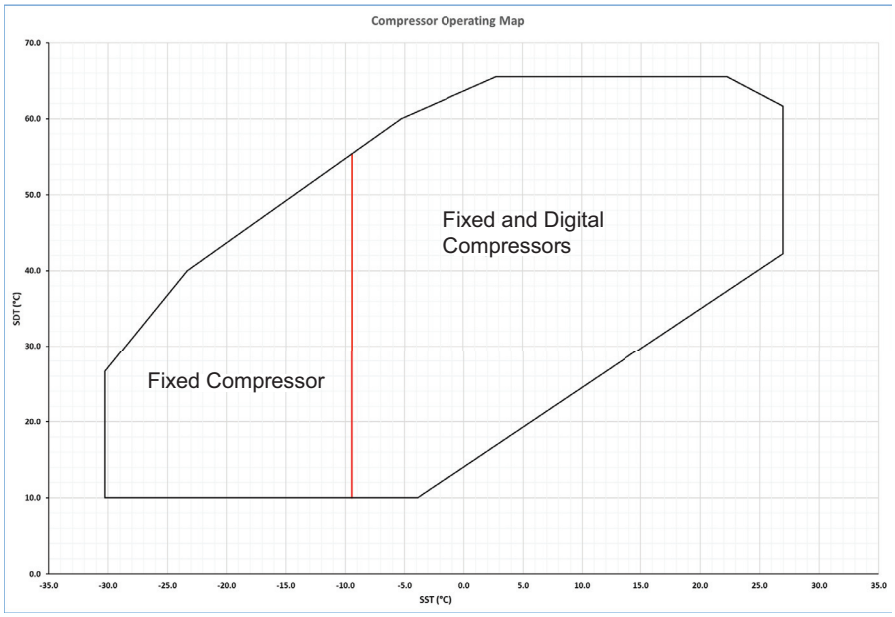


Fig. 147 — Compressor Operating Envelope, °C

Compressor Protection Module

When the digital option is ordered, the A1, digital, compressor on unit sizes 38RCD/S027, 030, 38RCS040, 050, and 38RCD060-110, is delivered with a pre-installed motor protection module inside the terminal box; see Fig. 148. This device provides for efficient and reliable protection against overheating and overloading, as well as protection against phase loss/reversal. A red and green LED light will show the status of any alerts and the cause. See the table showing "CoreSense Communication Module LED Flash Codes" on page 141 for LED sequence for all faults. This motor protection module is also availably on all compressors on 38RCD110 (Ckt B) and 38RCD130. All other compressors are protected by an internal overload inside the compressor shell.

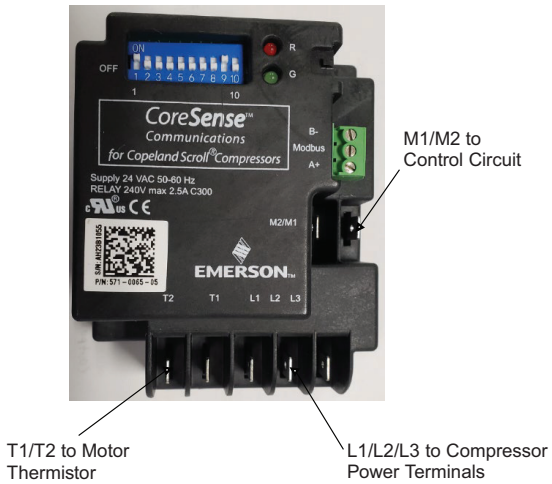


Fig. 148 — Compressor Protection Module

OVERHEATING AND OVERLOADING

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

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

PHASE REVERSAL/LOSS

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

Motor Overload Protection

COPELAND COMPRESSORS MODELS WITH ELECTRICAL CODE TF

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

COPELAND COMPRESSORS MODELS WITH ELECTRICAL CODE "TE"

⚠ CAUTION

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

Copeland models with "**TE**" in the electrical code (i.e., YPD163K1T-**TE**D, except YP182 230V) have a motor overload system that consists of an external electronic control module connected to a chain of four thermistors embedded in the motor windings. The module will trip and remain off for a minimum of 30 minutes if the motor temperature exceeds a preset point to allow the scrolls to cool down after the motor temperature limit has been reached. It may take as long as two hours for the motor to cool down before the overload will reset.

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

⚠ CAUTION

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

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

CoreSense Communications Module Troubleshooting

Copeland models with "**TE**" in the electrical code (i.e., YPD163K1T-**TE**D, except YP182 230V) 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. 149).

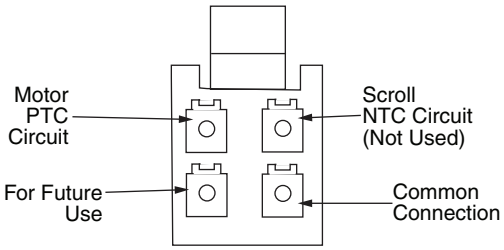


Fig. 149 — CoreSense Communication Motor Thermistor Plug

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 80.

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. 150. The flash code corresponds to the number of LED flashes, followed by a pause; then the flash code is repeated. A lockout condition produces a red flash, followed by a pause, a solid red, a second pause, and then repeated. Table 81 lists the flash code information for Warning and Alert codes along with code reset and troubleshooting information.

Table 80 — 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

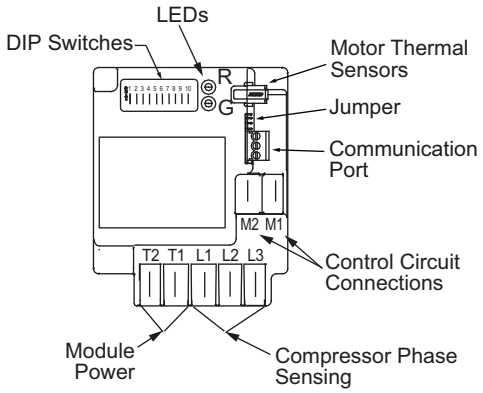


Fig. 150 — CoreSense Communication Motor Protection Wiring

Table 81 — CoreSense Communication Module LED Flash Codes

LED STATUS	FAULT CONDITION	FAULT CODE DESCRIPTION	FAULT CODE RESET	TROUBLESHOOTING INFORMATION
SOLID GREEN	None, normal operation	Module is powered and under normal operation	Not applicable	None
SOLID RED	Module malfunction	Module has an internal fault	Not applicable	1.Reset module by removing power from T1-T2. 2.Replace module.
WARNING LED FLASH				
GREEN FLASH CODE 1	Loss of communication	Module and Master Controller have lost communications with each other for more than 5 min	Automatic when communications are reestablished	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	38RC controls do not allow this operation normally. Confirm proper wiring and DIP switch settings.
GREEN FLASH CODE 4	Open/Shorted Scroll Thermistor	Not applicable	Not applicable	Not applicable
GREEN FLASH CODE 5	Not used	Not applicable	Not applicable	Not applicable
ALERT/LOCKOUT LED FLASH				
RED FLASH CODE 1	High motor temperature	Thermistor resistance greater than 4500 Ω. Lockout occurs after 5 alerts.	Thermistor resistance less than 2750 Ω and 30 minutes have elapsed	1.Check power supply. 2.Check system charge and superheat. 3.Check compressor contactor.
RED FLASH CODE 2	Open/shorted motor thermistor	Thermistor resistance greater than 4500 Ω, or less than 100 Ω. Lockout occurs after 6 hours.	Thermistor resistance is between 100 and 2750 Ω and 30 minutes have elapsed	1.Check for poor connections at module and thermistor fusite. 2.Check continuity of thermistor wiring harness. 3.Check for an open thermistor circuit.
RED FLASH CODE 3	Short cycling	Run time of less than 1 minute. Lockout if the number of alerts exceeds the number configured by the user in 24 hours.	Interrupt power to T2-T1	38RC controls do not allow this operation normally. Confirm proper wiring.
RED FLASH CODE 4	Scroll high temperature	Not applicable	Not applicable	Not applicable
RED FLASH CODE 5	Not used	Not applicable	Not applicable	Not applicable
RED FLASH CODE 6	Missing phase	Missing phase detected. Lockout after 10 consecutive alerts.	After 5 minutes and missing phase condition is not present	1.Check incoming power. 2.Check fuses or circuit breakers. 3.Check compressor contactor.
RED FLASH CODE 7	Reverse phase	Reverse phase detected. Lockout after 1 alert.	Interrupt power to T2-T1	1.Check incoming power phase sequence 2.Check compressor contactor 3.Check module phase wiring A-B-C.
RED FLASH CODE 8	Not used	Not applicable	Not applicable	Not applicable
RED FLASH CODE 9	Module low voltage	Less than 18 vac supplied to module	After 5 minutes and voltage is between 18 and 30 vac	This alert does not result in a lockout fault. 1.Verify correct 24 vac module is installed. 2.Check for a wiring error.

Warning Codes (Green LED Flash Code):

- Code 1 – Loss of Communication: The module will flash the green Warning LED one time indicating the module has not communicated with the master controller for longer than 5 minutes. Once communication is reinitiated, the Warning will be cleared. The 38RC 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 38RC units do not utilize a scroll thermistor.
- Code 5 – Not used.

Alert/Lockout Codes (Red LED Flash Code):

- Code 1 – Motor High Temperature: The module will flash the red Alert LED one time indicating the motor PTC circuit has exceeded 4500 Ω. A Code 1 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is below 2750 Ω. Five consecutive Code 1 Alerts will lock out the compressor. Once the module has locked out the compressor, a power cycle will be required for the lock-out to be cleared.
- Code 2 – Open/Shorted Motor Thermistor: The module will flash the red Alert LED 2 times indicating the motor PTC thermistor circuit has a resistance value greater than 2200 Ω or less than 100 Ω. that indicates an open/shorted thermistor chain. A Code 2 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the motor PTC circuit is back in the normal range. The module will lock out the compressor if the trip condition exists for longer than 6 hours. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 3 – Short Cycling: The module will flash the red Alert LED 3 times indicating the compressor is locked out due to

short cycling. A Code 3 Alert will open the M2-M1 contacts. Code 3 will be enabled when the Short Cycling DIP switch (no. 10) is ON (in the up position) and the compressor has exceeded the number of short cycles configured by the user in a 24-hour period. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.

- Code 4 – Scroll High Temperature: The module will flash the red Alert LED 4 times indicating the scroll NTC circuit is less than 2400 Ω. A Code 4 Alert will open the M2-M1 contacts. The Alert will reset after 30 minutes and the M2-M1 contacts will close if the resistance of the scroll NTC circuit is higher than 5100 Ω. The module will lock out the compressor if the number of Code 4 Alerts exceeds the user configurable number of Code 4 events within a 24-hour period. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 5 – Not used.
- Code 6 – Missing Phase: The module will flash the red Alert LED 6 times indicating a missing phase in one of the three leads to the compressor. A Code 6 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the missing phase condition is not present. The module will lock out the compressor after 10 consecutive Code 6 Alerts. Once the module has locked out the compressor, a power cycle will be required to clear the lockout.
- Code 7 – Reverse Phase: The module will flash the red Alert LED 7 times indicating a reverse phase in two of the three leads to the compressor. A Code 7 Alert will open the M2-M1 contacts. The module will lock out the compressor after one Code 7 Alert. A power cycle will be required to clear the lockout.
- Code 8 – Not used.
- Code 9 – Module Low Voltage: The module will flash the red Alert LED 9 times indicating low module voltage, less than 18 vac on the T2-T1 terminals for more than 5 seconds. A Code 9 Alert will open the M2-M1 contacts. The Alert will reset after 5 minutes and the M2-M1 contacts will close if the T2-T1 voltage is above the reset value in 18 to 30 vac.

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

Copeland replacement compressors are shipped with two solid-stage motor protection modules. A 120/240-volt module is installed and a 24-volt module is shipped with the compressor. The 38RC units require the 24-volt module be field installed. Failure to install the 24-volt module will result in a compressor failure alarm. See Fig. 150.

COMPRESSOR FUNCTIONAL CHECK

⚠ 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.

A functional compressor test with the suction service valve closed to check how low the compressor will pull suction pressure is not a good indication of how well a compressor is performing. Such a test may damage a scroll compressor. The following diagnostic procedure should be used to evaluate whether a Copeland scroll compressor is working properly.

1. Proper voltage to the unit should be verified.
2. The normal checks of motor winding continuity and short to ground should be made to determine if the inherent overload motor protector has opened or if an internal motor short or ground fault has developed. If the protector has opened, the compressor must be allowed to cool sufficiently to allow it to reset.
3. Proper indoor and outdoor blower/fan operation should be verified.
4. With service gages connected to suction and discharge pressure fittings, turn on the compressor. If suction pressure falls below normal levels, the system is either low on charge or there is a flow blockage in the system.
5. If suction pressure does not drop and discharge pressure does not rise to normal levels, reverse any two of the compressor power leads and reapply power to make sure compressor was not wired to run in reverse direction. If pressures still do not move to normal values, the compressor may be faulty. Reconnect the compressor leads as originally configured.
6. To test if the compressor is pumping properly, the compressor current draw must be compared to published compressor performance curves using the operating pressures and voltage of the system. If the measured average current deviates more than ±15% from published values, a faulty compressor may be indicated. A current imbalance exceeding 15% of the average on the three phases should be investigated further.

COMPRESSOR REPLACEMENT

All models contain scroll compressors and have from one to six compressors. 38RCD025-030 units utilize a single compressor per circuit. These compressors are mounted directly to the unit base. All other sizes have multiple compressors per circuit. Multiple compressor circuits are mounted in sets on mounting rails.

⚠ WARNING

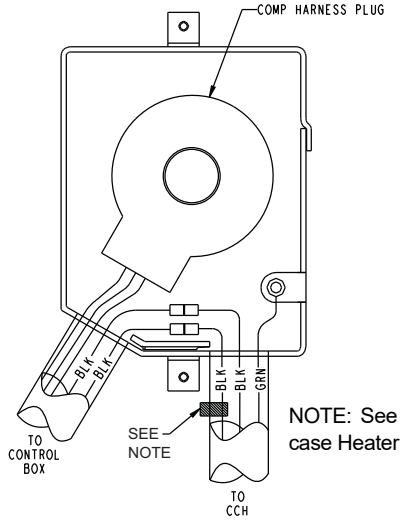
Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

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. 151 or 152.
3. Disconnect and remove the crankcase heater from the compressor. Save the ground screw for re-installation later.
4. If the compressor is equipped with a motor protection module (CoreSense), disconnect the wiring to the device.
5. Remove the cable from the compressor junction box.
6. If the compressor is a digital compressor, remove the digital unloader solenoid (Fig. 153). 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 GAS thermistor (DGT), return gas thermistor (SGT), 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 145. 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

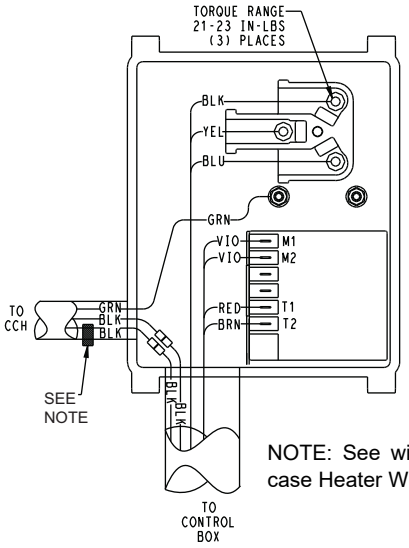
All compressors must be lifted by the lifting rings. Use care and extreme caution when lifting and moving compressors to avoid personal injury and equipment damage.

13. 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.
14. Before moving the compressor into its final location, install the mounting grommets on the compressor.



NOTE: See wire color codes in Crankcase Heater Wiring section, page 145.

Fig. 151 — Compressor Junction Box Without Motor Protection Module



NOTE: See wire color codes in Crankcase Heater Wiring section, page 145.

Fig. 152 — Compressor Junction Box With Motor Protection Module

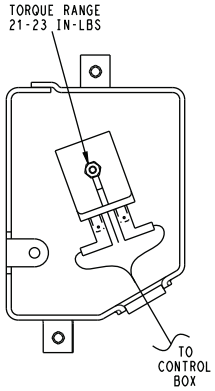


Fig. 153 — Digital Unloader Solenoid Valve

15. 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.
16. Secure the compressor using the mounting hardware removed in Step 10. Tighten mounting hardware to torque values listed in Table 82.

Table 82 — Compressor Fastener Recommended Torque Values

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)

17. 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 Table 82.
18. Replace the liquid line filter drier.
19. 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.
20. Leak check all braze connections and repair if necessary.
21. Evacuate the circuit using proper service techniques.
22. Knock the same holes out of the new compressor junction box, if required, and install the cable connectors from the old compressor.
23. Install the crankcase heater on the compressor as described in the section Crankcase Heater Mounting on page 144 and wire the crankcase heater as described in the same section. Crankcase heater position is critical to proper operation.
24. For compressors with the motor protection module, wire the power wiring and control wiring as shown in Fig. 152. A 120/240-volt module is installed and a 24-volt module is shipped with the compressor. Replacement compressors with CoreSense modules are shipped with a voltage specific solid-state motor protection module. The 38RC units require the 24-volt module be field installed. Failure to install the 24-volt module will result in a compressor failure alarm. For compressors without a motor protection module, install the motor plug by hand only. See Fig. 151.

⚠ 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.

25. If the compressor is a digital compressor, connect the digital unloader solenoid as shown in Fig. 153.

⚠ CAUTION

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

26. Recharge the compressors with new oil as described in the section Adding Oil on page 145.
27. Charge the circuit as described in the Start-Up section on page 54.
28. Check the operation of the compressor.

CRANKCASE HEATER MOUNTING

All 38RC 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 Table 83 and Fig. 154-156 for proper location. Crankcase heaters should be tightened to 20 to 25 in.-lb (2.26 to 2.82 N-m).

Table 83 — Crankcase Heater Location

UNIT	CRANKCASE HEATER LOCATION	
	CIRCUIT A COMPRESSOR(S)	CIRCUIT B COMPRESSOR(S)
38RCD025	Fig. 154	Fig. 154
38RCD027	Fig. 155	Fig. 155
38RCD030	Fig. 155	Fig. 155
38RCD040	Fig. 154	Fig. 154
38RCD050	Fig. 154	Fig. 155
38RCD060	Fig. 155	Fig. 155
38RCD070	Fig. 155	Fig. 154
38RCD080	Fig. 155	Fig. 155
38RCD090	Fig. 155	Fig. 155
38RCD100	Fig. 155	Fig. 155
38RCD110	Fig. 155	Fig. 156
38RCD130	Fig. 156	Fig. 156
38RCS025	Fig. 154	—
38RCS027	Fig. 155	—
38RCS030	Fig. 155	—
38RCS040	Fig. 155	—
38RCS050	Fig. 155	—

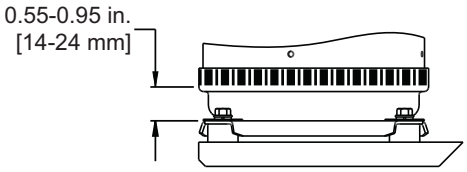


Fig. 154 — Copeland YP105, 123 and YPD110, 129, 145, 163, 192 Crankcase Heater Location

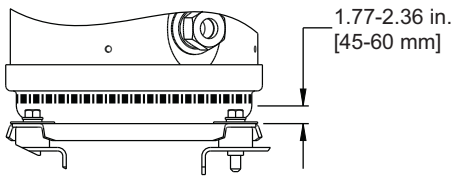


Fig. 155 — Copeland YP137, 154, 182 Crankcase Heater Location

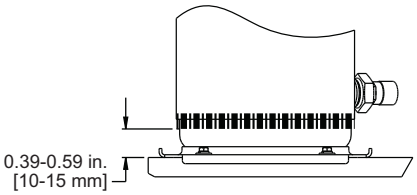


Fig. 156 — Copeland YP233, 293 Crankcase Heater Location

CRANKCASE HEATER WIRING

Crankcase heaters are specific to unit voltage. Each crankcase heater has a color-coded tag to indicate voltage. Table 84 identifies tag color code for each voltage. See Fig. 151 and 152 for compressor junction box connection information

Table 84 — 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

OIL CHARGE

⚠ CAUTION

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

R-32 systems use a polyolester (POE) oil. Use only Carrier approved compressor oil. Table 85 lists indicates the factory oil charge per compressor and the cold oil recharge amount.

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. Oil levels above the recommended level can lead to poor system performance.

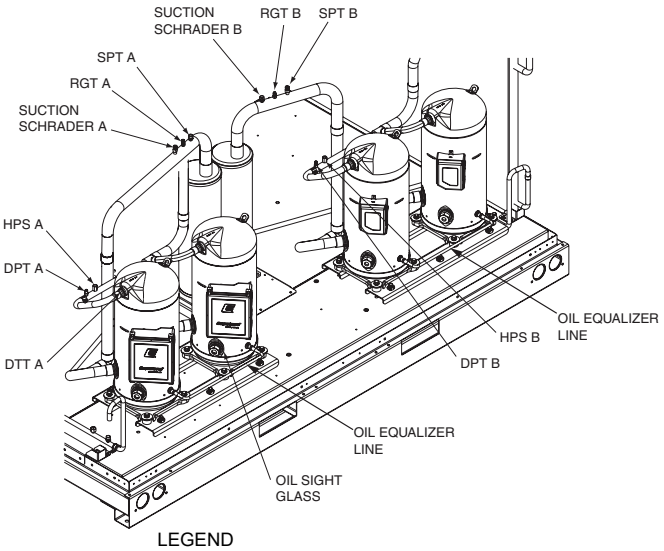
Adding Oil

Add oil to the oil equalizer Schrader valve on tandem compressor sets and the compressor Schrader valve on trio and single compressor circuits. (See Fig. 157 and 158.) When oil can be seen at the bottom of the sight glass, add oil in 5 oz (0.15 L) increments, each of which is approximately 1/8 in. (3.2 mm) oil level. Run all compressors for 20 minutes, then shut off to check oil level. Repeat procedure until acceptable oil level is present.

NOTE: Use only Carrier approved compressor oil Copeland NGX5020. Do not reuse oil that has been drained out, or oil that has been exposed to atmosphere.

Table 85 — Factory/Recharge Oil Charge Quantity per Compressor

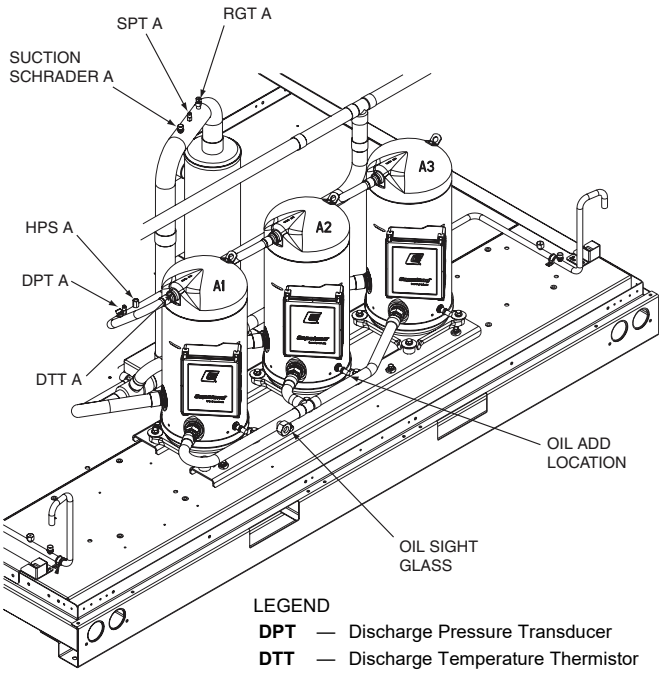
MODEL	OIL INITIAL (oz)	OIL RECHARGE (oz)	OIL INITIAL (L)	OIL RECHARGE (L)
YP105K1T	85	81	2.5	2.4
YP123K1T	85	81	2.5	2.4
YP137K1T	121	118	3.6	3.5
YP154K1T	126	118	3.7	3.5
YP182K1T	126	118	3.7	3.5
YP233K1T	150	150	4.4	4.4
YPD129K1T	85	81	2.5	2.4
YPD145K1T	114	106	3.4	3.1
YPD163K1T	114	110	3.4	3.3
YPD192K1T	114	110	3.4	3.3
YP232KIT	121	118	3.6	3.5



LEGEND

DPT — Discharge Pressure Transducer
DTT — Discharge Temperature Thermistor
HPS — High Pressure Switch
RGT — Return Gas Temperature Sensor
SPT — Space Temperature Sensor

Fig. 157 — Typical Tandem Compressor Assembly



LEGEND

DPT — Discharge Pressure Transducer
DTT — Discharge Temperature Thermistor
HPS — High Pressure Switch
RGT — Return Gas Temperature Sensor
SPT — Space Temperature Sensor

Fig. 158 — Typical Trio Compressor Assembly

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. 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. See Table 86.

Table 86 — Oil Dip Tube Assemblies

CARRIER PART NO.	COPELAND COMPRESSOR USAGE
30RA680018	YP/YPD105, 110, 123, 129, 137, 145, 154, 163, 182, 192
30RA680040	YP233, 293

Leaving the oil dip tube assembly in place is not recommended. See the section Replacing the Sight Glass below for installation instructions.

COMPRESSOR AND OIL EQUALIZER LINE SIGHT GLASSES

Compressors in single and tandem circuit arrangements have oil sight glasses located on the compressors (Fig. 157 and 158).

Replacing the Sight Glass

The sight glass seal is accomplished with an O ring. Do not reuse O ring.

To install or replace the compressor sight glass, torque the sight glass to 50 to 58 ft-lb (68 to 78 N-m).

If the sight glass is on the oil equalizer line, torque the sight glass to 25 to 30 ft-lb (34 to 40 N-m). Be sure to use a back-up wrench to install the sight glass on the oil equalizer line.

Control Module Service

LOSS OF COMMUNICATION

Loss of communication issues can be found on the Carrier Comfort Network (CCN) or Local Equipment Network (LEN). See the specific section below.

Carrier Comfort Network (CCN)

Loss of communication with CCN will result in the unit entering stand-alone mode. In this case check CCN wiring to the machine. The CCN communications with external control systems can be affected by high frequency electrical noise generated by the variable speed fan controller. Ensure unit is well grounded to eliminate ground currents along communication lines.

Local Equipment Network (LEN)

Loss of communications with the LEN is typically an internal wiring issue or a shorted input or output to a control module. Check the wiring, LEN wiring and input and output wiring.

CONTROL MODULE REPLACEMENT

The Carrier Controller replacement modules are shown in Table 87. If the Carrier Controller has been replaced, verify that all configuration data is correct. Enter the unit model number in ***Configuration Menu → Model Number Config***. Verify that all items under ***Configuration Menu → Current Configuration*** are correct. Any additional field-installed accessories or options ***Configuration Menu → Options1 Configuration*** should also be verified, as well as any specific time and maintenance schedules.

Table 87 — Replacement Modules

MODULE	REPLACEMENT PART NUMBER (WITH SOFTWARE)
Carrier Controller	2012540641
Carrier Input/Output Board (CIOB)	00PPG000585700
Aux Board	CEPL130567-02

Refer to the Start-Up Checklist for 38RC units (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. Disconnect all electrical power before servicing.

1. Check that all power to unit is off. Carefully disconnect all wires from the defective module by unplugging its connectors.
2. To remove the defective module, remove its mounting screws with a Phillips screwdriver, and remove the module from the control box. Save the screws for later use.
3. Verify that the address switches (all other modules) 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. Carefully check all wiring connections before restoring power.
7. Verify the Enable/Off/Remote Control switch is in the OFF position.
8. Restore control power. Verify that all module red LEDs blink in unison. Verify that all green LEDs are blinking and that the Controller display is communicating correctly.
9. Verify all configuration information, settings, set points and schedules. Return the Enable/Off/Remote Control switch to its previous position.

Condenser Fan Motors

If a condenser fan motor must be replaced, be sure to orient the motor properly in the motor mount. For 38RCD025-060 and 38RCS025-130, orient the motor plug toward the control box. Be sure the motor is securely seated in the bearing cup at the bottom of the motor support. Be sure to form a drip loop in the power wiring prior to connecting the power plug. See Condenser Fans on page 146 for proper fan placement.

CONDENSER FAN MOTOR PROTECTION

Each condenser fan motor is internally protected against overtemperature. They are also protected against a severe overcurrent condition by manual reset, calibrated trip, magnetic circuit breakers or fuses on a common circuit. Do not bypass connections or increase breaker size or fuse to correct trouble. Determine the cause and correct it before resetting the breaker.

Condenser Fans

AEROACOUSTIC (LOW SOUND) FANS

The units uses an aeroacoustic fan for lower sound levels and increased airflow.. The fan is covered by a molded shroud and grill assembly working in conjunction with the fan for improved performance.

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

To remove the fan, a fan puller will likely be needed. The fan motor shaft is protected from weather by the fan cover. If fan motor must be removed for service or replacement, when reinstalling the motor be sure to mount the motor band in the proper location. Do not use grease on the shaft or key. The fan motor has a step in the motor shaft. For proper performance, fan should be positioned such that it is securely seated on this step. Apply Loctite 680 Retaining Compound to the hub and motor

keyway only just prior to installing the key. See Fig. 159 and 160. Tighten bolt to 24 ± 2 ft-lb (32.5 ± 2.7 N-m). Figure 161 shows the proper position of mounted fan.

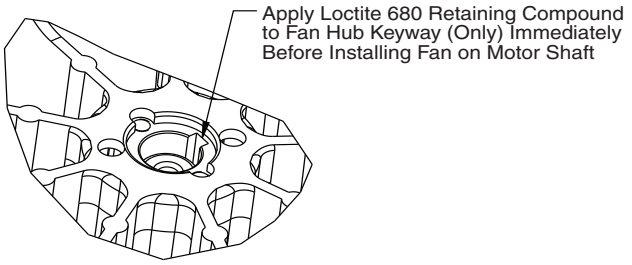


Fig. 159 — Aeroacoustic Fan, Fan Hub Keyway

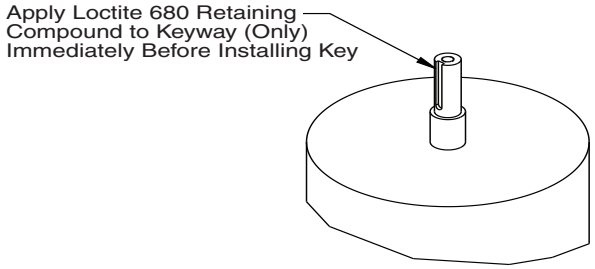


Fig. 160 — Aeroacoustic Fan, Fan Motor Keyway

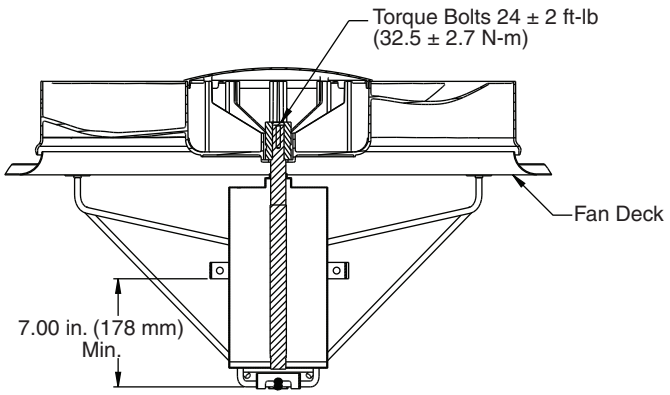


Fig. 161 — Aeroacoustic Fan Mounted Position

Filter Drier

This is a required field supplied and installed device. Replace whenever moisture/liquid indicator shows moisture in the system.

High Pressure Switch

All 38RC units are equipped with one high pressure switch per circuit, for high pressure protection. The high pressure switch is an automatic reset device. For pressure settings, see High Pressure Switch (HPS) on page 39. See Fig. 45-51 for typical locations of the high pressure switch on each circuit.

REPLACING SWITCH

⚠ WARNING

Care should be exercised while removing high pressure switch. Refrigerant system is under pressure. DO NOT remove high pressure switch before the condensing unit has been isolated and the refrigerant has been removed using standard refrigeration practices. Be sure to use proper personal protection equipment to guard against accidental exposure to refrigerant.

The high pressure switch is mounted on a female flare fitting. There is no Schrader valve under the high pressure switch. If the high pressure switch must be removed, the condensing unit must be isolated and the refrigerant removed using standard refrigeration practices before removing the high pressure switch, using a back-up wrench to secure the fitting. Be sure to loop cable and secure with a wire tie to create a strain relief as shown in Fig. 54 on page 50.

Moisture/Liquid Indicator

This is a required field supplied and installed device. A clear flow of liquid refrigerant indicates sufficient charge in the system. Bubbles indicate undercharged system or the presence of non-condensables. Moisture in the system measured in parts per million (ppm) changes the color of the indicator. See the specific manufacturer's instructions for moisture indication. Change the filter driers at the first sign of moisture in the system.

IMPORTANT: Unit must be in operation at least 12 hours before moisture indicator can give an accurate reading. With unit running, indicating element must be in contact with liquid refrigerant to give a true reading.

Variable Frequency Drives

The 38RC units with Greenspeed Intelligence are equipped with VFDs to control the condenser fans. The VFDs are configured through the Carrier Controller controls, and parameters should not be changed manually.

ADDRESSING AND COMMUNICATION

The 38RC units with Greenspeed Intelligence use Danfoss VFDs that operate through the Carrier controller, communicating commands to the drive over the LEN bus. As a result, each drive must have a unique address. For 38RC020-060 the VFD Fan drive address is 184. For 38RC070-130, the address for FVFD A1 is 181, and the address for FVFDB1 is 183.

COMMUNICATION WIRING

LEN wiring is connected to each drive at VFD Terminals 61 (Ground), 68 (+), and 69 (–). See Fig. 162.

It is recommended that the BUS TER (Bus Termination) DIP Switch be turned ON at the last VFD in the daisy chain. This switch is located behind the Local Control Panel (LCP). See Fig. 162.

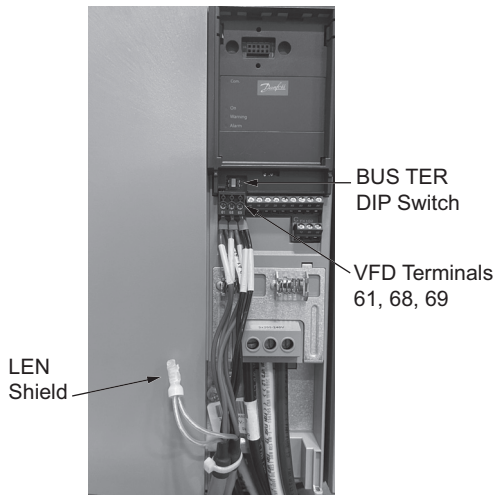


Fig. 162 — VFD LEN Wiring/BUS Termination

CONDENSER FAN DRIVES

Any unit with a D, G, H, K in the 13th position of the model number will have condenser fans controlled by a VFD. All fans operate on a single VFD at the same frequency. Fan drives are located on the right side of the unit. Reference the component arrangement diagrams in Fig. 10 and 11 on page 15 for VFD locations.

VFD CONFIGURATION TABLES

The configuration parameters for the VFD is stored in the control system and are automatically sent to the drives when addressed. The parameters should not need to be changed but are included as a reference for verification and troubleshooting. See Tables 70-73 for fan VFD parameters.

VFD ALARM RESET

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

VFD REPLACEMENT PROCEDURE

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

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

⚠ WARNING

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

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

⚠ CAUTION

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

4. Lift, position, and fasten the replacement drive to the unit. Tighten all bolts securely.
5. Connect power and LEN control wiring to the drive. For wiring details for fan drives, see Fig 163. Use the same knockout openings on the new drive as on the drive being replaced. Torque connections are 16 ft-lb for lug terminals.

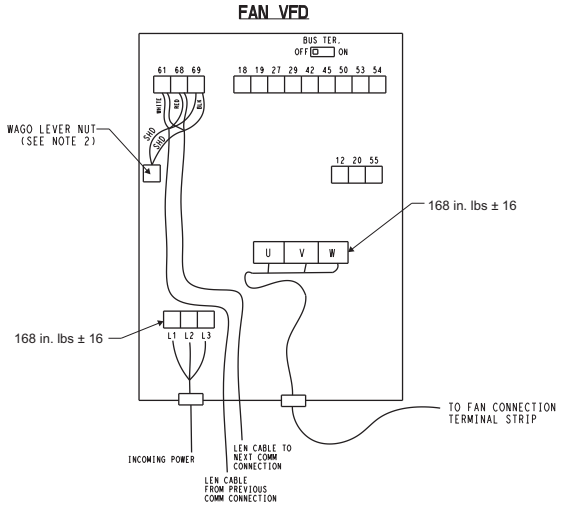


Fig. 163 — Fan Drive Wiring

6. Turn on power to the unit and allow the drive screen to become active. The drive will need to be manually addressed for the control system to export the correct parameters. Use this procedure to address the VFDs:
   a. Using the display interface on the VFD drive, select Main Menu with the Menu button. Navigate to menu item 8-30 and confirm that the LEN option is selected. Using the up/down arrows and OK button, follow the following path: ***8-** (Command Options) → 8-3* (FC Port Settings) → 8-30 (Protocol)***. If LEN is not selected, press the OK button and use the arrows to scroll through the options and select it. If no LEN option appears, LEN communication is not enabled on the drive. Follow the process described in the next section, Enable LEN Communication, and then complete the remainder of this addressing procedure.
   b. Navigate to menu item 8-31 on the VFD display and enter the address for the drive being configured, using the following path: ***8-** (Command Options) → 8-3* (FC Port Settings) → 8-31 (Address)***. Press the OK button and use the up/down arrows to select the drive address. Set the address to 184 for 38RC020-060, to 181 for 38RC070-130 Fan Drive A, and to 183 for 38RC070-130 Fan Drive B.
   c. Turn the unit power off and then on again. Cycling the power will cause the control system to send the correct configuration data files to the new drive.

Enable LEN Communication

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

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

LONG TERM STORAGE

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

Pressure Transducers

The suction and discharge transducers are different part numbers and can be distinguished by the color of the transducer body: suction (green) and discharge (black). See Fig. 45-51 for typical locations of pressure transducers on each circuit. No pressure transducer calibration is required. The transducers operate on a 5 vdc supply, which is generated by the Carrier controller. See Fig. 164 for transducer connections. These are located on CIOB-A for the A circuit transducers and on CIOB-B for the B circuit.

TROUBLESHOOTING

If a transducer is suspected of being faulty, first check supply voltage to the transducer. Supply voltage should be 5 vdc ± 0.2 v. If supply voltage is correct, compare pressure reading displayed on the display module against pressure shown on a calibrated pressure gage. Pressure readings should be within ± 5 psig (35 kPa). If the two readings are not reasonably close, check the pressure transducer harness wiring at the CIOB connection and at the transducer plug. If the wiring is good, replace the pressure transducer.

REPLACING TRANSDUCER

Pressure transducer should be mounted on an access fitting with a Schrader valve. Use caution when removing transducer. Use a back-up wrench to secure the fitting while removing and installing the pressure transducer. Be sure to loop cable and secure with a wire tie to create a strain relief as shown in Fig. 54 on page 50.

⚠ WARNING

Care should be exercised while removing any device, pressure sensing device or cap from an access fitting. Refrigerant system is under pressure. Be sure to use proper personal protection equipment to guard against accidental exposure to refrigerant.

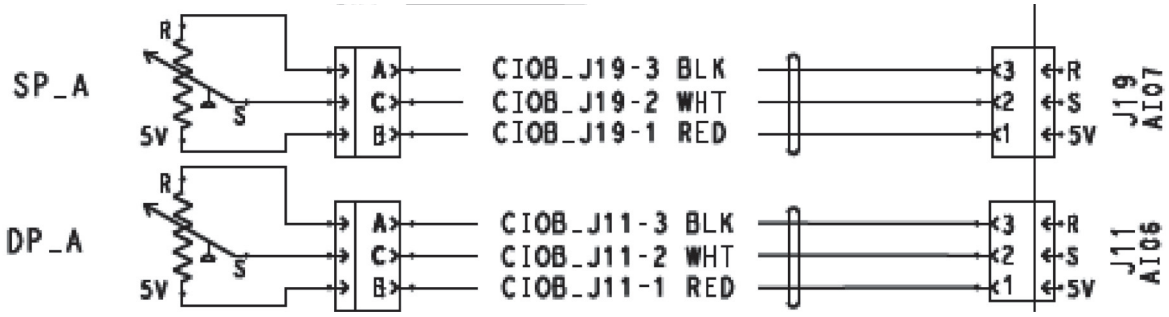


Fig. 164 — Typical 38RC Pressure Transducer Wiring

Temperature Relief Devices

All units have temperature relief devices to protect against damage from excessive pressures caused by extreme high temperatures (i.e., fire). These devices protect the high and low side and are installed in the liquid line between the condenser coils and the liquid line service valve.

Thermistors

Several styles of thermistors are used in the 38RC units. See Thermistors on page 39 for specific information on each thermistor. Thermistor connections are made to the CIOB. See Fig. 165.

TROUBLESHOOTING

To perform a thermistor-temperature sensor check, a high quality digital volt-ohmmeter is required.

1. Connect the digital voltmeter across the appropriate thermistor terminals at the CIOB terminals. See Fig. 165.
2. Using the voltage reading obtained, read the sensor temperature from Tables 88-92.
3. To check thermistor accuracy, measure temperature at probe location with an accurate thermocouple-type temperature measuring instrument. Insulate thermocouple to avoid ambient temperatures from influencing reading. Temperature measured by thermocouple and temperature determined from thermistor voltage reading should be close, ± 5°F (3°C), if care was taken in applying thermocouple and taking readings.

If a more accurate check is required, unit must be shut down and thermistor removed and checked at a known temperature (freezing point or boiling point of water) using either voltage drop measured across thermistor at the plug terminal, by determining the resistance with unit shut down and thermistor disconnected from the CIOB. Compare the values determined with the value read by the control in the Temperatures mode using the Carrier Controller display.

REPLACING THERMISTORS

Special instructions for replacing the outdoor air thermistor (OAT) are listed below. All other thermistors can be replaced simply by replacing the old with the new.

⚠ CAUTION

Be sure to route wiring away from all refrigerant piping. Heat from the piping can damage wiring.

Outdoor Air Thermistor (OAT)

This thermistor for 38RCD/RCS025-060 units is mounted close to the base of the unit. It must be mounted off the base rail for an accurate outdoor ambient temperature. See Fig. 52 on page 49 for mounting dimensions.

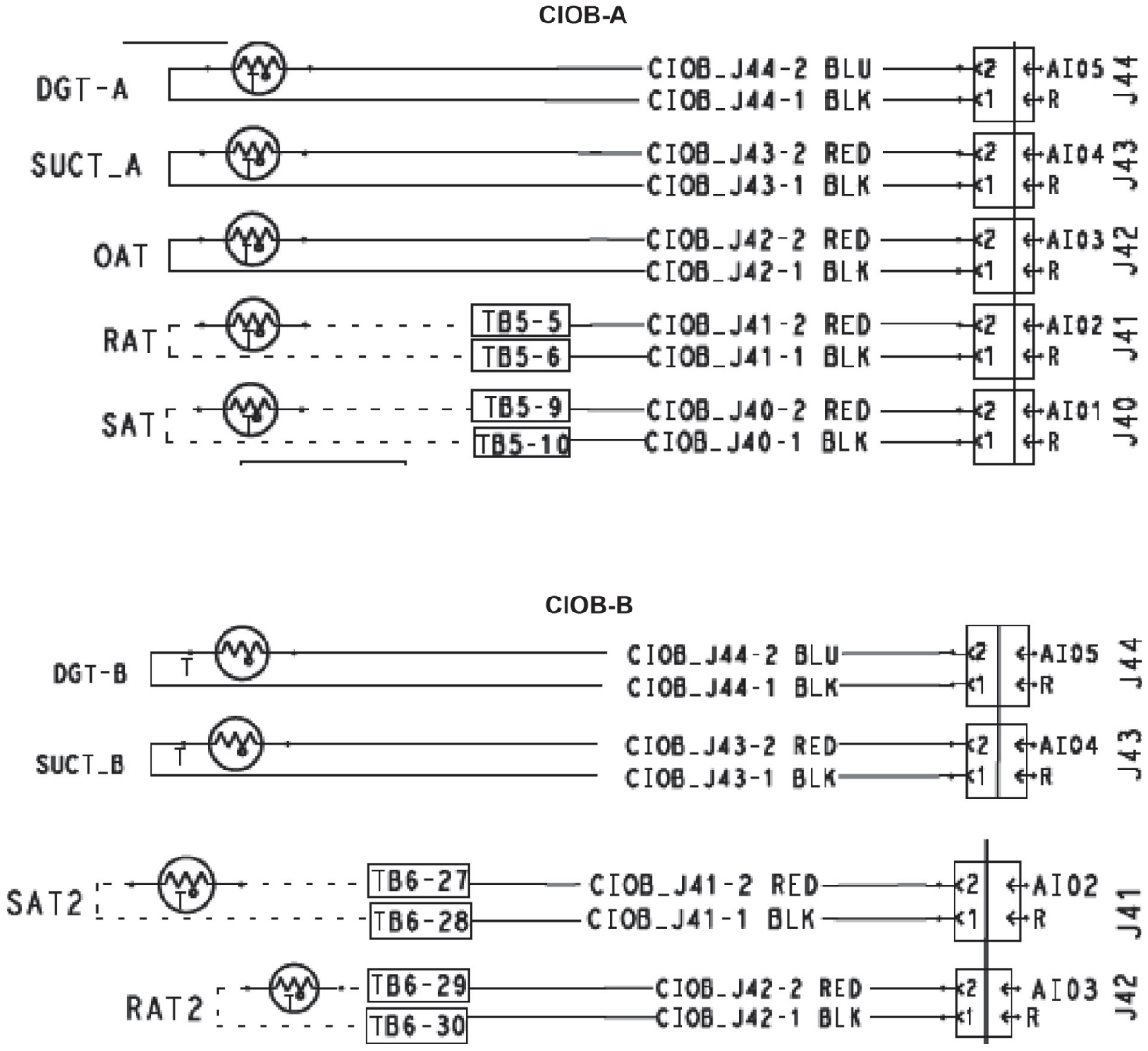


Fig. 165 — Typical CIOB Thermistor Connections

Table 88 — 5K Thermistor Temperatures (°F) vs. Resistance/Voltage Drop

TEMP (F)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–25	3.699	98,010
–24	3.689	94,707
–23	3.679	91,522
–22	3.668	88,449
–21	3.658	85,486
–20	3.647	82,627
–19	3.636	79,871
–18	3.624	77,212
–17	3.613	74,648
–16	3.601	72,175
–15	3.588	69,790
–14	3.576	67,490
–13	3.563	65,272
–12	3.550	63,133
–11	3.536	61,070
–10	3.523	59,081
–9	3.509	57,162
–8	3.494	55,311
–7	3.480	53,526
–6	3.465	51,804
–5	3.450	50,143
–4	3.434	48,541
–3	3.418	46,996
–2	3.402	45,505
–1	3.386	44,066
0	3.369	42,679
1	3.352	41,339
2	3.335	40,047
3	3.317	38,800
4	3.299	37,596
5	3.281	36,435
6	3.262	35,313
7	3.243	34,231
8	3.224	33,185
9	3.205	32,176
10	3.185	31,202
11	3.165	30,260
12	3.145	29,351
13	3.124	28,473
14	3.103	27,624
15	3.082	26,804
16	3.060	26,011
17	3.038	25,245
18	3.016	24,505
19	2.994	23,789
20	2.972	23,096
21	2.949	22,427
22	2.926	21,779
23	2.903	21,153
24	2.879	20,547
25	2.856	19,960
26	2.832	19,393
27	2.808	18,843
28	2.784	18,311
29	2.759	17,796
30	2.735	17,297
31	2.710	16,814
32	2.685	16,346
33	2.660	15,892
34	2.634	15,453
35	2.609	15,027
36	2.583	14,614
37	2.558	14,214
38	2.532	13,826
39	2.506	13,449
40	2.480	13,084
41	2.454	12,730
42	2.428	12,387
43	2.402	12,053
44	2.376	11,730
45	2.349	11,416
46	2.323	11,112
47	2.296	10,816
48	2.270	10,529
49	2.244	10,250
50	2.217	9,979
51	2.191	9,717
52	2.165	9,461
53	2.138	9,213
54	2.112	8,973
55	2.086	8,739
56	2.060	8,511
57	2.034	8,291
58	2.008	8,076
59	1.982	7,686
60	1.956	7,665
61	1.930	7,468
62	1.905	7,277
63	1.879	7,091
64	1.854	6,911
65	1.829	6,735
66	1.804	6,564
67	1.779	6,399
68	1.754	6,238
69	1.729	6,081
70	1.705	5,929
71	1.681	5,781
72	1.656	5,637
73	1.632	5,497
74	1.609	5,361
75	1.585	5,229
76	1.562	5,101
77	1.538	4,976
78	1.516	4,855
79	1.493	4,737
80	1.470	4,622
81	1.448	4,511
82	1.426	4,403
83	1.404	4,298
84	1.382	4,196
85	1.361	4,096
86	1.340	4,000
87	1.319	3,906
88	1.298	3,814
89	1.278	3,726
90	1.257	3,640
91	1.237	3,556
92	1.217	3,474
93	1.198	3,395
94	1.179	3,318
95	1.160	3,243
96	1.141	3,170
97	1.122	3,099
98	1.104	3,031
99	1.086	2,964
100	1.068	2,898
101	1.051	2,835
102	1.033	2,773
103	1.016	2,713
104	0.999	2,655
105	0.983	2,597
106	0.966	2,542
107	0.950	2,488
108	0.934	2,436
109	0.918	2,385
110	0.903	2,335
111	0.888	2,286
112	0.873	2,239
113	0.858	2,192
114	0.843	2,147
115	0.829	2,103
116	0.815	2,060
117	0.801	2,018
118	0.787	1,977
119	0.774	1,937
120	0.761	1,898
121	0.748	1,860
122	0.735	1,822
123	0.723	1,786
124	0.710	1,750
125	0.698	1,715
126	0.686	1,680
127	0.674	1,647
128	0.663	1,614
129	0.651	1,582
130	0.640	1,550
131	0.629	1,519
132	0.618	1,489
133	0.608	1,459
134	0.597	1,430
135	0.587	1,401
136	0.577	1,373
137	0.567	1,345
138	0.557	1,318
139	0.548	1,291
140	0.538	1,265
141	0.529	1,240
142	0.520	1,214
143	0.511	1,190
144	0.502	1,165
145	0.494	1,141
146	0.485	1,118
147	0.477	1,095
148	0.469	1,072
149	0.461	1,050
150	0.453	1,029
151	0.445	1,007
152	0.438	986
153	0.430	965
154	0.423	945
155	0.416	925
156	0.408	906
157	0.402	887
158	0.395	868
159	0.388	850
160	0.381	832
161	0.375	815
162	0.369	798
163	0.362	782
164	0.356	765
165	0.350	750
166	0.344	734
167	0.339	719
168	0.333	705
169	0.327	690
170	0.322	677
171	0.317	663
172	0.311	650
173	0.306	638
174	0.301	626
175	0.296	614
176	0.291	602
177	0.286	591
178	0.282	581
179	0.277	570
180	0.272	561
181	0.268	551
182	0.264	542
183	0.259	533
184	0.255	524
185	0.251	516
186	0.247	508
187	0.243	501
188	0.239	494
189	0.235	487
190	0.231	480
191	0.228	473
192	0.224	467
193	0.220	461
194	0.217	456
195	0.213	450
196	0.210	445
197	0.206	439
198	0.203	434
199	0.200	429
200	0.197	424
201	0.194	419
202	0.191	415
203	0.188	410
204	0.185	405
205	0.182	401
206	0.179	396
207	0.176	391
208	0.173	386
209	0.171	382
210	0.168	377
211	0.165	372
212	0.163	367
213	0.160	361
214	0.158	356
215	0.155	350
216	0.153	344
217	0.151	338
218	0.148	332
219	0.146	325
220	0.144	318
221	0.142	311
222	0.140	304
223	0.138	297
224	0.135	289
225	0.133	282

Table 89 — 5K Thermistor Temperatures (°C) vs. Resistance/Voltage Drop

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–32	3.705	100,260
–31	3.687	94,165
–30	3.668	88,480
–29	3.649	83,170
–28	3.629	78,125
–27	3.608	73,580
–26	3.586	69,250
–25	3.563	65,205
–24	3.539	61,420
–23	3.514	57,875
–22	3.489	54,555
–21	3.462	51,450
–20	3.434	48,536
–19	3.406	45,807
–18	3.376	43,247
–17	3.345	40,845
–16	3.313	38,592
–15	3.281	38,476
–14	3.247	34,489
–13	3.212	32,621
–12	3.177	30,866
–11	3.140	29,216
–10	3.103	27,633
–9	3.065	26,202
–8	3.025	24,827
–7	2.985	23,532
–6	2.945	22,313
–5	2.903	21,163
–4	2.860	20,079
–3	2.817	19,058
–2	2.774	18,094
–1	2.730	17,184
0	2.685	16,325
1	2.639	15,515
2	2.593	14,749
3	2.547	14,026
4	2.500	13,342
5	2.454	12,696
6	2.407	12,085
7	2.360	11,506
8	2.312	10,959
9	2.265	10,441
10	2.217	9,949
11	2.170	9,485
12	2.123	9,044
13	2.076	8,627
14	2.029	8,231
15	1.982	7,855
16	1.935	7,499
17	1.889	7,161
18	1.844	6,840
19	1.799	6,536
20	1.754	6,246
21	1.710	5,971
22	1.666	5,710
23	1.623	5,461
24	1.580	5,225
25	1.538	5,000
26	1.497	4,786
27	1.457	4,583
28	1.417	4,389
29	1.378	4,204
30	1.340	4,028
31	1.302	3,861
32	1.265	3,701
33	1.229	3,549
34	1.194	3,404
35	1.160	3,266
36	1.126	3,134
37	1.093	3,008
38	1.061	2,888
39	1.030	2,773
40	0.999	2,663
41	0.969	2,559
42	0.940	2,459
43	0.912	2,363
44	0.885	2,272
45	0.858	2,184
46	0.832	2,101
47	0.807	2,021
48	0.782	1,944
49	0.758	1,871
50	0.735	1,801
51	0.713	1,734
52	0.691	1,670
53	0.669	1,609
54	0.649	1,550
55	0.629	1,493
56	0.610	1,439
57	0.591	1,387
58	0.573	1,337
59	0.555	1,290
60	0.538	1,244
61	0.522	1,200
62	0.506	1,158
63	0.490	1,118
64	0.475	1,079
65	0.461	1,041
66	0.447	1,006
67	0.433	971
68	0.420	938
69	0.407	906
70	0.395	876
71	0.383	836
72	0.371	805
73	0.360	775
74	0.349	747
75	0.339	719
76	0.329	693
77	0.319	669
78	0.309	645
79	0.300	623
80	0.291	602
81	0.283	583
82	0.274	564
83	0.266	547
84	0.258	531
85	0.251	516
86	0.244	502
87	0.237	489
88	0.230	477
89	0.223	466
90	0.217	456
91	0.211	446
92	0.204	436
93	0.199	427
94	0.193	419
95	0.188	410
96	0.182	402
97	0.177	393
98	0.172	385
99	0.168	376
100	0.163	367
101	0.158	357
102	0.154	346
103	0.150	335
104	0.146	324
105	0.142	312
106	0.138	299
107	0.134	285

Table 90 — 10K Thermistor Temperature (°F) vs. Resistance/Voltage Drop

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
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
58	3.086	16,131
59	3.056	15,714
60	3.025	15,317
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
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
144	0.934	2,297
145	0.919	2,253
146	0.905	2,209
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
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
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
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 91 — 10K Thermistor Temperature (°C) vs. Resistance/Voltage Drop

TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)	TEMP (C)	VOLTAGE DROP (V)	RESISTANCE (Ohms)
–32	4.762	200,510	**15**	3.056	15,714	**62**	0.940	2,315
–31	4.748	188,340	**16**	3.000	15,000	**63**	0.913	2,235
–30	4.733	177,000	**17**	2.944	14,323	**64**	0.887	2,157
–29	4.716	166,342	**18**	2.889	13,681	**65**	0.862	2,083
–28	4.700	156,404	**19**	2.833	13,071	**66**	0.837	2,011
–27	4.682	147,134	**20**	2.777	12,493	**67**	0.813	1,943
–26	4.663	138,482	**21**	2.721	11,942	**68**	0.790	1,876
–25	4.644	130,402	**22**	2.666	11,418	**69**	0.767	1,813
–24	4.624	122,807	**23**	2.610	10,921	**70**	0.745	1,752
–23	4.602	115,710	**24**	2.555	10,449	**71**	0.724	1,693
–22	4.580	109,075	**25**	2.500	10,000	**72**	0.703	1,637
–21	4.557	102,868	**26**	2.445	9,571	**73**	0.683	1,582
–20	4.533	97,060	**27**	2.391	9,164	**74**	0.663	1,530
–19	4.508	91,588	**28**	2.337	8,776	**75**	0.645	1,480
–18	4.482	86,463	**29**	2.284	8,407	**76**	0.626	1,431
–17	4.455	81,662	**30**	2.231	8,056	**77**	0.608	1,385
–16	4.426	77,162	**31**	2.178	7,720	**78**	0.591	1,340
–15	4.397	72,940	**32**	2.127	7,401	**79**	0.574	1,297
–14	4.367	68,957	**33**	2.075	7,096	**80**	0.558	1,255
–13	4.335	65,219	**34**	2.025	6,806	**81**	0.542	1,215
–12	4.303	61,711	**35**	1.975	6,530	**82**	0.527	1,177
–11	4.269	58,415	**36**	1.926	6,266	**83**	0.512	1,140
–10	4.235	55,319	**37**	1.878	6,014	**84**	0.497	1,104
–9	4.199	52,392	**38**	1.830	5,774	**85**	0.483	1,070
–8	4.162	49,640	**39**	1.784	5,546	**86**	0.470	1,037
–7	4.124	47,052	**40**	1.738	5,327	**87**	0.457	1,005
–6	4.085	44,617	**41**	1.692	5,117	**88**	0.444	974
–5	4.044	42,324	**42**	1.648	4,918	**89**	0.431	944
–4	4.003	40,153	**43**	1.605	4,727	**90**	0.419	915
–3	3.961	38,109	**44**	1.562	4,544	**91**	0.408	889
–2	3.917	36,182	**45**	1.521	4,370	**92**	0.396	861
–1	3.873	34,367	**46**	1.480	4,203	**93**	0.386	836
0	3.828	32,654	**47**	1.439	4,042	**94**	0.375	811
1	3.781	31,030	**48**	1.400	3,889	**95**	0.365	787
2	3.734	29,498	**49**	1.362	3,743	**96**	0.355	764
3	3.686	28,052	**50**	1.324	3,603	**97**	0.345	742
4	3.637	26,686	**51**	1.288	3,469	**98**	0.336	721
5	3.587	25,396	**52**	1.252	3,340	**99**	0.327	700
6	3.537	24,171	**53**	1.217	3,217	**100**	0.318	680
7	3.485	23,013	**54**	1.183	3,099	**101**	0.310	661
8	3.433	21,918	**55**	1.150	2,986	**102**	0.302	643
9	3.381	20,883	**56**	1.117	2,878	**103**	0.294	626
10	3.328	19,903	**57**	1.086	2,774	**104**	0.287	609
11	3.274	18,972	**58**	1.055	2,675	**105**	0.279	592
12	3.220	18,090	**59**	1.025	2,579	**106**	0.272	576
13	3.165	17,255	**60**	0.996	2,488	**107**	0.265	561
14	3.111	16,464	**61**	0.968	2,400			

Table 92 — 100K Thermistor Temperatures (°C/°F) vs. Resistance

TEMP (C)	TEMP (F)	RESISTANCE (Ohms)	TEMP (C)	TEMP (F)	RESISTANCE (Ohms)
-40	-40	2,889,600	**75**	167	12,730
-35	-31	2,087,220	**80**	176	10,790
-30	-22	1,522,200	**85**	185	9,200
-25	-13	1,121,440	**90**	194	7,870
-20	-4	834,720	**95**	203	6,770
-15	5	627,280	**100**	212	5,850
-10	14	475,740	**105**	221	5,090
-5	23	363,990	**110**	230	4,450
0	32	280,820	**115**	239	3,870
5	41	218,410	**120**	248	3,350
10	50	171,170	**125**	257	2,920
15	59	135,140	**130**	266	2,580
20	68	107,440	**135**	275	2,280
25	77	86,000	**140**	284	2,020
30	86	69,280	**145**	293	1,800
35	95	56,160	**150**	302	1,590
40	104	45,810	**155**	311	1,390
45	113	37,580	**160**	320	1,250
50	122	30,990	**165**	329	1,120
55	131	25,680	**170**	338	1,010
60	140	21,400	**175**	347	920
70	158	15,070	**180**	356	830

MAINTENANCE

Recommended Maintenance Schedule

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

Every month:

- Check condenser coils for debris, clean as necessary.
- Check moisture indicating sight glass for possible refrigerant loss and presence of moisture.
- Check fusible plugs to be sure that they have not been capped. If the fusible plugs are vented, be sure the vent line is free of any obstructions.
- For units with the variable speed condenser fan option, check the VFD fan inlet for debris, snow, or ice. Clean as necessary.

Every 3 months:

- Check refrigerant charge.
- Check all refrigerant joints and valves for refrigerant leaks, repair as necessary.
- Check fan status switch operation.
- Check condenser coils for debris.
- Check all condenser fans for proper operation.
- Check compressor oil level.
- Check crankcase heater operation.
- For units with the variable speed condenser fan option, check the VFD fan filter. Clean if necessary.

Every 12 months:

- Check all electrical connections, tighten as necessary.
- Inspect all contactors and relays, replace as necessary.
- Check accuracy of thermistors, replace if greater than ± 2°F (1.2°C) variance from calibrated thermometer.
- Check accuracy of transducers, replace if greater than ± 5 psig (35 kPa) variance from calibrated gauge.
- Obtain and test an oil sample. Change oil only if necessary.
- Check refrigerant filter driers for excessive pressure drop, replace as necessary.
- Check condition of condenser fan blades and ensure they are securely fastened to the motor shaft.
- Lubricate door hinges.
- Perform service test to confirm operation of all components.
- If the unit is equipped with a ground fault interrupter-convenience outlet, GFI-CO (208/230, 460, or 575-3-60 only), test the operation of the device. Replace if necessary.

Lubrication

CONDENSER FAN BLADES

AeroAcoustic Fan

This assembly uses Loctite 680 Retaining Compound. DO NOT lubricate the fan shaft or fan hub.

CONDENSER FAN MOTOR BEARINGS

The condenser fan motors have sealed bearings so no field lubrication is required.

DOOR HINGES

All door hinges should be lubricated at least once a year.

MCHX Maintenance and Cleaning

Routine cleaning of coil surfaces is essential to maintain proper operation of the unit. Elimination of contamination and removal of harmful residues will greatly increase the life of the coil and extend the life of the unit. The following steps should be taken to clean MCHX condenser coils. Once coil maintenance is complete, using the Carrier controller display to indicate to the control Coil Cleaning Maintenance Done (***Run Status → PM → COIL → C.L.MN***), by toggling the value from **NO** to **YES**.

1. Remove any foreign objects or debris attached to the core face or trapped within the mounting frame and brackets.
2. Put on personal protective equipment including safety glasses and/or face shield, waterproof clothing and gloves. It is recommended to use full coverage clothing.
3. Start high pressure water sprayer and purge any soap or industrial cleaners from sprayer before cleaning condenser coils. Only clean, potable water is authorized for cleaning condenser coils.

⚠ CAUTION

Do not apply any chemical cleaners to MCHX condenser coils. These cleaners can accelerate corrosion and damage the coil.

4. Clean condenser face by spraying the coil steadily and uniformly from top to bottom while directing the spray straight toward the coil. Do not exceed 900 psig or 30 degree angle. The nozzle must be at least 12 in. from the coil face. Reduce pressure and use caution to prevent damage to air centers.

⚠ CAUTION

Excessive water pressure will fracture the braze between air centers and refrigerant tubes.

RTPF Maintenance and Cleaning

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

REMOVE SURFACE LOADED FIBERS

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

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

PERIODIC CLEAN WATER RINSE

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

ROUTINE CLEANING OF RTPF COIL SURFACE

Routine cleaning with Totaline® environmentally balanced coil cleaner is essential to extend the life of coils. This cleaner is available from Carrier Replacement Parts division as part number P902-0301 for a one gallon container, and part number P902-0305 for a five gallon container. It is recommended that all coils, including the standard copper tube aluminum fin, precoated fin, copper fin, or e-coated coils be cleaned with the Totaline environmentally balanced coil cleaner as described below. Coil cleaning should be

part of the unit's regularly scheduled maintenance procedures to ensure long life of the coil. Failure to clean the coils may result in reduced durability in the environment. Avoid the use of:

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

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

Totaline Environmentally Balanced Coil Cleaner Application

Equipment

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

⚠ CAUTION

Excessive water pressure will fracture the braze between air centers and refrigerant tubes.

Refrigeration Circuit

LEAK TESTING

Units are shipped with a nitrogen holding charge which must be removed prior to charging the system with R-32. If there is no pressure in the system, introduce enough nitrogen to search for the leak. Repair the leak using good refrigeration practices. After leaks are repaired, system must be evacuated and dehydrated.

CHARGING

If charging is required, see Start-Up section on page 54 for charging procedures.

Ground Fault Interrupter-Convenience Outlet

Some units may be equipped with a ground fault interrupter-convenience outlet (GFI-CO) (208/230, 460, or 575-3-60 only). Periodically, test the ground fault feature of this device. Test the GFI-CO by pressing the "Test" button on the device and check for power at the device. If the device is incorrectly wired, the GFI-CO may not trip and power may be present at the outlet. If power is present, disconnect all power to the unit and confirm wiring. If wiring is correct, replace the device.

If no power is present following the test, reset the device. To restore power to device, press the "Reset" button on the GFI-CO.

Decommissioning

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

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

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

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.

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.

TROUBLESHOOTING

Table 93 is an abbreviated list of symptoms, probable causes, and potential remedies. Table 94 lists alarm and alert codes. Tables 95 and 96 show Greenspeed alarms.

Alarms and Alerts

These are warnings of abnormal or fault conditions, and may cause either one circuit or the whole unit to shut down. They are assigned code numbers as listed in Table 94. Active pre-alerts/alerts/alarms are shown in Currently Active Alarms, ***Alarms → CRNT***. Up to 20 current alarms will be displayed. Time and date stamps are available in Alarm History.

If the unit is in alarm and unable to operate, Control Mode will show at the bottom of the Carrier controller. Automatic alarms will reset without operator intervention if the condition corrects itself. Manual alarms will require operator intervention to reset the alarm. Currently, Alarm Routing is not supported via BACnet, i-Vu®, or third party BACnet Building Management Systems.

RESETTING ALARMS

Before resetting any alarm, first determine the cause of the alarm and correct it. After determining and correcting the cause of the alarm, it may need to be reset. Press the alarm, bell, icon in the top right of the home screen. Press Reset Alarms. Change Alarm Reset to Yes, then press Set when prompted. Access must be set to Service or Factory level to reset alarms.If the condition has been resolved, the alerts/alarms will be cleared from the active alert/alarm set.

ALARM HISTORY

The Carrier controller display has the ability to display the latest alarms and alerts up to 20 events. This is a first-in, first-out alarm buffer. As a Pre-alert, Alert, or Alarm is generated, it is written to the Alarm History. To access Alarm History, press the alarm bell icon in the top right of the home screen, then press Alarm Historic. The latest pre-alerts, alerts and alarms will appear first on the list.

Table 93 — Troubleshooting

SYMPTOM	POSSIBLE CAUSES	POSSIBLE REMEDIES
Unit does not run.	Check for power to unit	Check overcurrent protection device. Check non-fused disconnect (if equipped). Restore power to unit. Check for 24 volts at the control boards.
	Wrong/incorrect unit configuration	Check unit configuration. If unit is controlled by a Local Schedule, check to be sure that the Day of the Week is properly set. Enable/Off/Remote Control Switch is not in a position to allow the unit to operate. Fan Status Switch is open.
	Active alarm	Check alarm status. See Alarms and Alerts beginning on page 157 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section beginning on page 135 and follow troubleshooting instructions.
	No cooling load	Cooling Load is satisfied.
Unit runs when it is not called for.	Incorrect unit configuration	If unit is controlled by a Local Schedule, check to be sure that the Day of the Week is properly set.
Unit operates too long or continuously.	Low refrigerant charge	Check for leak and add refrigerant.
	Compressor or control contacts welded	Replace contactor or relay.
	Non-condensables in refrigerant circuit	Remove refrigerant and recharge.
Circuit does not run.	Active alarm	Check alarm status. See Alarms and Alerts beginning on page 157 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section beginning on page 135 and follow troubleshooting instructions.
Circuit does not load.	Active alarm	Check alarm status. See Alarms and Alerts beginning on page 157 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section beginning on page 135 and follow troubleshooting instructions.
	Low Saturated Suction Temperature	See Alarms, Pre-Alerts, and Alerts A120, A121, P120,121, T120,121, page 171.
	Faulty compressor discharge check-valve	Replace compressor.
Compressor does not run.	Active alarm	Check alarm status. See Alarms and Alerts beginning on page 157 and follow troubleshooting instructions.
	Active operating mode	Check for Operating Modes. See the Operating Modes section beginning on page 135 and follow troubleshooting instructions.
	Inoperative compressor contactor	Check control wiring. Check contactor operation, replace if necessary.

Table 94 — Alarm and Alert Codes

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
T048 (61048)	Alert	OILRA_E	T048 CktA, Oil Return Not Reliable With Only One Comp Available	If only one compressor is available then only this alert gets triggered	Circuit A is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	169
T049 (61049)	Alert	OILRB_E	Circuit B Compressor Availability Alert	Oil return not reliable with only one comp available	Circuit B shut down	Manual	169
A060 (60135)	Alarm	SAT_E	Supply Air Temp-LOW Range Supply Air Temp-HIGH Range	SAT_E thermistor Input out of range Out of Range Value: 5K ≥ -40 to 302°F 10K ≥ -40 to 212°F	Unit shut down	Automatic	169
A060 (60135)	Alarm	SAT_E	Supply Air Temperature Update Not Received	If the sensor is required for the Control Type (C.TYP=1, 3,5, 8, 9) and the sensor is being written to by CCN or a third-party control, the sensor must be updated every 3 minutes. If it is not updated, then the Update Not Received alarm will be generated.	Unit shut down	Automatic	169
A061 (60136)	Alarm	RAT_E	Return Air Temp-LOW Range Return Air Temp-HIGH Range	RAT_E thermistor Input out of range 5K ≥ -40 to 302°F 10K ≥ -40 to 212°F	Unit shut down	Automatic	169
A061 (60136)	Alarm	RAT_E	Return Air Temperature Update Not Received	If the sensor is required for the Control Type (C.TYP = 1, 3, 5, 8, 9) and the sensor is being written to by CCN or a third-party control, the sensor must be updated every 3 minutes. If it is not updated, then the Update Not Received alarm will be generated.	Unit shut down	Automatic	169
A062 (60137)	Alarm	SAT2_E	Supply Air Temp for Ckt B - LOW Range Supply Air Temp for Ckt B - HIGH Range	Applicable only for control type 8, SAT_E thermistor Input out of range 5K ≥ -40 to 302°F 10K ≥ -40 to 212°F	Unit shut down for Control Type 8	Automatic	169
A062 (60137)	Alarm	SAT2_E	Supply Air Temperature 2 Not Updated	If the sensor is required for the Control Type (C.TYP= 8) and the sensor is being written to by CCN or a third-party control, the sensor must be updated every 3 minutes. If it is not updated, then the Update Not Received alarm will be generated.	Unit shut down for Control Type 8	Automatic	NA
A063 (60138)	Alarm	RAT2_E	Return Air Temp for Ckt B-LOW Range Return Air Temp for Ckt B-HIGH Range	Applicable only for control type 8, RAT_E thermistor Input out of range 5K ≥ -40 to 302°F 10K ≥ -40 to 212°F	Unit shut down for Control Type 8	Automatic	169
A063 (60138)	Alarm	RAT2_E	Return Air Temperature 2 Not Updated	If the sensor is required for the Control Type (C.TYP= 8) and the sensor is being written to by CCN or a third-party control, the sensor must be updated every 3 minutes. If it is not updated, then the Update Not Received alarm will be generated.	Unit shut down for Control Type 8	Automatic	169
A064 (60148)	Alarm	RLA_ALARM_E	Refrigerant Leak Detection Alarm	AHU shall be equipped with refrigerant leakage sensor installed. If a leak is detected, it shall open RL-A contact to DI06 on CIOB-A. Unit should shut down and post an alarm. This alarm is applicable to all control types except control type 8 in which it is an alert.	Unit is shut down or is not allowed to start	Refrigerant Leak detection alarm shall be manual reset for first 5 minutes from its detection, then converts to an Auto resettable alarm.	169

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
A120 (11120)	Alert	LOW_SSTA_ALARM_E	Circuit A Low Saturated Suction Temperature Alarm	This alert is used to keep the evaporator from freezing and the saturated suction temperature above the low limit for the compressors. At least one compressor in the circuit must be ON and one of the following conditions must be true: 1. The circuit's saturated suction temperature is less than 28°F for 5 minutes continuously, 2. The circuit's saturated suction temperature is less than 15°F for 2 minutes continuously, 3. The circuit's saturated suction temperature is less than 5°F for 1 minute continuously, 4. The circuit's saturated suction temperature is less than –15°F for 20 sec continuously.	If the circuit contains more than one operating compressor and the operating conditions meet the criteria above, one compressor in the affected circuit will be shut down with an appropriate local alert (P120/P121) generated. A 5-minute time guard will be added to the compressor. If the saturated suction temperature continues to be less than the criteria listed above, then another compressor will be shut down until the last compressor on the circuit is shut down at which time the appropriate alert or alarm will be issued (T120, T121, A120, A121). If the circuit contains one operating compressor and the operating conditions meet the criteria above, the affected circuit will be shut down and the appropriate alert (T120, T121) generated. A 5-minute time guard will be added to the compressor. Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	171
A121 (11121)	Alert	LOW_SSTB_ALARM_E	Circuit B Low Saturated Suction Temperature Alarm			Manual	171
A126 (61126)	Alert	HIGH_HEAD_MANUAL_A_E	Circuit A High Head Pressure Alarm	The first four daily occurrences of these conditions will generate a T126 alert for the appropriate circuit. With the fifth daily occurrence, the condition will generate the A126 alarm for the appropriate circuit.	Circuit A is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	172
A127 (61127)	Alert	HIGH_HEAD_MANUAL_B_E	Circuit B High Head Pressure Alarm	The first four daily occurrences of these conditions will generate a T127 alert for the appropriate circuit. With the fifth daily occurrence, the condition will generate the A127 alarm for the appropriate circuit.	Circuit B is shut down	Manual	172
A140 (60601)	Alarm	REV_ROT_E	Phase Reversal Detected	In Service Screen, if Reverse Rotation is Enabled and From CIOB board, DISCIN_REV_ROT is off then the Reverse Rotation Alarm is Activated	Unit is shut down or is not allowed to start	Manual	173
A150 (61150)	Alarm	EMERGENCY_E	Unit Is In Emergency Stop	This alarm is indicated when a CCN Emergency Stop command is received. If the CCN point name EMSTOP in the CCN Status Table is set to "Emstop," the unit will shut down and generate this alarm.	Unit is shut down or is not allowed to start	Automatic	175
A153 (61153)	Alarm	ILL_CNFG_02_E	Illegal Configuration - Invalid Unit	Unit model number configuration is invalid.	Unit is not allowed to start	Automatic	NA
A155 (61155)	Alarm	ILL_CNFG_04_E	Illegal Configuration - Dual Thermostat Type on Single Ck Unit	Check to see if Configuration→OPT2→C. TYP = 8 (DUAL TSTAT) control type is configured for a single circuit machine, ***Configuration → UNIT → NCKT*** = 1 (Single Circuit). Illegal if you have only one stage available and try to use.	Unit is shut down or is not allowed to start	Automatic	NA

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
A160 (61160)	Alarm	ILL_CNFG_CTRLTYPE_E	Illegal Control Type Configuration	The unit has digital model number and configuring control type 4 raises an Alarm	Unit is shut down or is not allowed to start	Automatic	NA
A161 (61161)	Alarm	ILL_CNFG_DIG_MLV_E	Illegal Digital Compressor Configuration	Digital compressor and Hot Gas Bypass Valve configured in the same unit	Unit is shut down or is not allowed to start	Automatic	NA
A175 (61175)	Alarm	AUXCOMFAIL_E	Loss of Communication with AUX Board	A communication problem with the AUX Board has been detected by the controller. The AUX Board is required for digital compressor operation.	AUX Board functions, digital compressor	Automatic	176
A176 (61176)	Alarm	ALM_CIOB1_COM_F	Loss of Communication with CIOB Board 1 Failure	CIOB-A board Connection is disconnected or Lost due to any other reason	Unit is shut down or is not allowed to start	Automatic	NA
A177 (61177)	Alarm	ALM_CIOB2_COM_F	Loss of Communication with CIOB Board 2 Failure	LEN connection between Carrier control and CIOB board is not correct.	For Control Type 5 and Control Type 8, CIOB-2 communication failure triggers unit fail alarm. For Control Types other than Control Type 5 and Control Type 8, CIOB-2 communication failure triggers Circuit-B alert (i.e., run unit with circuit A).	Automatic	NA
A179 (61179)	Alarm	VFAN_A_COMM_LOSS	Fan VFD Communication Failure	This alarm indicates that there are communication problems between the VFD drives for unit in small and large for Circuit A	The controller lost communication with a Danfoss fan VFD module. Unit shut down.	Automatic	177
A180 (61180)	Alarm	VFAN_B_COMM_LOSS	Fan VFD Communication Failure	This alarm indicates that there are communication problems between the CIOB and fan VFD	The controller lost communication with a Danfoss fan VFD module. Unit shut down.	Automatic	177
A197 (61197)	Alarm	VFAN_A_FAN_FAULT	VFAN_A Stop Fault	When VFD status word >7, this alarm is activated.	None	Automatic	NA
A198 (61198)	Alarm	VFAN_B_FAN_FAULT	VFAN_B Stop Fault	When VFD status word >7, this alarm is activated.	None	Automatic	NA
A199 (61661)	Alarm	ALARM_OUT_E	Test::Alarm relay by Quicktest	Any alarm that brings the unit down or when Quick Test is enabled and Input Alarm Relay is On	Unit is shut down or is not allowed to start	Automatic	NA
A200 (61200)	Alarm	IDFAU_FS_E	Indoor Fan Status Failure — Fan Not Running	IF 38RC unit is Enabled (***Inputs→GEN.I→STST=STRT***). AND Airflow switch is open (Inputs→GEN.I→ID.F.A= OFF).	Unit is shut down or is not allowed to start	Manual	177
A230 (60230)	Alarm	SENSOR_SWAP_E	Sensor Swap Alarm	IF current applied “control type” uses SAT or RAT. This alarm is applicable for control type 5 as well as all control type, which uses PID algorithm AND Unit/Circuit is not in Prestart state or Shutdown or OFF or TRIPOUT or QUICK TEST state. Condition: RAT < SAT, for continuously 150 sec. NOTE: If Control Point has increased during unit run, then unit will go off. In this case RAT<SAT alarm is not applicable. NOTE: For Control type 8, refer to 11231, SENSOR_SWAP_CIRA_E and 11232, SENSOR_SWAP_CIRA_E	Unit is shut down or is not allowed to start	Manual	NA

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
A234 (60234)	Alert	DGT_A_FAIL	CKT A - DGT Out Of Range Alarm	Low Limit: Monitored at any given point of time when all the compressors are OFF in a circuit: For continuously 10 sec, If [OAT is above 35F] and [the DGT reading is below 33F], then control shall trigger “DGT out of range alarm”. Monitored only when any compressor is ON (Running): If “DGT is below 33F” for continuously 90 sec, control shall trigger “DGT out of range alarm”. High Limit: Control shall trigger “DGT out of range alarm”, if DGT reading is greater then or equal to high limit (350°F) for continuously 10 sec.	Circuit is stopped or is not allowed to start Note: For single circuit units, circuit A shutdown result in unit shutdown	Automatic Clear if for continuously 10 sec 35°F ≤ DGT ≤ 350°F	NA
A235 (60235)	Alert	DGT_B_FAIL	CKT B - DGT Out Of Range Alarm				NA
A412 (61412)	Alarm	VFAN_A_STS_ampstop	VFAN_A_STATUS	Alarm bit are set in VFD	Unit is shut down or is not allowed to start	Automatic	177
A414 (61414)	Alarm	VFAN_B_STS_ampstop	VFAN_B_STATUS			Automatic	NA
A509 (60509)	Alert	RUN_OUT_MAP_A_F	Compressor Running Outside MAP - Cir A	IF 3 min passed after first compressor start in the circuit. and the circuit is running (i.e., at least 1 compressor running) THEN If [SST≥25°F] AND [SCT≤ 108°F] AND [Current SCT is lying outside the compressor map (i.e., Current SCT is in yellow shaded area in compressor map)] is TRUE THEN If Current SCT does not move inside the compressor map within 65 min, in this case control will trigger compressor running outside map alarm for the circuit.	1.The circuit shall be stopped. 2.Alarm Icon shall be on. Alarm relay shall be energized. Note: For single circuit units, circuit A shutdown results in unit shutdown	Manual	NA
A507 (61668)	Alarm	UNIT_LEVEL_E	Unit Level Alarm	When both circuits have low oil level alarm present, unit level alarm is raised.	Unit is shut down or is not allowed to start	Manual	NA
A510 (60510)	Alert	RUN_OUT_MAP_B_F	Compressor Running Outside MAP - Cir B	IF 3 min passed after first compressor start in the circuit and the circuit is running (i.e., at least 1 compressor running). If above condition is TRUE THEN If [SST≥25°F] AND [SCT≤ 108°F] AND [Current SCT is lying outside the compressor map (i.e., Current SCT is in yellow shaded area in compressor map)] is TRUE THEN If Current SCT does not move inside the compressor map within 65 min, in this case control will trigger compressor running outside map alarm for the circuit.	1.The circuit shall be stopped. 2.Alarm Icon shall be on. Alarm relay shall be energized.	Manual	NA

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
A600 (60600)	Alarm	ILL_CONF_COOL_RST_MA_E	Illegal Cool and Rst Ma Configuration	Both COOL_MA_E and RESET_LMT_E alerts are active, or Cooling Setpoint selection type is use 4_20Ma(1) and Cooling Reset Type is 1.	Unit is shut down or is not allowed to start	Automatic	NA
A801 (60146)	Alarm	HGBP_INVALID_CTRL_ALARM	HGBP Valve turned on in control type 4	If the unit is in control type 4, HGBP valve shall not get ON. NOTE: Controls shall automatically TURN OFF the HGBP, once control type 4 is selected. And control type 4 shall not allow any USER (via UI or Protocol) to write HGBP point for turning the HGBP to ON. Abnormal Condition: If the unit is in control type 4 AND HGBP valve gets ON, control shall raise an alert (HGBP Valve turned on in control type 4). This alert shall persist for 3 min before triggering unit alarm (HGBP Valve turned on in control type 4).	Unit is shut down or is not allowed to start	Manual	NA
P120 (60120)	Pre-Alert	LOW_SSTA_ALERT_NO_BC_E	Circ.A Low Sat. Suct.Temp —One Comp Shutdown	This alert is used to keep the evaporator from freezing and the saturated suction temperature above the low limit for the compressors. At least one compressor in the circuit must be ON and one of the following conditions must be true: 1.The circuit's saturated suction temperature is less than 28°F for 5 minutes continuously, 2.The circuit's saturated suction temperature is less than 15°F for 2 minutes continuously, 3.The circuit's saturated suction temperature is less than 5°F for 1 minute continuously, 4.The circuit's saturated suction temperature is less than –15°F for 20 seconds continuously.	This is a non-broadcast alarm. If more than one compressor in the circuit is running, one of the compressors will be shut down. A 5-minute prohibition timer is added to the compressor.	Automatic	171
P121 (60121)	Pre-Alert	LOW_SSTB_ALERT_NO_BC_E	Circ.B Low Sat. Suct.Temp — One Comp Shutdown			Automatic	171
T064 (60139)	Alarm	RLA_ALARM	Refrigerant Leak Detection Alarm for Circuit A	If a leak is detected, this contact will close. Unit should shut down and post an alarm. This alert is specific to control type 8.	Unit Shutdown, if control type is not equal to 8. For Control Type 8, circuit is shut down or is not allowed to start	Refrigerant Leak detection alarm shall be manual reset for first 5 min from its detection and thereafter is an Auto resettable alarm.	NA
T065 (60140)	Alarm	RLB_ALARM	Refrigerant Leak Detection Alarm for Circuit B				NA
T068 (11328)	Alert	RGTA_E	Circuit A Return Gas Thermistor Failure	This alert occurs when the compressor return gas temperature thermistor is outside the range of –40 to 302°F (–40 to 150.0°C).	Circuit shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Automatic	169
T-069 (11329)	Alert	RGTB_E	Circuit B Return Gas Thermistor Failure			Automatic	169
T073 (11333)	Alert	OAT_E	Outside Air Thermistor Failure	This alert occurs when the outdoor air temperature thermistor is outside the range of –40 to 302°F (–40 to 150.0°C).	Outside Air Temperature Reset will be disabled and the unit will run under normal set point control. Outdoor Ambient Lockout is disabled.	Automatic	169
T074 (11334)	Alert	SPT_E	Space Temperature Thermistor Failure	This alert occurs when the Space Temperature Thermistor is outside the range of –40 to 302°F (–40 to 150.0°C).	Space Temperature Reset will be disabled. And the unit will run under normal set point control.	Automatic	169
T082 (11342)	Alert	SPTO_E	Space Temperature Offset Sensor Failure	This alert occurs when the space temperature offset potentiometer is outside the range of –5 to 5	Space Temperature Offset disabled. Unit will run under normal control without space temperature offset	Automatic	170

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
T090 (11350)	Alert	DP_A_E	CircA Disc Pressure - LOW Range CircA Disc Pressure - HIGH Range	Transducer reading is outside the range of 0.0 to 667.0 psig (0.0 to 4599 kPa).	Circuit is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Automatic	170
T091 (11351)	Alert	DP_B_E	CircB Disc Pressure - LOW Range CircB Disc Pressure - HIGH Range			Automatic	170
T092 (11352)	Alert	SP_A_E	CircA Suct Pressure - LOW Range	Transducer reading is below 12.0 psig (82.7371 kpa).	Circuit is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Automatic	170
T093 (11353)	Alert	SP_B_E	CircB Suct Pressure - LOW Range			Automatic	170
T110 (61110)	Alert	CHARGE_A_E	Circuit A Loss of Charge	Circuit discharge pressure is less than 26 psi (179.3 kPa). The alert criteria are ignored during the following conditions: 1.The first minute following power-up 2.If the outdoor air temperature is less than –5°F (–20.6°C) 3.For 1 minute following the outdoor air temperature rising above –5°F (–20.6°C)	Circuit is not allowed to start Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	170
T111 (61111)	Alert	CHARGE_B_E	Circuit B Loss of Charge			Manual	170
T112 (61112)	Alert	HIGH_SSTA_E	Circuit A High Suction Temperature	The following conditions must be true: 1.The circuit is ON. 2.The circuit's saturated suction temperature is greater than 78°F (25.6°C) after 5 minutes of operation.	Circuit A shut down	Manual	170
T113 (61113)	Alert	HIGH_SSTB_E	Circuit B High Suction Temperature		Circuit B shut down	Manual	170
T114 (61114)	Alert	LOW_SHA_E	Circuit A Low Suction Superheat	1.The circuit is ON. 2.5 minutes after the compressor starts, the circuit superheat is less than 5°F (2.8°C) for 5 continuous minutes.	Circuit is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	170
T115 (61115)	Alert	LOW_SHB_E	Circuit B Low Suction Superheat			Manual	170
T120 (11120)	Alert	LOW_SSTA_ALERT_E	Circuit A Low Saturated Suction Temperature Alert	This alert or is used to keep the evaporator from freezing and the saturated suction temperature above the low limit for the compressors. At least one compressor in the circuit must be ON and one of the following conditions must be true: 1.The circuit's saturated suction temperature is less than 28°F for 5 minutes continuously, 2.The circuit's saturated suction temperature is less than 15°F for 2 minutes continuously, 3.The circuit's saturated suction temperature is less than 5°F for 1 minute continuously, 4.The circuit's saturated suction temperature is less than –15°F for 20 seconds continuously.	If the circuit contains more than one operating compressor and the operating conditions meet the criteria above, one compressor in the affected circuit will be shut down with an appropriate local alert (P120/P121) generated. A 5-minute time guard will be added to the compressor. If the saturated suction temperature continues to be less than the criteria listed above, then another compressor will be shut down until the last compressor on the circuit is shut down at which time the appropriate alert or alarm will be issued (T120, T121, A120, A121). If the circuit contains one operating compressor and the operating conditions meet the criteria above, the affected circuit will be shut down and the appropriate alert (T120, T121) generated. A 5-minute time guard will be added to the compressor. Note: For single circuit units, circuit A shutdown result in unit shutdown.	Automatic	171
T121 (11121)	Alert	LOW_SSTB_ALERT_E	Circuit B Low Saturated Suction Temperature Alert			Automatic	171

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
T122 (11122)	Alert	HPSA_E	Circuit A High-Pressure Switch Trip	This alert has multiple criteria. The Carrier controller monitors the HPS (high pressure switch). The 38RC units employ one HPS for each circuit. For High Pressure Trip Alert: 1. The alert criterion is checked when the circuit is ON or OFF. 2. The circuit HPS opens for 10 seconds or more. When both of the above conditions met will result in the alert (T122). See Page 171 for more detailed tripping conditions on T122/123.	Circuit is shut down or is not allowed to start. Note: For single circuit units, circuit A shutdown result in unit shutdown.	Manual	171
T123 (11123)	Alert	HPSB_E	Circuit B High Pressure Switch Trip			Manual	171
T126 (11126)	Alert	HIGH_HEAD_PRESS_A_E	Circuit A High Head Pressure Alert	The first four daily occurrences of these conditions will generate a T126 alert for the appropriate circuit.	Circuit is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Automatic	172
T127 (11127)	Alert	HIGH_HEAD_PRESS_B_E	Circuit B High Head Pressure Alert	The first four daily occurrences of these conditions will generate a T127 alert for the appropriate circuit.	Circuit is shut down	Automatic	172
T174 (11369)	Alert	COOL_MA_E	4-20 mA Cooling Setpoint Input Failure	The following conditions must be true: 1. The unit must be configured for either Control Type ***Configuration*** → ***OPT2*** → ***C.TYP***=7 [PCT CAP] or 9 [VAV SETPOINT]. 2. The Energy Management Module (CIOB-2) is required and must be configured, EMM Module Installed, ***Configuration*** → ***OPT1*** → ***EMM***=YES. 3. The signal is less than 2 mA or greater than 22 mA. Action To Be Taken: For ***Configuration*** → ***OPT2*** → ***C.TYP***=7 (PCT CAP) without return air and supply air thermistors, the function is disabled and the unit is not allowed to start or run. For ***Configuration*** → ***OPT*** → ***C.TYP***=9 (VAV SETPOINT), the function is disabled. For ***C.TYP***=7 with return air and supply air thermistors and ***C.TYP***=9, the unit controls will use ***Cooling Set Point 1 (Setpoints*** → ***COOL*** → ***CSP.1***) as the Active Set Point (***Run Status*** →***VIEW***→***SETP***).	For ***Configuration*** → ***OPT2*** → ***C.TYP***=7 without Return Air and Supply Air Thermistors, unit is shut down or not allowed to start. For ***Configuration*** → ***OPT2*** → ***C.TYP***=9, 4-20 mA set point function is disabled. For ***Configuration*** → ***OPT2*** → ***C.TYP***=7 with Return Air and Supply Air Thermistors, or ***C.TYP***=9, unit operates with Cooling Set Point 1 ***Setpoints*** → ***COOL*** → ***CSP.1*** as the Active Set Point Run ***Status*** → ***VIEW*** → ***SETP.***	Automatic	176
T175 (11368)	ALERT	AUXCOMFAIL_CKTA_E	Loss of Communication with Aux board CKt A	Control type 8, Aux board Communication Lost	Unit is shut down	Automatic	NA
T176 (11366)	Alert	RESET_LMT_E	4-20 mA Reset Input Failure	This alert indicates a problem has been detected with reset 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA.	4-20 mA Cooling Temperature Reset function is disabled	Automatic	176
T177 (11368)	Alert	DMD_LMT_E	4-20 mA Demand Limit Failure	This alert indicates that a problem has been detected with demand limit 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA.	4-20 mA Cooling Demand Limit function is disabled	Automatic	177

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
T201 (11201)	Alert	IDFA_FS_E	Circuit A Indoor Fan Status Failure	This alarm is generated when the following conditions are true: 1.38RC unit is Enabled. 2.Control Type is Dual Thermostat (OPTIONS2_CTRL-TYPE=8). 3.Airflow switch 1 is open (TSTAT_IN_ID-FA_FS=OFF) NOTE: Control Type 8 is not applicable for single circuit unit.	Circuit is shut down or is not allowed to start	Manual	177
T202 (11202)	Alert	IDFB_FS_E	Circuit B Indoor Fan Status Failure			Manual	177
T231 (11231)	Alert	SENSOR_SWAP_CIRA_E	Sensor Swap Alarm Ckt A	Only checked when circuit runtime, if Return_T less than Supply_t continuously for 1 minute then this alarm triggers in control type 8 for cir A NOTE: Control Type 8 is not applicable for single circuit unit.	Circuit is shut down or is not allowed to start	Manual	177
T232 (11232)	Alert	SENSOR_SWAP_CIRB_E	Sensor Swap Alarm Ckt B	Only checked when circuit runtime, if RAT2 less than SAT2 continuously for 1 minute then this alarm triggers in control type 8 for CIR B NOTE: Control Type 8 is not applicable for single circuit unit.	Circuit is shut down or is not allowed to start	Manual	177
T233 (11233)	Alert	SPTOSENS_E	Space Temperature Offset Sensor Not Applicable in Selected control type	Other than control type 5, if space Temperature Offset sensor is enabled then this Alert triggers	None	Automatic	NA
T303 (11303)	Alert	COILSRVC_E	Coil — Scheduled Maintenance Due	Need to Configure SI_COIL from 0 to 65535,once the Configured Service Countdown (***Maintenance*** → ***COIL Maintenance*** → ***COIL*** → ***C.L.DN***) has expired, then the Alarm is generated	Once the Alert is generated, before clearing the Alert Service engineer has to change Coil Maintenance from NO to Yes and then reset the alarm manually	Manual	177
T413 (61413)	Alert	VFAN_A_STS_vfdfault	VFAN_A_ALERT	If Warning bit are set in VFD, then respective alarm gets triggered otherwise clear it.	None	Automatic	177
T415 (61415)	Alert	VFAN_B_STS_vfdfault	VFAN_B_ALERT		None	Automatic	NA
T701 (11354)	Alert	COMP_A1_FB_FAIL_E	Compressor A1 not started or Pressure not established	Condition1: Discharge and Suction pressure not established Between 1 and 2 min after the start of the first compressor (applicable only for first started compressor), if the difference between the Highest and the Lowest SP value shall be at least of 3 psi otherwise alert shall be triggered. Condition2: 2 min after start of first compressor, if delta pressure (dp_a – sp_a) is less then 29PSI. Then, alarm shall be raised for all active compressors in the circuit.	Condition 1 is TRUE: Compressor A1 is shut down. Condition 2 is TRUE: Circuit Shutdown Note: For single circuit units, circuit A shutdown result in unit shutdown	For Condition1, Automatic For Condition 2, Manual	NA
T702 (11355)	Alert	COMP_A2_FB_FAIL_E	Compressor A2 not started or Pressure not established				NA
T703 (11356)	Alert	COMP_A3_FB_FAIL_E	Compressor A3 not started or Pressure not established				NA

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
T704 (11357)	Alert	COMP_B1_FB_FAIL_E	Compressor B1 not started or Pressure not established	Condition1: Discharge and Suction pressure not established Between 1 and 2 min after the start of the first compressor (applicable only for first started compressor), if the difference between the Highest and the Lowest SP value shall be at least of 3 psi otherwise alert shall be triggered. Condition2: 2 min after start of first compressor, if delta pressure (dp_a – sp_a) is less then 29PSI. Then, alarm shall be raised for all active compressors in the circuit.	Condition 1 is TRUE: Compressor A1 is shut down. Condition 2 is TRUE: Circuit Shutdown Note: For single circuit units, circuit A shutdown result in unit shutdown	For Condition1, Automatic For Condition 2, Manual	NA
T705 (11358)	Alert	COMP_B2_FB_FAIL_E	Compressor B2 not started or Pressure not established				NA
T706 (11366)	Alert	COMP_B3_FB_FAIL_E	Compressor B3 not started or Pressure not established				NA
A770 (61770)	Alarm		Circuit A welded compressor contactor alarm	After all compressors shut down, the circuit saturated condensing temperature rises more than 5°F in less than 5 minutes.	Unit shuts down. The fan will be turned on to keep saturated condensing temperature in check.	Manual	178
A771 (61771)	Alarm		Circuit B welded compressor contactor alarm			Manual	178
T801 (60145)	Alert	HGBP_INVALID_CTRL_TYPE	HGBP Valve turned on in control type 4	If the unit is in control type 4, HGBP valve shall not get ON. NOTE: Controls shall automatically TURN OFF the HGBP, once control type 4 is selected. And control type 4 shall not allow any USER (via UI or Protocol) to write HGBP point for turning ON the HGBP to ON. Abnormal Condition: If the unit is in control type 4 AND HGBP valve gets ON, control shall raise an alert (HGBP Valve turned on in control type 4). This alert shall persist for 3 min before triggering unit alarm (HGBP Valve turned on in control type 4).	None	Automatic	NA
A10037 (60141)	Alert	HIGH_DGTA_ALARM	High Discharge gas temperature alarm circuit A	Tested only when the circuit is On. If the circuit is running and if more than 6 successive circuit capacity decreases have occurred because of “high DGT overrides” (based on the DGT Limit graph), then alert (manual Clearance) shall trip the circuit. If no “high DGT overrides” has occurred for more than 30 minutes. then the override counter shall be reset to zero (high_DGT_count = 0).	Circuit is shut down Note: For single circuit units, circuit A shutdown result in unit shutdown	Manual	NA
A10038 (60142)	Alert	HIGH_DGTB_ALARM	High Discharge gas temperature alarm circuit B			Manual	NA

Table 94 — Alarm and Alert Codes (cont)

CODE	TYPE	POINT NAME	DESCRIPTION	TRIP CONDITION	ACTION TAKEN	RESET METHOD	DETAILS PAGE NO.
A501 (61662)	Alarm	LOWOIL_A1_E	Low Oil Level Alarm for Compressor 1 in circuit A	If the Compressor A1 alert activates two times in an hour then the alert will turn into Alarm	Circuit A is shut down	If any of the low oil level alerts occur more than 3 time in an hour in a circuit, then the corresponding circuit shall be tripped with low oil level alarm for the corresponding circuit and this alarm shall require manual clearance.	NA
A502 (61663)	Alarm	LOWOIL_A2_E	Low Oil Level Alarm for Compressor 2 in circuit A	If the compressor A2 alert activates two times in an hour then the Alert will turn into an Alarm	Circuit A is shut down		NA
A503(61664)	Alarm	LOWOIL_A3_E	Low Oil Level Alarm for Compressor 3 in circuit A	If the compressor A3 alert activates two times in an hour then the Alert will turn into an Alarm	Circuit A is shut down		NA
A504 (61665)	Alarm	LOWOIL_B1_E	Low Oil Level Alarm for Compressor 1 in circuit B	If the Compressor B1 alerts activates two times in an hour then the alert will turn into Alarm	Circuit B is shut down		NA
A505 (61666)	Alarm	LOWOIL_B2_E	Low Oil Level Alarm for Compressor 2 in circuit B	If the Compressor B2 alerts activates two times in an hour then the alert will turn into Alarm	Circuit B is shut down		NA
A506 (61667)	Alarm	LOWOIL_B3_E	Low Oil Level Alarm for Compressor 3 in circuit B	If the Compressor B3 alerts activates two times in an hour then the alert will turn into Alarm	Circuit B is shut down		NA
T500 (11360)	Alert	LOWOIL_A1_E	Low Oil Level Alert for Compressor 1 in Circuit A	If the comp oil level sensor switch is open for more than 20 seconds and extra compressor is not added, then alert will be raised	When OLS alert is raised, another available compressor in the circuit shall be added. If the alert is not cleared in 120s, the compressor with alert will be shut down	Automatic	NA
T501 (11361)	Alert	LOWOIL_A2_E	Low Oil Level Alert for Compressor 2 in Circuit A			Automatic	NA
T502 (11362)	Alert	LOWOIL_A2_E	Low Oil Level Alert for Compressor 3 in Circuit A			Automatic	NA
T503 (11363)	Alert	LOWOIL_B1_E	Low Oil Level Alert for Compressor 1 in Circuit B			Automatic	NA
T504 (11364)	Alert	LOWOIL_B2_E	Low Oil Level Alert for Compressor 2 in Circuit B			Automatic	NA
T505 (11365)	Alert	LOWOIL_B2_E	Low Oil Level Alert for Compressor 3 in Circuit B			Automatic	NA

Table 95 — Greenspeed Common Alarms

ALARM	DESCRIPTION	PROBABLE CAUSE
A179	Loss of communication with Danfoss module	Wrong VFD address, damaged communication cable, wiring error, no power to VFD, unresponsive VFD.
A412 (61412)	Mains phase loss (A4)[a]	Phase is missing or imbalance is too high on supply side. Check incoming wiring, drive fuses, and incoming power to unit. This is also used for a fault in input rectifier on frequency converter.
	Inverter Overload (A9)[a]	Frequency converter has cut out due to excessive current and temperature over a certain time period. Check motors for locked rotor or shorts.
	Torque Limit (A12)[a]	Motor torque limit has been exceeded. Check motor for locked rotor or fan restrictions.
	Over Current (A13)[a]	Inverter peak current limit is exceeded. Check motor for locked rotor or restrictions.
	Earth (ground) Fault (A14)[a]	Current exists between output phases and ground. Check motors for short to ground. Check wiring connections at fan motor terminal block at drive.
	Short Circuit (A16)[a]	There is a short circuit in the motor wiring. Find the short circuit and repair.
	Control Word Timeout (A17)[a]	Drive is not communicating with the unit. Check LEN bus wiring connections. Ensure address is set properly.
	Heatsink Temp (A29)[a]	Heatsink has exceeded max temperature. Check drive fan operation and blockage of air-flow to heatsink fins.
	Motor Phase U Missing (A30)[a]	Check load side wiring to motor for missing phase.
	Motor Phase V Missing (A31)[a]	Check load side wiring to motor for missing phase.
	Motor Phase W Missing (A32)[a]	Check load side wiring to motor for missing phase.
	Fieldbus Communication Fault (A34)[a]	Fieldbus on communication card in drive is not working.

NOTE(S):

a. Danfoss drive alarm code.

Table 96 — Greenspeed Alarm/Alert Details, Danfoss Drive

ALARM NO./ WARNING NO.	ALARM	DESCRIPTION	WARNING	ALARM/ TRIP	ALARM/ TRIP LOCK	PARAMETER
1	T413	10V Low	X	—	—	—
2	T413,A412	Live Zero Error	(X)	(X)	—	6-01
3	T413	No Motor	(X)	—	—	1-80
4	T413,A412	Mains Phase Loss	(X)	(X)	(X)	14-12
5	T413	DC Voltage High	X	—	—	—
6	T413	DC Voltage Low	X	—	—	—
7	T413,A412	DC Over Volt	X	X	—	—
8	T413,A412	DC Under Volt	X	X	—	—
9	T413,A412	Inverter Overld	X	X	—	—
10	T413,A412	Motor ETR Over	(X)	(X)	—	1-90
11	T413,A412	Motor Thermistor Over	(X)	(X)	—	1-90
12	T413,A412	Torque Limit	X	X	—	—
13	T413,A412	Over Current	X	X	X	—
14	T413,A412	Earth Fault	X	X	X	—
16	A412	Short Circuit	—	X	X	—
17	T413,A412	Ctrl Word To	(X)	(X)	—	8-04
23	T413,A412	Fans Warn	X	X	—	—
25	T413,A412	Brake Resistor	X	X	—	—
26	T413,A412	Brake Overload	(X)	(X)	—	2-13
28	T413,A412	Brake Check	(X)	(X)	—	2-15
29	A412	Pwr Card Temp	—	X	X	—
30	A412	U Phase Loss	—	(X)	(X)	4-58
31	A412	V Phase Loss	—	(X)	(X)	4-58
32	A412	W Phase Loss	—	(X)	(X)	4-58
33	A412	Inrush Fault	—	X	X	—
34	T413,A412	Fieldbus Fault	X	X	—	—
36	T413,S412	Mains Failure	X	X	—	—
38	A412	Internal Fault	—	X	X	—
47	T413,A412	24V Supply Low	X	X	X	—
48	A412	1.8V Supply Low	—	X	X	—
49	T413	Speed Limit	(X)	—	—	1-86
57	A412	AMA Not OK	—	X	—	—
59	T413	Current Limit	X	—	—	—
61	T413	Encoder Loss	X	—	—	—
62	T413	Output Freq Limit	X	—	—	—
64	T413	Voltage Limit	X	—	—	—
65	T413,A412	Ctrl Card Temp	X	X	X	—
66	T413	Low Temp	X	—	—	—
67	A412	Option Change	—	X	—	—
68	A412	Safe Stop	—	X	—	—
71	T413,A412	PTC1 Safe Stop	X	X	—	—
72	T413,A412	Dangerous Failure	X	X	X	—
80	A412	Drive Initialized	—	X	—	—
94	T413,A412	End of Curve	(X)	(X)	—	22-50
95	T413,A412	Broken Belt	(X)	(X)	—	22-60
96	T413	Start Delayed	(X)	—	—	22-76
97	T413	Stop Delayed	(X)	—	—	22-76
98	T413	Clock Failure	(X)	—	—	0-70
203	T413	Missing Motor	X	—	—	—
204	T413	Locked Rotor	X	—	—	—
243	T413,A412	Brake IGBT	X	X	—	—
247	T413	Pwr Card Temp	X	—	—	—
251	A412	Service Trip	—	X	—	—

NOTE: (X) = Dependent on Parameter.

ALARM AND ALERT DETAILS

COMM FAIL — Communication Failure

Criteria for Trip: This alarm is generated any time the LEN (Local Equipment Network) communication is lost. An A152 alarm may be generated also.

Action To Be Taken: If communication between the Carrier controller and the CIOB is lost, the unit may continue to run. If problem is internal to the Main Base Board, the machine shuts down or is not allowed to start.

Reset Method: Automatic once communication is restored.

Possible Causes: If this condition is encountered, check the following items:

- Check the LEN for a wiring error or short to ground.
- Check all Input connections for a short to ground.
- Check the machine grounding.
- Check address setting on the CIOB(s).
- Check the power supply for the CIOB. It should be 24 vac. Voltages less than 18 vac can cause this problem.
- If unit has an AUX Board installed that not addressed correctly, it will cause a COMM FAIL alarm. Check the AUX Board address.

T048 — Circuit A Compressor Availability Alert

T049 — Circuit B Compressor Availability Alert

Criteria for Trip: This alarm is generated any time another alarm has locked out at least one compressor on 2-compressor circuits or 2 compressors in a 3-compressor circuit. As a result, the unit will not have enough compressors available to perform the oil management routine. The control will shut the circuit down.

Action To Be Taken: Circuit shuts down or is not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- See the offending alarm.
- For 2-compressor circuit units, the routine will require both compressors to operate for the oil management routine. If one compressor fails, the T048/T049 alert will be generated. This feature can be disabled by changing the value of ***TCOM***, Two Comp Ckt Oil Mgmt (***Main Menu → SERVCIE***) from **ENBL** to **DSBL**. Caution must be exercised when making this change to ensure oil return at all loading conditions.

A060 — Supply Air Thermistor Failure

A060 — Supply Air Temperature Update Not Received

A061 — Return Air Thermistor Failure

A061 — Return Air Temperature Update Not Received

A062 — Supply Air 2 Thermistor Failure (Control Type 8 Only)

A062 — Supply Air Temperature Update Not Received (Control Type 8 Only)

A063 — Return Air 2 Thermistor Failure (Control Type 8 Only)

A063 — Return Air Temperature Update Not Received (Control Type 8 Only)

Criteria for Trip: Two alarm criteria are used:

- The sensor is required for the Control Type (***Configuration → OPT2 → C.TYP*=1, 3, 5, 8, or 9**) and the sensor reading is outside the range of –40 to 245°F (–40 to 118°C). If this condition is true, the thermistor failure alarm will be generated.
- If the sensor is required for the Control Type (***C.TYP*=1**, 3, 5, 8, or 9) and the sensor is being written to by CCN or a third-party control, the sensor must be updated every 3 minutes. If it is not updated, then the Update Not Received alarm will be generated.

Action To Be Taken: The unit will be shut down.

Reset Method: Automatic, once the condition is resolved.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty thermistor.
- Check for a wiring error.
- If temperatures are being transmitted, check transmission timing and communication wiring.

T068 — Circuit A Compressor Return Gas Temperature Thermistor Failure

T069 — Circuit B Compressor Return Gas Temperature Thermistor Failure

Criteria for Trip: This alert occurs when the compressor return gas temperature thermistor is outside the range of –40 to 245°F (–40 to 118°C).

Action To Be Taken: Circuit is shut down.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty thermistor.
- Check for a wiring error.

T073 — Outside Air Thermistor Failure

Criteria for Trip: This alert occurs when the outdoor air temperature thermistor is outside the range of –40 to 245°F (–40 to 118°C).

Action to be taken: If the unit is set for outdoor air temperature reset, reset will be disabled and the unit will run under normal set point control.

If the unit is configured to use outdoor ambient lockout, the unit will be shut down or not allowed to start. If the unit is required to be operating, disable Low Ambient Lockout, ***Main Menu → Setpoints → OAT Lockout Temperature* = –20°F** (–28.9°C).

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty thermistor.
- Check for a wiring error.

T074 — Space Temperature Thermistor Failure

Criteria for Trip: This alert occurs when the Space Temperature Thermistor is outside the range of –40 to 304°F (–40 to 151°C).

Action To Be Taken: If the sensor is being used as the control input to determine capacity ***Configuration → OPT2 → C.TYP*=5** (SPT Multi), the control's response depends on the failure mode. If the sensor fails open, the unit will be OFF with the Control Mode, ***Main Menu → Status → General Unit Parameters → Control Mode* =9** (SPT Satisfied) and Space Temp Control Mode, ***Main Menu → Status → General Unit Parameters → Space Temp Control Mode*=0** (Cool Off). If the sensor fails closed or shorted, the unit will be ON and Space Temp Control Mode, ***Main Menu → Status → General Unit Parameters → Space Temp Control Mode*=2** (Hi Cool).

If the sensor is being used to support space temperature reset, the function will be disabled and the unit will continue to run.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty thermistor.
- Check for a wiring error.
- Check to see that the override button has not permanently shorted the sensor. Holding the button down too long for an override period will cause this alarm.

T082 — Space Temperature Offset Sensor Failure

Criteria for Trip: This alert occurs when the space temperature offset potentiometer is outside the range of –40 to 356°F (–40 to 180°C).

Action To Be Taken: Space temperature offset function will be disabled. The unit will run under normal control without the space temperature offset.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty offset potentiometer.
- Check for a wiring error.

T090 — Circuit A Discharge Pressure Transducer Failure

T091 — Circuit B Discharge Pressure Transducer Failure

Criteria for Trip: Transducer reading is outside the range of 0.0 to 667.0 psig (0.0 to 4599 kPa).

Action To Be Taken: Circuit is shut down.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty transducer.
- Check for a wiring error.
- Check the CIOB transducer channel for proper operation.

T092 — Circuit A Suction Pressure Transducer Failure

T093 — Circuit B Suction Pressure Transducer Failure

Criteria for Trip: Transducer reading is outside the range of 0.0 to 420.0 psig (0.0 to 2896 kPa). If the ambient reading is below 30°F, these alerts are not checked during the first 5 minutes of the compressor startup.

Action To Be Taken: Circuit is shut down.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check for a faulty transducer.
- Check for a wiring error.
- Check the CIOB transducer channel for proper operation.

T094 — Discharge Gas Thermistor Failure

Criteria for Trip: The following conditions must be true:

Discharge gas temperature is outside the range of –40 to 350°F (–40 to 177°C).

Action To Be Taken: The circuit is shut down.

Reset Method: Automatic, once the condition resolves.

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring for the discharge gas thermistor (DGT).
- Check the discharge temperature thermistor for accuracy.
- Check the unit refrigerant charge.

T110 — Circuit A Loss of Charge

T111 — Circuit B Loss of Charge

Criteria for Trip: The following conditions must be true:

1. The circuit is OFF.
2. The circuit's discharge pressure is less than 26 psi (179.3 kPa).

The alert criteria are ignored during the following conditions:

1. The first minute following power-up
2. If the outdoor air temperature is less than –5°F (–20.6°C)
3. For 1 minute following the outdoor air temperature rising above –5°F (–20.6°C)

Action To Be Taken: The circuit is not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check the refrigerant charge for the circuit.
- Check the discharge pressure transducer for the circuit for accuracy.
- Check the discharge pressure transducer wiring.
- Check the outside air thermistor (OAT) sensor for accuracy.
- Check the outside air thermistor (OAT) sensor wiring.

T112 — Circuit A High Suction Temperature

T113 — Circuit B High Suction Temperature

Criteria for Trip: The following conditions must be true:

1. The circuit is ON.
2. The circuit's saturated suction temperature is greater than 78°F (25.6°C) after 5 minutes of operation.

Action To Be Taken: The circuit is shutdown.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Check the TXV operation.
- Check to be sure the TXV bulb is correctly located.
- Check TXV equalizer line if properly installed
- Check TXV capacity is proper for the application.
- Check for high return air temperatures.
- Check the suction pressure transducer for the circuit for accuracy.

T114 — Circuit A Low Suction Superheat

T115 — Circuit B Low Suction Superheat

Criteria for Trip: The following conditions must be true:

1. The circuit is ON.
2. Five minutes after the compressor starts, the circuit superheat is less than 5°F (2.8°C) for 5 continuous minutes.

Superheat is a calculated value based on saturated suction temperature converted from the circuit suction pressure and return gas temperature. In units with a digital compressor, the compressor's operation will cause the suction pressure to rise and fall when operating. In this case, suction pressure is an average or the lowest suction pressure readings over the period of time. This has the tendency to artificially increase the reported superheat, since the lowest suction pressure (saturated suction temperature) is used.

Action To Be Taken: The circuit is shut down.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:

- Check the charge for the system.
- Check the TXV for proper installation and operation.
- Check the TXV for proper sizing.
- Check the evaporator coil for a refrigerant restriction.
- Check for airflow during operation.
- Check the suction pressure transducer for accuracy.
- Check the return gas thermistor for accuracy.
- Check to be sure the return gas thermistor for the circuit is insulated with cork insulation tape to obtain a more accurate reading.

P118 — High Discharge Gas Temperature

T118 — High Discharge Gas Temperature

Criteria for Trip: This alert is part of the compressor protection algorithm for digital compressor units. The following conditions must be true:

The discharge gas temperature (***Main Menu → Input → Temperatures → Refrigerant Temps → CirA Discharge Gas Temp***) is greater than 260°F (127°C) to 270°F (132°C) depending on SCT.

Action To Be Taken: Compressor A1 is shut down. If this is the first or second occurrence within a 32-minute window, the pre-alert P118 will be generated. This is a non-broadcast alert. If this is the third occurrence within the 32-minute window, the alert T118 is generated.

Reset Method: The first two times compressor A1 is shut down due to the pre-alert P118, the pre-alert will automatically reset after the discharge temperature is less than 250°F (121.1°C) and the compressor will restart. The third occurrence will result in the alert T118 and will require a manual reset.

Multiple P118 pre-alerts may be stored in the alarm history. If there are 1 or 2 strikes on the circuit and the circuit recovers for a period of time, it is possible to clear out the strikes, thereby resetting the strike counter automatically.

Possible Causes: If this condition is encountered, check the following items:

- Check to be sure that the circuit is properly charged. If a leak is found, repair the leak and recharge the circuit.
- Check the discharge gas thermistor (DGT) for accuracy.
- Check the DGT connections.

A120 — Circuit A Low Saturated Suction Temperature Alarm

A121 — Circuit B Low Saturated Suction Temperature Alarm

P120 — Circuit A Low Saturated Suction Temperature Pre-Alert

P121 — Circuit B Low Saturated Suction Temperature Pre-Alert

T120 — Circuit A Low Saturated Suction Temperature Alert

T121 — Circuit B Low Saturated Suction Temperature Alert

Criteria for Trip: This alert or alarm is used to keep the evaporator from freezing and the saturated suction temperature above the low limit for the compressors. If the ambient reading is below 30°F, these alerts are not checked during the first 5 minutes of the compressor startup.

At least one compressor in the circuit must be ON and one of the following conditions must be true:

1. The circuit's saturated suction temperature is less than 28°F (–2.2°C) for 4 minutes continuously,
2. The circuit's saturated suction temperature is less than 15°F (–9.4°C) for 2 minutes continuously,
3. The circuit's saturated suction temperature is less than 5°F (–15°C) for 1 minute continuously,
4. The circuit's saturated suction temperature is less than –15°F (–26.1°C) for 20 seconds continuously.

Action To Be Taken: If the circuit contains more than one operating compressor and the operating conditions meet the criteria above, one compressor in the affected circuit will be shut down with an appropriate local alert (P120/P121) generated. This is a non-broadcast alert/alarm. The alarm LED will not be lit, nor will the pre-alert be broadcast on a network. A 5-minute time guard will be added to the compressor. If the saturated suction temperature continues to be less than the criteria listed above, then another compressor will be shut down until the last compressor on the circuit is shut down at which time the appropriate alert or alarm will be issued (T120, T121, A120, A121).

If the circuit contains one operating compressor and the operating conditions meet the criteria above, the affected circuit will be shut down and the appropriate alert (T120, T121) generated. A 5-minute time guard will be added to the compressor.

Reset Method: The first two occurrences that a circuit is shut down entirely due to this condition, an alert will be generated (T120, T121) which keeps the circuit off for 5 minutes before allowing the circuit to try again. The third time this occurs, an alarm (A120, A121) will be generated which will necessitate a manual reset to get the circuit back running.

To recover from these alerts, a 5-minute off timer must elapse and the saturated suction temperature must rise above 29.32°F (–1.5°C). If recovery occurs, staging will be allowed on the circuit again. Therefore, it is possible that multiple P120 or P121 as well as T120 or T121 alerts may be stored in the alarm history. If there are 1 or 2 strikes on the circuit and the circuit recovers for a period of time, it is possible to clear out the strikes thereby resetting the strike counter automatically. The control must have saturated suction temperature greater than or equal to 34°F (1.1°C) for 60 minutes in order to reset the strike counters.

Possible Causes: If this condition is encountered, check the following items:

- Check to be sure that the circuit is properly charged. If a leak is found, repair the leak and recharge the circuit.
- Check for proper air flow for the evaporator coil.
- If the alarms are occurring during cold ambient conditions, consider installing Greenspeed head pressure control.
- If wind baffles are required, check to see if they are installed.
- Check the suction pressure transducer accuracy.
- Check for a low load condition (low return air temperature). Check the control system to see if the unit should be operating.
- In control systems which rely on the supply air temperature:
  - Check the accuracy of the supply air sensor.
  - Check the supply air temperature sensor to be sure that it is correctly sensing the mixed supply air temperature, especially in a face split coil.
- Check for restrictions in the liquid line. Be sure all service valves are open.
- Check the filter drier. Change the core(s) if necessary.
- Check the operation of the liquid line solenoid valves, if equipped. Be sure that the correct valve operates for the circuit.
- Be sure that the liquid line solenoid valve is installed correctly (flow), if equipped.
- For the circuit TXV(s):
  - Check the superheat setting of the TXV. A very high setting will cause low saturated suction condition.
  - Check to be sure the proper TXV is installed.
  - Check the operation of the TXV.
  - Check the location of the TXV bulb and that it is properly installed on the correct suction line.
  - Check the TXV equalizer line to be sure that it is properly connected to the correct suction line and open to suction pressure.
- Check for a low airflow condition. Low airflow can cause a low saturated suction condition.
- Check for dirty air filters causing an airflow restriction.
- Check the nozzle in the distributor to be sure it is correct.
- Check for a blocked or mis-circuited evaporator coil.

P122 - Circuit A High Pressure Switch Chattering Pre-Alert

P123 - Circuit B High Pressure Switch Chattering Pre-Alert

T122 - Circuit A High Pressure Switch Chattering

T123 - Circuit B High Pressure Switch Chattering

Criteria for Trip: This alert has multiple criteria. The Carrier controller monitors the HPS. The 38RC units employ one HPS for each circuit. For High Pressure Switch Chattering Alert the following conditions must be true:

1. The circuit is ON or OFF.
2. The controller detects a Closed-Open-Closed-Open pattern of the high pressure switch circuit within a 60-second window.

If all of the conditions listed above are true, a pre-alert (P122/P123) will be generated for the first two occurrences. This is a non-broadcast alert. The third occurrence will result in the alert (T122/T123). If the circuit runs for 15 minutes without tripping the pre-alert condition or if the circuit has cycled three times, the strike counter is reset.

Action To Be Taken: The circuit shuts down immediately or is not allowed to start.

Reset Method: The pre-alerts (P122/P123) will automatically reset for the first two occurrences of this condition. After the pre-alert is generated, there is a 15-minute time delay and the high pressure switch must reset before the circuit will attempt to restart. Following the second automatic reset of the pre-alert, the next occurrence (T122/T123) will require a manual reset.

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring of the high pressure switch circuit.
- Check wiring of the liquid line solenoid valve, if equipped. Be sure that the correct valve operates for the circuit.
- Check for non-condensables in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.
- Check the evaporator coil for a refrigerant restriction.
- For the TXV(s) (thermostatic expansion valves):
  - Check for the proper TXV. The 38RC units require bleed port TXVs. Failure to use this type of valve may result in high pressure switch trips at start-up.
  - Check the TXV for proper operation.
- Check the condenser fans and motors for proper rotation and operation.
- Check the liquid line service valve to be sure that it is open.
- Check to be sure that the long line check valve assembly is mounted correctly. The arrows indicate direction of flow.
- Check the Discharge Pressure Transducer for accuracy.

P122 (60122) - Circuit A High Pressure Trip Pre-Alert

P123 (60123) - Circuit B High Pressure Trip Pre-Alert

T122 - Circuit A High Pressure Trip

T123 - Circuit B High Pressure Trip

Criteria for Trip: This alert has multiple criteria. The Carrier controller monitors the HPS (high pressure switch). The 38RC units employ one HPS for each circuit. For High Pressure Trip Pre-Alert and Alert:

1. The alarm criterion is checked when the circuit is ON or OFF.
2. The circuit HPS opens for 4 seconds or more.

If all of the conditions listed above are true a pre-alert (P122/P123) will be generated for the first two occurrences. This is a non-broadcast alert. The third occurrence will result in the alert (T122/T123). If the circuit runs for 15 minutes without tripping the pre-alert condition or if the circuit has cycled three times, the strike counter is reset.

Action To Be Taken: The circuit shuts down immediately or is not allowed to start.

Reset Method: The pre-alerts (P122/P123) will automatically reset for the first two occurrences of this condition. After the pre-alert is generated, there is a 15-minute time delay and the high pressure switch must reset before the circuit will attempt to restart. Following the second automatic reset of the pre-alert, the next occurrence (T122/T123) will require a manual reset.

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring of the high pressure switch circuit.
- Check wiring of the liquid line solenoid valve, if equipped. Be sure that the correct valve operates for the circuit.
- Check for non-condensables in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.
- Check the evaporator coil for a refrigerant restriction.
- For the TXV(s) (thermostatic expansion valves):
  - Check for the proper TXV. The 38RC units require bleed port TXVs. Failure to use this type of valve may result in High Pressure Switch Trips at start-up.
  - Check the TXV for proper operation.
- Check the condenser fans and motors for proper rotation and operation.
- Check the liquid line service valve to be sure that it is open.
- Check to be sure that the long line check valve assembly is mounted correctly. The arrows indicate direction of flow.
- Check the discharge pressure transducer for accuracy.

A126 - Circuit A High Head Pressure

T126 - Circuit A High Head Pressure

A127 - Circuit B High Head Pressure

T127 - Circuit B High Head Pressure

Criteria for Trip: The following conditions must be true:

1. The circuit is ON.
2. All outdoor fans for the circuit or all common outdoor fans must be ON.
3. The compressor's operation is outside of the operating envelope. See Fig. 146 and 147 on page 138 for the compressor operating envelope, or see the following calculations.
   a. If circuit saturated suction temperature is greater than or equal to –20.0°F (–28.9°C) but less than –10.0°F (–23.3°C) and circuit saturated condensing temperature is greater than 2.5 times circuit saturated suction temperature + 140.0°F (104.4°C).
   b. If circuit saturated suction temperature is greater than or equal to –10.0°F (–23.3°C) but less than 15.0°F (–9.4°C) and circuit saturated condensing temperature is greater than circuit saturated suction temperature + 125.0°F (69.4°C).
   c. If circuit saturated suction temperature is greater than or equal to 15.0°F (–9.4°C) but less than 40.0°F (4.4°C) and circuit saturated condensing temperature is greater than 0.4 times circuit saturated suction temperature + 134.0°F (63.8°C).
   d. If circuit saturated suction temperature is greater than or equal to 40.0°F (4.4°C) but less than 45.0°F (7.3°C) and circuit saturated condensing temperature is greater than circuit saturated suction temperature + 110.0°F (61.1°C).
   e. If circuit saturated suction temperature is greater than or equal to 45.0°F (7.3°C) and circuit saturated condensing temperature is greater than 153°F (67°C).

The first four daily occurrences of these conditions will generate a T126 or T127 alert for the appropriate circuit. With the fifth daily occurrence, the condition will generate the A126 or A127 alarm for the appropriate circuit.

Action To Be Taken: The circuit shuts down immediately.

Reset Method: For T126/T127, the alert will automatically reset for the first 4 daily occurrences once the circuit saturated condensing temperature falls below the trip criteria. The circuit will restart once the time guard has been satisfied. For A126/A127, the alarm requires a manual reset.

Possible Causes: If this condition is encountered, check the following items:

- Check for non-condensables in the refrigerant circuit.
- Check for condenser air re-circulation.
- Check for the proper refrigerant charge (overcharged).
- Check for operation beyond the limit of the machine.
- Check the condenser coils for debris or restriction.
- Check the evaporator coil for a refrigerant restriction.
- Check the TXV for proper operation.
- Check the condenser fans and motors for proper rotation and operation.
- Check the liquid line service valve to be sure that it is open.
- Check the suction and discharge pressure transducers for accuracy.
- Confirm unit configuration.

A140 — Reverse Rotation Detected

Criteria for Trip: The alarm criterion is checked when the first compressor in a circuit is started. The control writes the value of the suction pressure 5 seconds before starting the first compressor in the circuit. At the time the compressor is started, another reading is obtained. A rate of change is calculated based on the two values and extrapolated to the expected value 5 seconds later. The suction pressure is obtained 5 seconds after the compressor has been started. If the suction pressure is not at least 1.25 psig (8.62 kPa) lower than the expected value or the upper limit for proof of proper rotation, a reverse rotation alarm is declared.

The example below lists sample suction pressures of a starting circuit. Figures 166 and 167 show reverse rotation detection for this example.

TIME	SUCTION PRESSURE psig (kPa)	SATURATED SUCTION TEMPERATURE °F (°C)
t=–5 (5 sec before compressor start)	200.4 (1382)	70 (21.1)
t=0 (compressor start)	197.1 (1359)	69 (20.6)
t=5 (5 sec after compressor start)	169.6 (1169)	60 (15.6)

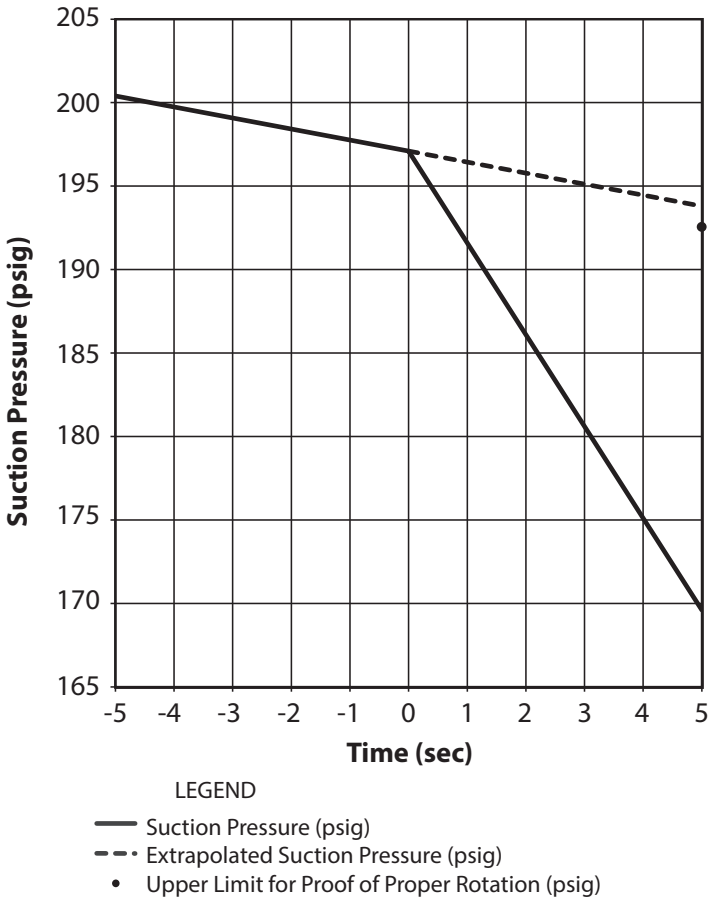


Fig. 166 — Reverse Rotation Detection (psig)

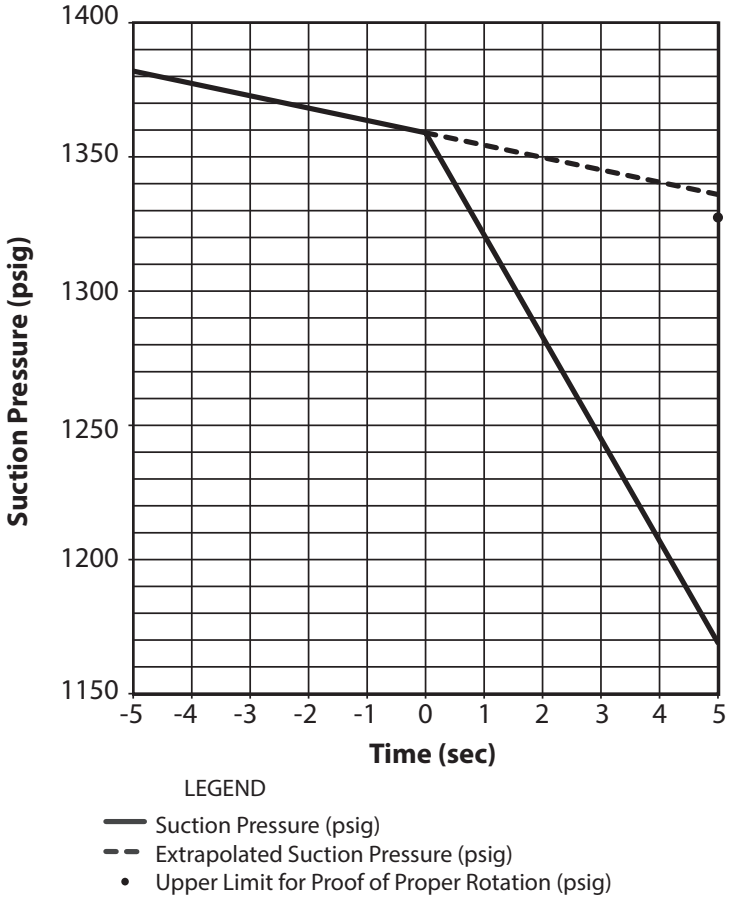


Fig. 167 — Reverse Rotation Detection (kPa)

Using the rate of change of the suction from the example, five (5) seconds after t=0, the suction pressure should be 193.8 psig (1336 kPa), if the compressor did not start. Subtracting the 1.25 psig (8.62 kPa) from extrapolated suction pressure, 192.55 psig (1328 kPa) determines the upper limit that if the suction pressure is above this level the unit will fault on reverse rotation. This point is denoted by a black dot in Fig. 166 and 167. In the example, the suction pressure is lower than the upper limit, and therefore is allowed to continue operation.

Action To Be Taken: The unit shuts down immediately.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:

- Check the wiring of the incoming power for proper phasing. This alarm may be disabled once the reverse rotation check has been verified by setting Reverse Rotation Enable ***Configuration → SERV → REV.R*=DSBL**.
- Check Control Type (***Configuration → OPT2 → C.TYP***) setting. If the A1 compressor is a digital compressor and is enabled (***Configuration → UNIT → A1.TY*=YES**), ***C.TYP*** must be selected for a digital compressor compatible control option, **1** (VAV), **3** (TSTAT MULTI), **5** (SPT MULTI), **7** (PCT CAP), or **9** (VAV SETPOINT).

A150 — Unit is in Emergency Stop

Criteria for Trip: This alarm is indicated when a CCN Emergency Stop command is received. If the CCN point name EMSTOP in the CCN Status Table is set to "Emstop," the unit will shut down and generate this alarm.

Action To Be Taken: The unit is shut down or not allowed to start.

Reset Method: Automatic, once the Emergency Stop command is revoked. This alarm will clear when the EMSTOP point value is returned to "Enable."

Possible Causes: If this condition is encountered, check the value of the CCN point, EMSTOP. If it is "Emstop," change it to "Enable."

A151 — Illegal Configuration Alarm

Criteria for Trip: This alarm is indicated when an illegal configuration has been entered. There are several different configuration alarms. When expanding the alarm, the control will indicate which configuration is incorrect. For example, if the wrong size is configured, the A151 expansion will indicate "ILLEGAL CONFIG - INVALID UNIT SIZE."

Action To Be Taken: The unit is not allowed to start.

Reset Method: Automatic, once the illegal configuration is corrected.

Possible Causes: If this condition is encountered, check the items shown in Table 97 based on the illegal configuration.

A152 — Unit Down Due to Failure

Criteria for Trip: This alarm is generated if both circuits are off due to alerts and/or alarms.

Action To Be Taken: The unit is not allowed to start.

Reset Method: Automatic, once other alerts/alarms are corrected

Possible Causes: If this condition is encountered, see the appropriate alert/alarm information in Table 94 on page 158.

T153 — Real Time Clock Hardware Failure Alert

Criteria for Trip: This alert is indicated when the Carrier controller time clock is not initialized or fails to increment.

Action To Be Taken: Occupancy defaults to Occupied. Unit defaults to Local On mode, ignoring any schedules.

Reset Method: Automatic, when the time is initialized or starts incrementing again.

Possible Causes: If this condition is encountered, check the following items:

- Check the Hour and Minute (***Time Clock → TIME → HH.MM***), and reset the time. If the error returns, replace the board.
- If the unit is connected to a CCN network, and time broadcast is enabled, repeated broadcasts of time behind that of the controller will cause this alarm to be generated. Disconnect the unit from the network to troubleshoot the time clock. Check the network settings and clock.

A154 — Serial EEPROM Hardware Failure

Criteria for Trip: This alarm is indicated when a problem with the Serial EEPROM (Electrically Erasable Programmable Read-Only Memory) on the Carrier controller has been detected.

Action To Be Taken: The unit is shut down or not allowed to start.

Reset Method: Manual.

Possible Causes: If this condition is encountered, reset the power to the unit. If the error returns, replace the board.

Table 97 — Illegal Configurations (Alarm A151)

ILLEGAL CONFIGURATION	POSSIBLE CAUSES
AUX BOARD INCORRECT REVISION	Check to see if the AUX Board is an older revision not compatible with the current software.
	Check the red LED on the AUX Board to be sure that it is blinking in unison with the other boards in the unit. If it is not, it is not communicating: • Check the LEN Communication wiring for continuity to the Main Base Board. • Check the AUX Board DIP Switch settings for the address.
	For 208 volt systems, check the control transformer to be sure that it is tapped correctly.
	Consider cycling power to the AUX Board.
AUX BOARD SOFTWARE REV MUST BE 3 OR HIGHER	Check to see if the AUX Board is an older revision not compatible with the current software. The AUX Board software revision can be found in the vendor part number, CEPL130567-03. The -03 indicates Revision 03.
AUX BOARD SHOULD BE AUX1, NOT AUX2	Check the part number of the AUX Board. It should have the Carrier Part Number 32GB500442EE (UTEC Part Number CEPL130567-03). This board is required for the digital compressor output. An AUX2 Board, Carrier Part Number 332GB500432EE (UTEC Part Number CEPL130568-02) does not have the capability to supply this output.
CONTROL TYPE SET TO INVALID TYPE FOR SPLIT	Check ***Configuration → OPT2 → C.TYP*** for a valid control type.
DUAL THERMOSTAT TYPE ON SINGLE CKT UNIT	Check to see if ***Configuration → OPT2 → C.TYP* = 8** (DUAL TSTAT) control type is configured for a single circuit machine, ***Configuration → UNIT → NCKT* = 1** (Single Circuit)
DUAL THERMOSTAT AND SWITCH DEMAND LIMIT	Check to see if ***Configuration → OPT2 → C.TYP* = 8** (DUAL TSTAT) control type is configured with switch control demand limit enabled, ***Configuration → RSET → DMDC* = 1** (Switch).
INVALID UNIT SIZE HAS BEEN ENTERED	Check to be sure that a valid unit size ***Configuration → UNIT → SIZE*** has been entered.
UNIT CONFIGURATION SET TO INVALID TYPE	Digital compressor, ***Configuration → UNIT → A1.TY*=YES**, and hot gas ***Configuration → OPT1 → MLV*=YES** are both enabled. Only one can be enabled.

T155 — Serial EEPROM Storage Failure

Criteria for Trip: Configuration data in the serial EEPROM cannot be verified which may mean Main Base Board replacement. It is possible a re-initialization of the database or particular storage area(s) by cycling power may correct this problem.

Action To Be Taken: None.

Reset Method: Manual.

Possible Causes: If this condition is encountered, reset the power to the unit. If the error returns, replace the board.

A156 — Critical Serial EEPROM Storage Failure

Criteria for Trip: Critical configuration data in the serial EEPROM chip cannot be verified which may require replacement of the Carrier controller. Recovery is automatic but typically board replacement is necessary.

Action To Be Taken: Unit shuts down or is not allowed to start.

Reset Method: Manual.

Possible Causes: If this condition is encountered, reset the power to the unit. If the error returns, replace the board.

A157 — A/D Hardware Failure

Criteria for Trip: A problem with the analog to digital conversion chip on the Main Base Board has caused the chip to fail.

Action To Be Taken: Unit shuts down or is not allowed to start.

Reset Method: Manual

Possible Causes: If this condition is encountered, reset the power to the unit. If the error returns, replace the board.

T170 — Loss of Communication with the Compressor Expansion Module

Criteria for Trip: This alert is generated when the Carrier controller cannot establish communication with the Compressor Expansion Module (CXB). This board is found on the 38RCD070-130 units only.

Action To Be Taken: All CXB functions are disabled.

Reset Method: Automatic once communication is reestablished.

Possible Causes: If this condition is encountered, check the following items:

- Confirm unit configuration, ***Configuration → UNIT → SIZE***.
- Check LEN communication wiring.
- Check CXB DIP Switch settings.
- Check for control power to the CXB.

T173 — Loss of Communication with the Energy Management Module

Criteria for Trip: This alert is generated when the Carrier controller cannot establish communication with the Energy Management Module (EMM).

Action To Be Taken: All EMM functions, Switch Controlled Demand Limit, Y3/Y4 Thermostat Input, 4-20 mA Demand Limit, 4-20 mA Temperature Reset, 4-20 mA Percent Capacity, and 4-20 mA Cooling Set Point, are disabled.

Reset Method: Automatic once communication is reestablished.

Possible Causes: If this condition is encountered, check the following items:

- Confirm unit configuration, EMM Module Installed (***Configuration → OPT1 → EMM***). If a feature requiring the EMM is enabled, the control will automatically start searching for the board. If it is not installed, disable the feature requiring the EMM.
- Check LEN communication wiring.
- Check EMM DIP switch settings.
- Check for control power to the EMM.

T174 — 4 to 20 mA Cooling Set Point Input Failure

Criteria for Trip: The following conditions must be true:

1. The unit must be configured for either Control Type ***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=7** [PCT CAP] or **9** [VAV SETPOINT].
2. The Energy Management Option is present. This is defined by the model number configuration.
3. The signal is less than 2 mA or greater than 22 mA.

Action To Be Taken: For ***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=7** (PCT CAP) without return air and supply air thermistors, the function is disabled and the unit is not allowed to start or run. For ***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=9** (VAV SETPOINT), the function is disabled. For ***C.TYP*=7** with return air and supply air thermistors and ***C.TYP*=9,** the unit controls will use Cooling Set Point 1 ***(Main Menu → Setpoints → Cooling Setpoint 1***) as the Active Set Point (***Main Menu → Status Tables → General Unit Parameters → Active Setpoint***).

Reset Method: Automatic once signal is restored.

Possible Causes: If this condition is encountered, check the following items:

- Confirm the input signal the control is reading. Check the value of 4-20 Cooling Demand (***Main Menu → Status Tables → General Unit Parameters → 4-20 mA Setpoint Signal***). Compare this to expected signal strength.
- Confirm that the signal wiring polarity, TB5-12 (–) and TB5-11 (+), is correct.

A175 — Loss of Communication with AUX board

Criteria for Trip: A communication problem with the AUX Board has been detected by the Main Base Board. The AUX Board is required for digital compressor operation.

Action to be taken: Functions associated with the AUX Board, digital compressor are stopped.

Reset Method: Automatic once the condition is resolved.

Possible Causes: If this condition is encountered, check the following items:

- Check the configurations. If Compressor A1 Digital ***Configuration → UNIT → A1.TY*=YES** and no AUX Board is installed, this alarm will be generated.
- Check the address of the AUX Board.
- Check the LEN wiring to the AUX Board.
- Check the power supply to the AUX Board.

T176 — 4 to 20 mA Reset Input Failure

Criteria for Trip: This alert indicates a problem has been detected with reset 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA.

Action to be taken: The cooling reset function will be disabled when this occurs.

Reset Method: Manual

Possible Causes: If this condition is encountered, check the following items:

- Confirm the input signal the control is reading. Check the value of 4-20 Reset Signal (***Inputs Mode → 4-20 → RSET***). Compare this to expected signal strength.
- Confirm signal polarity, LVT-8 (–) and LVT-9 (+)
- Confirm Energy Management Module configuration, EMM Module Installed, ***Configuration → OPT1 → EMM*=YES**.

T177 — 4 to 20 mA Demand Limit Input Failure

Criteria for Trip: This alert indicates that a problem has been detected with demand limit 4 to 20 mA input. The input value is either less than 2 mA or greater than 22 mA.

Action to be taken: The cooling demand limit function will be disabled when this occurs.

Reset Method: Manual.

Possible Causes: If this condition is encountered, check the following items:

- Confirm the input signal the control is reading. Check the value of 4-20 Demand Signal (***Main Menu → Status Tables → Unit Parameters → 4-20 mA Demand Signal***). Compare this to expected signal strength.
- Confirm signal polarity, TB6-11 (–) and TB6-10 (+)
- Confirm Energy Management Module Option is present. Option is defined by the model number configuration.

A179 (Fan VFD Communication Failure)

Criteria for Trip: This alarm indicates that there are communication problems between the Carrier controller and fan VFD. When this alarm occurs, the unit will shut down. Reset is automatic when all alarms are cleared.

Action to be taken: Unit will shut down.

Reset Method: Automatic.

Possible Causes:

- Check LEN wiring between Carrier controller and VFD.
- Check that address is set correctly on VFD.
- Check that VFD is set for LEN communication.

A180 (Fan VFD Circuit B Communication Failure - 070 to 150T units only)

Criteria for Trip: This alarm indicates that there are communication problems between the Carrier controller and fan VFD. When this alarm occurs, the unit will shut down. Reset is automatic when all alarms are cleared.

Action to be taken: Unit will shut down.

Reset Method: Automatic.

Possible Causes:

- Check LEN wiring between Carrier controller and VFD.
- Check that address is set correctly on VFD.
- Check that VFD is set for LEN communication.

A200 — Indoor Fan Status Failure - Fan Not Running

Criteria for Trip: This alarm is generated when the following conditions are true:

1. 38RC unit is Enabled (***Main Menu → Status Tables → General Unit Parameters → CCN Chiller*=STRT**).
2. Airflow switch is open (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA*=OFF**). Indoor Fan Status CIRB is also used for Control Type 8.

Action To Be Taken: Unit is not allowed to start, or is shut down.

Reset Method: Automatic once the condition is resolved.

Possible Causes: If this condition is encountered, check the following items:

- Confirm that airflow is present in the air handler if an airflow switch is used.
- Check airflow switch circuit wiring.
- If no airflow switch is used, confirm the jumper is in place between TB5-23 and 24. (TB6-23 and 24 is used for circuit B when using control type 8.)

T201 — Circuit A Indoor Fan Status Failure - Fan Not Running

T202 — Circuit B Indoor Fan Status Failure - Fan Not Running

Criteria for Trip: This alarm is generated when the following conditions are true:

1. 38RC unit is Enabled (***Main Menu → Status Tables → General Unit Parameters → CCN Chiller*=STRT**).
2. Control Type is Dual Thermostat (***Main Menu → Configuration Menu → Options2 Configuration → Machine Control Type*=8**).
3. Airflow switch 1 is open (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRA*= OFF**) (T201) or airflow switch 2 is open (***Main Menu → Inputs → Input Status → Indoor Fan Status CIRB*=OFF**) (T202).

Action To Be Taken: For T201, circuit A is not allowed to start, or is shut down. For T202, circuit B is not allowed to start, or is shut down.

Reset Method: Automatic once the condition is resolved.

Possible Causes: If this condition is encountered, check the following items:

- Confirm that airflow is present in the air handler if an airflow switch is used.
- Check airflow switch circuit wiring.
- If no airflow switch 1 is used, confirm the jumper is in place between TB5-23 and 24 for T201.
- If no airflow switch 2 is used, confirm the jumper is in place between TB6-23 and 24 for T202.

T303 — Coil - Scheduled Maintenance Due

Criteria for Trip: This alarm is generated when the Coil Service Countdown (***Run Status → PM → COIL → C.L.DN***) has expired.

Action To Be Taken: None, service alert only.

Reset Method: Manual. Perform coil maintenance. Before the alert can be cleared, Coil Cleaning Maint Done ***(Run Status → PM → COIL → C.L.MN***) must be toggled from **NO** to **YES**. Reset the alert.

Possible Causes: If this condition is encountered, check Coil Service Countdown.

T231 - Sensor Swap Alarm Circuit A

T232 - Sensor Swap Alarm Circuit B (Only Used for Control Type 8)

Criteria for Trip: Alarm is generated when RAT is less than SAT continuously for 1 minute while unit is running.

Action to Be Taken: None

Possible Causes: The RAT and SAT sensor may be swapped at the AHU or the CIOB board connections. If control type 8 is used, the sensors may be swapped between A and B circuits.

- Confirm compressors are actually running.

A412 (Variable Speed Fan Motor/Drive Failure)

This alarm indicates that there is a variable speed fan motor/VFD related alarm. When this alarm occurs, there is no impact to normal unit operation. Reset is automatic when all alerts are cleared.

T413 (Variable Speed Fan Motor/Drive Failure)

This alert indicates that there is a variable speed fan motor/VFD related alert. When this alert occurs, there is no impact to normal condensing unit operation. Reset is automatic when all alerts are cleared.

T500 - Low Oil Level Alert For Compressor 1 in Circuit A

T501 - Low Oil Level Alert For Compressor 2 in Circuit A

T502 - Low Oil Level Alert For Compressor 3 in Circuit A

T503 - Low Oil Level Alert For Compressor 1 in Circuit B

T504 - Low Oil Level Alert For Compressor 2 in Circuit B

T505 - Low Oil Level Alert For Compressor 3 in Circuit B

This alert indicates the low oil level sensor has detected a low oil level in the compressor.

Criteria for Trip: Oil level is below the sensor continuously for 1 minute.

Action to Be Taken: An additional compressor in the circuit will be started.

Reset Method: Automatic: Compressor oil level will increase above the oil sensor level.

Possible Causes:

- The flow rate in the refrigerant line is too low to bring oil back to the compressor.
- Oversized evaporator circuits
- Oversized, too long, or too much rise in Suction Line
- Insufficient oil added for line length between AHU and condensing unit.

Check installation manual for system installation instruction.

A500 - Low Oil Level Alert For Compressor 1 in Circuit A

A501 - Low Oil Level Alert For Compressor 2 in Circuit A

A502 - Low Oil Level Alert For Compressor 3 in Circuit A

A503 - Low Oil Level Alert For Compressor 1 in Circuit B

A504 - Low Oil Level Alert For Compressor 2 in Circuit B

A505 - Low Oil Level Alert For Compressor 3 in Circuit B

This alarm indicates the low oil level sensor has detected a low oil level in the compressor.

Criteria for Trip: Oil level is below the sensor and has not risen 1 minute after second compressor was added to the circuit, or it is a single compressor circuit.

Action to Be Taken: Circuit Shutdown.

Reset Method: Manual.

Possible Causes:

- The flow rate in the refrigerant line is too low to bring oil back to the compressor.
- Oversized evaporator circuits
- Oversized, too long, or too much rise in Suction Line
- Insufficient oil added for line length between AHU and Condensing Unit.

Check installation manual for system installation instruction.

T701 — Compressor A1 Not Started or Pressure Not Established Alert

T702 — Compressor A2 Not Started or Pressure Not Established Alert

T703 — Compressor A3 Not Started or Pressure Not Established Alert

T704 — Compressor B1 Not Started or Pressure Not Established Alert

T705 — Compressor B2 Not Started or Pressure Not Established Alert

T706 — Compressor B3 Not Started or Pressure Not Established Alert

Criteria for Trip:
Condition 1: Discharge and Suction pressure not established. Between 1 and 2 min after the start of the first compressor (applicable only for first started compressor), the difference between the Highest and the Lowest SP value shall be at least 3 psi, otherwise alert shall be triggered.

Condition 2: 2 min after start of first compressor, if delta pressure (dp_a – sp_a) is less than 29 psi, then alarm shall be raised for all active compressors in the circuit.

Action To Be Taken: When Condition 1 is TRUE, Compressor A1 is shut down. When Condition 2 is TRUE, the circuit is shut down.

NOTE: For single circuit units, circuit A shutdown results in unit shutdown.

Reset Method: For condition 1, automatic; for condition 2, manual.

Possible Causes: If this condition is encountered, check the following items:

- Check for a Compressor Overload trip. Either the compressor internal overload protector is open or the external overload protector (CoreSense module) has activated.
- If the unit is a 208/230 volt unit, be sure that the control transformer is wired to the correct voltage tap. Low voltage to the Current Sensing Board can cause this alarm.
- Check the unit for low refrigerant charge. If the compressor operates for an extended period of time with low refrigerant charge, the compressor advanced scroll temperature protection (ASTP) device will open, which will cause the compressor to trip on its overload protection device.
- Check for a compressor circuit breaker trip.
- Check the Current Sensing Board to be sure that it is operating correctly.
- Check for a wiring error.
- For compressors that use the CoreSense compressor protection module, check the following items:
  - Check the motor temperature lead connection.
  - If the compressor is a replacement compressor, verify that the correct CoreSense module is installed. Replacement compressors are shipped with a 115-volt module. The 38RC units operate with a 24-volt module that is shipped with the compressor, but not installed. The 115-volt module must be removed and replaced with the 24-volt module shipped with the compressor. Failure to do so will not allow the M1-M2 contacts to close, resulting in this alarm.

A770 (61770) - Circuit A Welded Compressor Contactor Alarm

A771 (61771) - Circuit B Welded Compressor Contactor Alarm

Criteria for Trip: After all compressors shut down, the circuit saturated condensing temperature rises more than 5°F in less than 5 minutes.

Action to Be Taken: Unit will shut down. The fan will be turned on to keep saturated condensing temperature in check.

Possible Causes: Welded compressor contactor.

APPENDIX A — DISPLAY TABLES

Main Menu

ITEM	CCN MENU NAME	ACCESS	MENU ICON
1	Configuration Menu	**Service/Factory**	
2	Status Tables	Basic/User/Service/Factory	
3	Set Points	Basic/User/Service/Factory	
4	Maintenance	Service/Factory	
5	Inputs	Basic/User/Service/Factory	
6	Service	Service/Factory	
7	Outputs	Basic/User/Service/Factory	

APPENDIX A — DISPLAY TABLES (cont)

Configuration Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Options 2 Configuration	Service/Factory	OPTIONS2 Configuration	
2	Reset Configuration	Service/Factory	Reset Configuration	
3	Unit Configuration	Service/Factory	Unit Configuration	
5	Model Number Config	Service/Factory	Model Number Configuration	
6	Options1 Configuration	Service/Factory	OPTIONS1 Configuration	
7	Schedule	See submenus	See submenus	
8	Current Configuration	Basic/User/Service/Factory	CURCONF - Current Configuration	
9	VFD Configuration	Service/Factory	VFD_CONF - VFD Configuration	
10	VFDTest	Service/Factory	VFD Test	
11	FAN_TEST	Service/Factory	FAN_TEST - FAN_TEST	
12	CCN Configuration	Service/Factory	CCN Configuration	
16	Date/Time Configuration	Basic/User/Service/Factory	Date/Time Configuration	
17	HMI Configuration	See submenus	See submenus	

Schedule Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Local Schedule	Service/Factory	LOCALOCC-Schedule Menu	
2	Holiday Schedule	Service/Factory	Holiday Schedule	

APPENDIX A — DISPLAY TABLES (cont)

HMI Configuration Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	BACnet Configuration	Service/Factory	HMI Configuration	
2	MODBUS Slave Config	Service/Factory	MODBUS Slave Config	
3	MODBUS Mast Config	Service/Factory	MODBUS Mast Config	
4	Network Wizard	See submenus	See submenus	

Network Wizard Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Network Interfaces	See submenus	See submenus	
2	Domain Name System	Service/Factory	DNS IP	
3	Network Diag	See submenus	See submenus	

Network Interfaces Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Network Wizard - eth0	Service/Factory	Network Wizard - eth0	
2	Network Wizard - eth1	Service/Factory	Network Wizard - eth1	
3	Wi+Fi	Service/Factory	Wi+Fi	

Network Diag Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Cloud Test	Service/Factory	Cloud Test	
2	Ping Test	Service/Factory	Ping Test	

APPENDIX A — DISPLAY TABLES (cont)

Status Tables Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	General Unit Parameters	Basic/User/Service/Factory	General Unit Parameters	
2	Unit Parameters	Basic/User/Service/Factory	Unit Parameters	
3	Circuit A Parameters	Basic/User/Service/Factory	CIRCA_AN - Circuit A Parameters	
5	Circuit B Parameters	Basic/User/Service/Factory	CIRCB_AN - Circuit B Parameters	
6	System Information	Basic/User/Service/Factory	System Information	
7	Oil Sensor Info	Basic/User/Service/Factory	Low Oil Level Switch Sensor Status	
8	LLSV Status	Basic/User/Service/Factory	Liquid Line Solenoid Valve Status	

Maintenance Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Run Test	Service/Factory	RUNTEST - Run Test	
2	Test Mode	Service/Factory	Test Mode	
3	Current Operating Modes	Service/Factory	CURRMODS - Current Operating Modes	
5	Compressor Start Hour	Service/Factory	STARTHOUR - Compressor Start Hour	
6	USB Logs Export	Service/Factory	USB Logs Export	

Inputs Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Inputs Status	Basic/User/Service/Factory	INPUTS - Input Status	
2	Temperatures	See submenus	See submenus	
3	Pressures	Basic/User/Service/Factory	RFGPRESS - RFG Pressure	

APPENDIX A — DISPLAY TABLES (cont)

Temperatures Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	Air Temps	Basic/User/Service/Factory	AIRTEMP - Air Temps	
2	Refrigerant Temps	Basic/User/Service/Factory	RFGTEMP - Refrigerant Temps	

Outputs Menu

ITEM	CCN MENU NAME	ACCESS	MENU TEXT DESCRIPTION	MENU ICON
1	General Outputs	Basic/User/Service/Factory	GENOP - General Outputs	
2	Outputs Circuit A	Basic/User/Service/Factory	CIRA - Outputs Circuit A	
3	Outputs Circuit B	Basic/User/Service/Factory	CIRB - Outputs Circuit B	

Configuration Menu - Options 2 Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CTRLTYPE	1,3,4,5,7,8,9	1	—	Machine Control Type 1 = VAV 3 = Tstat Multi 4 = Tstat 2 Stage 5 = SPT Multi 7 = Pct Cap 8 = Dual Stat 9 = VAV Setpoint	1	9
2	CTRL_MOD	0 to 3	0	—	Control Method	0	3
3	SEQ_TYPE	1 to 2	1	—	Loading Sequence Select 1 = Equal 2 = Staged	1	2
4	Lead_Cir	1 to 3	1	—	Lead_Cir 1 = Auto 2 = A_Lead 3 = B_Lead	1 to 3	1
5	RAMP_ENA	Disable_Enable	Disable	—	Ramp Load Select	0	1
6	COOL_RMP	0.2 to 2	1	F/min	Cooling Ramp Loading	0.2	2
7	DELAY	0 to 15	2	MINUTES	Minutes Off Time	0	15
8	STAGEDEL	30 to 90	90	SECONDS	Min Delay Between Stages	30	90
9	Z_GAIN	1 to 4	1	—	Dead band Multiplier	1	4

Configuration Menu - Reset Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CRST_TYP	0 to 2	0	—	Cooling Reset Type 0 = No Reset 1 = 4-20 mA Input 2 = Out Air Temp	0	2
2	DEG	–30 to 30	10	DEGREE_F	4-20 - Degrees Reset	–30	30
3	REM_NO	0 to 125	10	DEGREE_F	Remote - No Reset Temp	0	125
4	REM_FULL	1 to 125	10	DEGREE_F	Remote - Full Reset Temp	0	125
5	REM_DEG	–30 to 30	10	DEGREE_F	Remote - Degrees Reset	–30	30
6	RTN_NO	0 to 30	10	DEGREE_F	Return - Full Reset Temp	0	30
7	RTN_FULL	0 to 10	0	DEGREE_F	Return - No Reset Temp	0	10
8	RTN_DEG	–30 to 30	0	DEGREE_F	Return - Degrees Reset	–30	30
9	DMD_CTRL	1 to 3	0	—	Demand Limit Select 1 = None 2 = Switch 3 = 4-20 mA Input	0	3
10	DMT20MA	0 to 100	100	PERCENT	Demand Limit at 20 mA	0	100
11	SHED_DEL	0 to 60	0	PERCENT	Loadshed Demand Delta	0	60
12	SHED_TIM	0 to 120	60	MINUTES	Maximum Loadshed Time	0	120
13	DLSWSP1	0 to 100	80	PERCENT	Demand Limit Switch 1	0	100
14	DLSWSP2	0 to 100	50	PERCENT	Demand Limit Switch 2	0	100

Configuration Menu - Unit Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	SIZE		None	TONS	Unit Size	25	130
2	NUMCKTS	1 to 2	1	—	Number of Refr Ckts	1	2
3	SIZE_A1		15	TONS	Compressor A1 Size	0	50
4	SIZE_A2		15	TONS	Compressor A2 Size	0	50
5	SIZE_A3		15	TONS	Compressor A3 Size	0	50
6	SIZE_B1		25	TONS	Compressor B1 Size	0	50
7	SIZE_B2		25	TONS	Compressor B2 Size	0	50
8	SIZE_B3		25	TONS	Compressor B3 Size	0	50
9	FAN_TYPE		7	—	Fan Sequence Number	1	8
10	CPA1TYPE	No_Yes	0	—	Compressor A1 Digital	0	1
11	MAXULTME	0 to 15	8	SECONDS	Maximum A1 Unload Time	0	15
12	DIG_XTND	No_Yes	0	—	Allow Digital Low Load	0	1
13	VFD_fan_sel	No_Yes	60	—	VFD Selection	0	1

Configuration Menu - Options1 Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	HGBP_V	Disable_Enable	Disable	—	HGBP Valve Select	0	1
2	SPTSENS	Disable_Enable	Disable	—	Space Temp Sensor	0	1
3	SPTOSENS	Disable_Enable	Disable	—	Space Temp Offset Enable	0	1
4	SPTO_RNG	0 to 10	5	—	Space Temp Offset Range	0	1
5	RATTYPE	Type	5K	—	RAT Thermistor Type 5k 10k None	—	—
6	SATTYPE	Type	5K	—	SAT Thermistor Type 5k 10k None	—	—
7	CMP_FBK	Disable_Enable	Enable	—	Compressor Fbk Enable	0	1
8	OIL_SENS	Disable_Enable	Disable	—	Oil Sen Switch Dsbl	0	1
9	CMP_OMAP	Disable_Enable	Disable	—	Comp out of map alarm	0	1

Configuration Menu - Current Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	MODEL		0	—	Model details	0	0
2	UNITSIZE		130	TONS	Unit Size	25	130
3	NUMCKTS	1 to 2	1	—	Number of Refr Ckts	1	2
4	VOLTAGE		0	VOLTS	Unit Voltage	0	575
5	UNITFREQ		0	HZ	Unit Frequency	0	0
6	COIL		0	—	Coil type	0	0
7	LOWSOUND		0	—	Low Sound	0	0
8	REVISION		0	—	Revision	0	0
9	LONGLINE		0	—	Long Line Options	0	0
10	LWABIENT		0	—	Low Ambient	0	0
11	COMP		0	—	Compressor type	0	0
12	DISCNCT		0	—	Disconnect	0	0
13	CONTROLS		0	—	Controls	0	0
14	INTERFCE		0	—	External Interface	0	0
15	PACKING		0	—	Packing	0	0
16	GRILLE		0	—	Grille	0	0

APPENDIX A — DISPLAY TABLES (cont)

Configuration Menu - VFD Configuration

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CONF_002		0	HZ	Motor Speed	0	0
2	CONF_103		0	PERCENT	Torque Profile	0	0
3	CONF_120		0	KW	Motor KW	0	0
4	CONF_122		0	VOLTS	Motor Volts	0	0
5	CONF_123		0	HZ	Motor Frequency	0	0
6	CONF_124		0	AMPS	Motor Amp	0	0
7	CONF_125		0	RPM	Motor rpm	0	0
8	CONF_173		0	—	Flying Restart	0	0
9	CONF_180		0	—	Function at Stop	0	0
10	CONF_190		0	—	Motor Thermal Protection	0	0
11	CONF_191		0	—	Motor External Fan	0	0
12	CONF_193		0	—	Thermistor src	0	0
13	CONF_302		0	—	Min ref	0	0
14	CONF_303		0	—	Max Reference	0	0
15	CONF_313		0	—	Type Reference	0	0
16	CONF_315		0	—	src ref#1	0	0
17	CONF_316		0	—	src ref#2	0	0
18	CONF_341		0	—	Ramp Up	0	0
19	CONF_342		0	—	Ramp Down	0	0
20	CONF_410		0	—	Motor Speed Direct	0	0
21	CONF_412		0	HZ	Motor Speed Low Limit	0	0
22	CONF_414		0	—	Motor Speed High Limit	0	0
23	CONF_416		0	—	Torque Limit	0	0
24	CONF_418		0	—	Current Limit	0	0
25	CONF_419		0	HZ	Max Output Frequency	0	0
26	CONF_512		0	—	DI #27	0	0
27	CONF_801		0	—	Control Site	0	0
28	CONF_802		0	—	Control Source	0	0
29	CONF_803		0	—	Control Timeout	0	0
30	CONF_804		0	—	Control Timeout Function	0	0
31	CONF_805		0	—	Function at Time out	0	0
32	CONF_810		0	—	Function at Time end	0	0
33	CONF_830		0	—	Protocol	0	0
34	CONF_831		0	—	Address	0	0
35	CONF_832		0	—	Baud rate	0	0
36	CONF_833		0	—	Parity/Stop bit	0	0
37	CONF_834		0	SECONDS	Estimated Cycle time	0	0
38	CONF_837		0	SECONDS	Max Intercharacter delay	0	0
39	CONF1401		0	HZ	Switching Frequency	0	0
40	CONF1403		0	—	Overmodulation	0	0
41	CONF1440		0	—	VT level zero mag level	0	0
42	CONF1460		0	—	Function at overtemp	0	0
43	CONF1461		0	—	Func at inv overload	0	0

Configuration Menu - VFDTest

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	Kp_Gain		0	—	PID Kp gain	0	0
2	Ki_Gain		0	—	PID Ki gain	0	0
3	Kd_Gain		0	—	PID Kd gain	0	0
4	PREDELAY		0	—	Time Delay(Prestart)	0	0
5	FanSpeed		0	—	Fan Speed	0	0
6	CSP_OFST	0 to 25	0	DEGREE_F	VFD Cond sp offset	0	25

Configuration Menu - FAN_TEST

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	VFDSpeed		0	HZ	Drive Frequency	0	0
2	VFANSPD		0	PERCENT	VariaFan Speed	0	0
3	OAT	–45 to 320	0	DEGREE_F	Outside Air Temperature	–45	320
4	WSCT		0	DEGREE_F	Saturated Cond Temp	0	0
5	CondSP		0	DEGREE_F	Computed Cond Setpoint	0	0
6	LOW_SCT	–47.2 to 158	0	DEGREE_F	Lowest Saturated CondTmp	–47.2	158
7	VFANSPDB		0	PERCENT	VariaFan Speed	0	0
8	CondSP_A		0	DEGREE_F	Computed Cond ckt A	0	0
9	CondSP_B		0	DEGREE_F	Computed Cond Setpoint	0	0
10	VFDSpdB		0	HZ	Drive Frequency	0	0

Status Tables - General Unit Parameters

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	A_UNIT_STAT	1 to 10			Control Mode 1 = Local OFF 2 = Network Off 3 = Clock OFF 4 = EMstop/Alarms 5 = Remote ON 6 = Network On 7 = Clock On 8 = IDF OFF till it turns to alarm 4 9 = SPT Satisfied 10 = Local On	1	10
2	SPTMODE	0 to 3		—	Space Temp Control Mode 0 = Off Cool 1 = Lo Cool 2 = Hi Cool 3 = Cool On	0	3
3	GEN_OCC	No_Yes		—	Occupied	0	1
4	CHIL_S_S	Start_Stop		—	CCN Chiller	0	1
5	ALM	0 to 2		—	Alarm State 0 = Normal 1 = Alert 2 = Alarm		
6	COOL_MA	0 to 22		MILLIAMPS	4-20 mA Setpoint Signal	0	22
7	DEM_LIM	0 to 100		PERCENT	Active Demand Limit	0	100
8	MODE	No_Yes		—	Override Modes in Effect	0	1
9	STAGE	0 to 99		—	Requested Stage	0	99
10	CAP_T	0 to 100		PERCENT	Percent Total Capacity	0	100
11	SP	0 to 100	60	DEGREE_F	Active Setpoint	0	100
12	SP2	0 to 100	60	DEGREE_F	Active Setpoint 2	0	100
13	CTRL_PNT	–20 to 140	60	DEGREE_F	Control Point	–20	140
14	CTRLPNT2	–20 to 140	60	DEGREE_F	Control Point AHU2	–20	140
15	RETURN_T	–45 to 320		DEGREE_F	Return Air Temperature	–45	320
16	RAT2	–45 to 320		DEGREE_F	Return Air Temp AHU2	–45	320
17	SUPPLY_T	–45 to 320		DEGREE_F	Supply Air Temperature	–45	320
18	SAT2	–45 to 320		DEGREE_F	Supply Air Temp AHU2	–45	320
19	EMSTOP	Disable_Enable		—	Emergency Stop	0	1
20	MIN_LEFT			—	Minutes Left for Start	0	1

Status Tables - Unit Parameters

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	OAT	–45 to 320		DEGREE_F	Outside Air Temperature	–45	320
2	SPT	–45 to 320		DEGREE_F	Space Temperature	–45	320
3	LMT_MA	0 to 22		MILLIAMPS	4-20 mA Demand Limit Signal	0	22
4	DMD_SW1	Disable_Enable		—	Demand Limit Switch 1	0	1
5	DMD_SW2	Disable_Enable		—	Demand Limit Switch 2	0	1

Status Tables - Circuit A Parameters

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CAPA_T	0 to 100	0	PERCENT	Percent Total Capacity	0	100
2	CAPA_A	0 to 100	0	PERCENT	Percent Available Cap.	0	100
3	DP_A	0 to 725	0	PRESS_PSI	Circ A Disc Pressure	0	725
4	SP_A	0 to 725	0	PRESS_PSI	Circ A Suction Pressure	0	725
5	SCTA	–47.2 to 158	–47.2	DEGREE_F	Saturated Condensing Tmp	–47.2	158
6	SSTA	–47.2 to 158	–47.2	DEGREE_F	Saturated Suction Temp	–47.2	158
7	DGTA	–40 to 304	0	DEGREE_F	CirA Discharge Gas Temp	–40	304
8	SH_A	–100 to 200	0	DEGREE_F	Suction Superheat Temp	–100	200

Status Tables - Circuit B Parameters

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CAPB_T	0 to 100	0	PERCENT	Percent Total Capacity	0	100
2	CAPB_A	0 to 100	0	PERCENT	Percent Available Cap.	0	100
3	DP_B	0 to 725	0	PRESS_PSI	Circ B Disc Pressure	0	725
4	SP_B	0 to 725	0	PRESS_PSI	Circ B Suction Pressure	0	725
5	SCTB	–47.2 to 158	–47.2	DEGREE_F	Saturated Condensing Tmp	–47.2	158
6	SSTB	–47.2 to 158	–47.2	DEGREE_F	Saturated Suction Temp	–47.2	158
7	SH_B	–40 to 304	0	DEGREE_F	Suction Superheat Temp	–100	200
8	DGTB	–100 to 200	0	DEGREE_F	Circ B Discharge Temp	–40	304

Status Tables - System Information

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	SDK_VER		0	—	SDK version	0	0
2	APP_VER		0	—	APP version	0	0
3	SOFT_NB			—	Soft Part Number	0	0
4	GRP_ID		One00016729	—	group id	0	0
5	IOT_VER		0	—	IOT version	0	0
6	ROOT_VER		0	—	ROOTFS version	0	0
7	OS_VER		0	—	Core board OS version	0	0
8	OS_BUILD		0	—	Core board OS buildinfo	0	0
9	BOOT_VER		0	—	Uboot version	0	0
10	BOOT_BUI		0	—	Uboot buildinfo	0	0

Status Tables - Oil Sensor Info[a]

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	A1STAT	0 to 7	0	—	A1 Compressor Status	0	7
2	A2STAT	0 to 7	0	—	A2 Compressor Status	0	7
3	A3STAT	0 to 7	0	—	A3 Compressor Status	0	7
4	B1STAT	0 to 7	0	—	B1 Compressor Status	0	7
5	B2STAT	0 to 7	0	—	B2 Compressor Status	0	7
6	B3STAT	0 to 7	0	—	B3 Compressor Status	0	7
7	CIRASTAT	0 to 5	0	—	Circuit A Status	0	5
8	CIRBSTAT	0 to 5	0	—	Circuit B Status	0	5
9	CIRAOIL		0	—	Circuit A Oil Return	0	1
10	CIRBOIL		0	—	Circuit B Oil Return	0	1
11	OLSAMGMT		0	—	OLS Management Circuit A	0	1
12	OLSBMGMT		0	—	OLS Management Circuit B	0	1
13	CIRA _LOW_OIL_ALERT1		0	—	CIRA Low Oil Alert 1 Timestamp	0	0
14	CIRA _LOW_OIL_ALERT2		0	—	CIRA Low Oil Alert 2 Timestamp	0	0
15	CIRA _LOW_OIL_ALERT3		0	—	CIRA Low Oil Alert 3 Timestamp	0	0
16	CIRA _LOW_OIL_ALERT4		0	—	CIRA Low Oil Alert 4 Timestamp	0	0
17	CIRB _LOW_OIL_ALERT1		0	—	CIRB Low Oil Alert 1 Timestamp	0	0
18	CIRB _LOW_OIL_ALERT2		0	—	CIRB Low Oil Alert 2 Timestamp	0	0
19	CIRB _LOW_OIL_ALERT3		0	—	CIRB Low Oil Alert 3 Timestamp	0	0
20	CIRB _LOW_OIL_ALERT4		0	—	CIRB Low Oil Alert 4 Timestamp	0	0
21	A1SWSTAT		0	—	A1_OLS_Status	0	1
22	A2SWSTAT		0	—	A2_OLS_Status	0	1
23	A3SWSTAT		0	—	A3_OLS_Status	0	1
24	B1SWSTAT		0	—	B1_OLS_Status	0	1
25	B2SWSTAT		0	—	B2_OLS_Status	0	1
26	B3SWSTAT		0	—	B3_OLS_Status	0	1

NOTE(S):

a. A1STAT, A2STAT, A3STAT, B1STAT, B2STAT and B3STAT are OLS status CCN points w.r.t compressors.
Compressor OLS Status
0 - COM_OFF,
1 - COM_RUNNING_NO_OLS_ALERT,
2 - COM_RUNNING_OIL_RETURN,
3 - COM_RUNNING_OLSALERT,
4 - COM_READY_AVAILABLE,
5 - COM_TRIPOUT_OLS_ALERT,
6 - COM_TRIPOUT_OLS_ALARM,
7 - COM_DISABLE

CIRASTAT, CIRBSTAT are OLS status CCN points for the circuit.
Circuit OLS Status
0 - COMP_RUNNING_STATE,
1 - COMP_ON_STATE,
2 - COMP_READY_STATE,
3 - COMP_DISABLED_STATE,
4 - COMP_OFF_STATE,
5 - COMP_TRIPOUT_STATE

Status Tables - LLSV Status

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	LLSVACON	1 to 5	1	—	LLSV A Control State 1 = OFF 2 = Equalizing Pressure 3 = Pre-Start 4 = Running 5 = Stopping	1	5
2	LLSV_A	Off_On	0	—	Liquid Line Solenoid A	0	1
3	LLSV_A2	Off_On	0	—	Liquid Line Solenoid A2	0	1
4	LLSVBCON		0	—	LLSV B Control State	0	0
5	LLSV_B	Off_On	0	—	Liquid Line Solenoid B	0	1
6	LLSV_B2	Off_On	0	—	Liquid Line Solenoid B2	0	1

APPENDIX A — DISPLAY TABLES (cont)

Set Points

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CSP1	35 to 80	60	DEGREE_F	Cooling setpoint 1	35	80
2	CSP2	35 to 80	55	DEGREE_F	Cooling setpoint 2	35	80
3	CSP3	35 to 80	60	DEGREE_F	Cooling setpoint 3	35	80
4	CSP4	35 to 80	55	DEGREE_F	Cooling setpoint 4	35	80
5	SPT_SP	65 to 80	78	DEGREE_F	Space T Cool Setpoint	65	80
6	SPTO	–10 to 10	2.8	VOLTS	Space Temp Offset	–10	10
7	SPSP_PO	–10 to 100	78	DEGREE_F	Space T SP Plus Offset	–10	100
8	DMDLCON	–1 to 2	1	DEGREE_F	Lo Cool On Setpoint	–1	2
9	DMDHCON	0.5 to 20	3	DEGREE_F	HI Cool On Setpoint	0.5	20
10	DMDLCOFF	0.5 to 2	0.5	DEGREE_F	Lo Cool Off Setpoint	0.5	2
11	OATLOCK	–20 to 80	30	DEGREE_F	OAT Lockout Temperature	–20	80

Maintenance - Run Test

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	CAPA_T	0 to 100	0	PERCENT	Percent Total Capacity	0	100
2	CAPA_A	0 to 100	0	PERCENT	Percent Available Cap.	0	100
3	DP_A	0 to 725	0	PRESS_PSI	Circ A Disc Pressure	0	725
4	SP_A	0 to 725	0	PRESS_PSI	Circ A Suction Pressure	0	725
5	SCTA	–47.2 to 158	–47.2	DEGREE_F	Saturated Condensing Tmp	–47.2	158
6	SSTA	–47.2 to 158	–47.2	DEGREE_F	Saturated Suction Temp	–47.2	158
7	DIGCMPDT	–40 to 356	0	DEGREE_F	Discharge Gas Temp	–40	356
8	SH_A	–100 to 200	0	DEGREE_F	Suction Superheat Temp	–100	200
9	C_A1_RLY	Off_On	0	—	Compressor A1 Relay	0	1
10	C_A2_RLY	Off_On	0	—	Compressor A2 Relay	0	1
11	C_A3_RLY	Off_On	0	—	Compressor A3 Relay	0	1
12	A1_FBK	Off_On	0	—	Compressor A1 Feedback	0	1
13	A2_FBK	Off_On	0	—	Compressor A2 Feedback	0	1
14	A3_FBK	Off_On	0	—	Compressor A3 Feedback	0	1
15	CAPB_T	0 to 100	0	PERCENT	Percent Total Capacity	0	100
16	CAPB_A	0 to 100	0	PERCENT	Percent Available Cap.	0	100
17	DP_B	0 to 725	0	PRESS_PSI	Circ B Disc Pressure	0	725
18	SP_B	0 to 725	0	PRESS_PSI	Circ B Suction Pressure	0	725
19	SCTB	–47.2 to 158	–47.2	DEGREE_F	Saturated Condensing Tmp	–47.2	158
20	SSTB	–47.2 to 158	–47.2	DEGREE_F	Saturated Suction Temp	–47.2	158
21	SH_B	–100 to 200	0	DEGREE_F	Suction Superheat Temp	–100	200
22	C_B1_RLY	Off_On	0	—	Compressor B1 Relay	0	1
23	C_B2_RLY	Off_On	0	—	Compressor B2 Relay	0	1
24	C_B3_RLY	Off_On	0	—	Compressor B3 Relay	0	1
25	B1_FBK	Off_On	0	—	Compressor B1 Feedback	0	1
26	B2_FBK	Off_On	0	—	Compressor B2 Feedback	0	1
27	B3_FBK	Off_On	0	—	Compressor B3 Feedback	0	1
28	FAN_CON1	Off_On	0	—	Fan Contactor 1	0	1
29	FAN_CON2	Off_On	0	—	Fan Contactor 2	0	1
30	FAN_CON3	Off_On	0	—	Fan Contactor 3	0	1
31	FAN_CON4	Off_On	0	—	Fan Contactor 4	0	1
32	FAN_CON5	Off_On	0	—	Fan Contactor 5	0	1
33	FAN_CON6	Off_On	0	—	Fan Contactor 6	0	1
34	HGBP_OP	Off_On	0	—	HGBP	0	1
35	space	–40 to 240	0	DEGREE_F	Space Temperature	–40	240
36	Space_te	–40 to 240	0	DEGREE_F	Space Temp_IOMAP	–40	240
37	Rat_tem	–40 to 240	0	DEGREE_F	Return Temp IOMAP	–40	240
38	Sat_tem	–40 to 240	0	DEGREE_F	Supply Temp IOMAP	–40	240
39	SIZE_A1		15	TONS	Compressor A1 Size	0	50
40	SIZE_A2		15	TONS	Compressor A2 Size	0	50
41	SIZE_A3		15	TONS	Compressor A3 Size	0	50
42	SIZE_B1		25	TONS	Compressor B1 Size	0	50
43	SIZE_B2		25	TONS	Compressor B2 Size	0	50
44	SIZE_B3		25	TONS	Compressor B3 Size	0	50
45	VFD_FAN		0	—	Fan Speed	0	0

Maintenance - Test Mode

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	QCK_TST	Disable_Enable	0	—	Quick Test Enable	0	1
2	IN_A1	Off_On	0	—	Compressor A1 Relay	0	1
3	IN_A2	Off_On	0	—	Compressor A2 Relay	0	1
4	IN_A3	Off_On	0	—	Compressor A3 Relay	0	1
5	IN_B1	Off_On	0	—	Compressor B1 Relay	0	1
6	IN_B2	Off_On	0	—	Compressor B2 Relay	0	1
7	IN_B3	Off_On	0	—	Compressor B3 Relay	0	1
8	IN_FAN1	Off_On	0	—	Fan 1 Relay	0	1
9	IN_FAN2	Off_On	0	—	Fan 2 Relay	0	1
10	IN_FAN3	Off_On	0	—	Fan 3 Relay	0	1
11	IN_FAN4	Off_On	0	—	Fan 4 Relay	0	1
12	IN_FAN5	Off_On	0	—	Fan 5 Relay	0	1
13	IN_FAN6	Off_On	0	—	Fan 6 Relay	0	1
14	IN_LLSVA	Off_On	0	—	Liquid Line Solenoid A	0	1
15	IN_LSVA2	Off_On	0	—	Liquid Line Solenoid A2	0	1
16	IN_LLSVB	Off_On	0	—	Liquid Line Solenoid B	0	1
17	IN_LSVB2	Off_On	0	—	Liquid Line Solenoid B2	0	1
18	IN_AULTM	0 to 15	0	SECONDS	Comp A1 Unload Time	0	15
19	IN_ALM	Off_On	0	NO_UNIT	Remote Alarm Relay	0	1
20	IN_VFAN		0	—	QuickTest for VFD	0	0
21	IN_HGBP		0	—	Quick Test HGBP Valve	0	1

Maintenance - Current Operating Modes

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	MODE_5	Off_On	0	—	Ramp Load Limited	0	1
2	MODE_6	Off_On	0	—	Timed Override in effect	0	1
3	MODE_9	Off_On	0	—	Slow Change Override	0	1
4	MODE_10	Off_On	0	—	Minimum OFF time active	0	1
5	MODE_14	Off_On	0	—	Temperature Reset	0	1
6	MODE_15	Off_On	0	—	Demand Limited	0	1
7	MODE_17	Off_On	0	—	Low Temperature Cooling	0	1
8	MODE_18	Off_On	0	—	High Temperature Cooling	0	1
9	MODE_21	Off_On	0	—	High SCT Circuit A	0	1
10	MODE_22	Off_On	0	—	High SCT Circuit B	0	1
11	MODE_23	Off_On	0	—	Minimum Comp On Time	0	1
12	MODE_25	Off_On	0	—	Low Sound Mode	0	1
13	MODE_DFL	Off_On	0	—	Oil Recover Mode	0	1
14	MODE_TG	Off_On	0	—	Time Guard Active	0	1
15	OATLMODE	Off_On	0	—	OAT Below Lockout Temp	0	1
16	LOWOIL_A	Off_On	0	—	LowOil Override Cir A	0	1
17	LOWOIL_B	Off_On	0	—	LowOil Override Cir B	0	1
18	Hi_DGTA	Off_On	0	—	Hi DGT mode circuit A	0	1
19	Hi_DGTB	Off_On	0	—	Hi DGT mode circuit B	0	1
20	CAP_IMB	Off_On	0	—	Cap load in imbalance	0	1
21	CIRA_FRZ	Off_On	0	—	Capacity Freeze CirA	0	1
22	CIRB_FRZ	Off_On	0	—	Capacity Freeze CirB	0	1
23	MODE_B_5	Off_On	0	—	Ramp Load Ltd AHU2	0	1
24	MODE_B_9	Off_On	0	—	Slow Chng Override AHU2	0	1
25	MODE_B17	Off_On	0	—	Low Temp Cooling AHU2	0	1
26	MODE_B18	Off_On	0	—	High Temp Cooling AHU2	0	1
27	MODE_B23	Off_On	0	—	Min Comp On Time AHU2	0	1
28	Hi_OVRA	Off_On	0	—	High Pressure override A	0	1
29	Hi_OVRB	Off_On	0	—	High Pressure override B	0	1
30	OUT_MAPA	Off_On	0	—	Out of map ON/OFF Ckt A	0	1
31	OUT_MAPB	Off_On	0	—	Out of map ON/OFF Ckt B	0	1

Maintenance - Compressor Start Hour

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	MACH_HRS		0	HOURS	Machine Operating Hours	0	999999
2	MACH_CYC		0	—	Machine Starts	0	1000000
3	CIRA_HRS		0	HOURS	Circuit A Run Hours	0	999999
4	A1_HRS		0	HOURS	Compressor A1 Run Hours	0	999999
5	A2_HRS		0	HOURS	Compressor A2 Run Hours	0	999999
6	A3_HRS		0	HOURS	Compressor A3 Run Hours	0	999999
7	CIRB_HRS		0	HOURS	Circuit B Run Hours	0	999999
8	B1_HRS		0	HOURS	Compressor B1 Run Hours	0	999999
9	B2_HRS		0	HOURS	Compressor B2 Run Hours	0	999999
10	B3_HRS		0	HOURS	Compressor B3 Run Hours	0	999999
11	CIRA_CYC		0	—	Circuit A Starts	0	999999
12	A1_CYC		0	—	Compressor A1 Starts	0	999999
13	A2_CYC		0	—	Compressor A2 Starts	0	999999
14	A3_CYC		0	—	Compressor A3 Starts	0	999999
15	CIRB_CYC		0	—	Circuit B Starts	0	999999
16	B1_CYC		0	—	Compressor B1 Starts	0	999999
17	B2_CYC		0	—	Compressor B2 Starts	0	999999
18	B3_CYC		0	—	Compressor B3 Starts	0	999999

Inputs - Input Status

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	IDFA_FS	Off_On	0	—	Indoor Fan Status CIRA	0	1
2	Y1	Off_On	0	—	Y1 Thermostat Input	0	1
3	Y2	Off_On	0	—	Y2 Thermostat Input	0	1
4	IDFB_FS	Off_On	0	—	Indoor Fan Status CIRB	0	1
5	Y3	Off_On	0	—	Y3 Thermostat Input	0	1
6	Y4	Off_On	0	—	Y4 Thermostat Input	0	1

Inputs - Temperatures - Air Temps

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	SUPPLYT		0	DEGREE_F	Supply Air Temperature	–45	320
2	SAT2		0	DEGREE_F	Supply Air Temp AHU2	–45	320
3	RETURNT		0	DEGREE_F	Return Air Temperature	–45	320
4	RAT2		0	DEGREE_F	Return Air Temp AHU2	–45	320
5	OAT		0	DEGREE_F	Outside Air Temperature	–45	320
6	SPT		0	DEGREE_F	Space Temperature	–45	320

Inputs - Temperatures - Refrigerant Temps

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	SUCT_A		0	DEGREE_F	CirA Suction Temp	–40	304
2	DGT_A		0	DEGREE_F	CirA Discharge Gas Temp	–40	304
3	SUCT_B		0	DEGREE_F	Circ B Suction Temp	–40	304
4	DGT_B		0	DEGREE_F	Circ B Discharge Temp	–40	304

Inputs - Pressures - RFG Pressure

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	SPA		0	PRESS_PSI	Circ A Suction Pressure	0	725
2	DPA		0	PRESS_PSI	Circ A Disc Pressure	0	725
3	SPB		0	PRESS_PSI	Circ B Suction Pressure	0	725
4	DPB		0	PRESS_PSI	Circ B Disc Pressure	0	725

Service

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	ENABLEA1	Disable_Enable	0	—	Enable Compressor A1	0	1
2	ENABLEA2	Disable_Enable	0	—	Enable Compressor A2	0	1
3	ENABLEA3	Disable_Enable	0	—	Enable Compressor A3	0	1
4	ENABLEB1	Disable_Enable	0	—	Enable Compressor B1	0	1
5	ENABLEB2	Disable_Enable	0	—	Enable Compressor B2	0	1
6	ENABLEB3	Disable_Enable	0	—	Enable Compressor B3	0	1
7	REVR_VER	Disable_Enable	1	—	Phase Reversal Enable	0	1
8	TCOM_EBL	Disable_Enable	1	—	Two Comp Ckt Oil Mgmt	0	1

Outputs - General Outputs

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	FAN_CON1	Off_On	0	—	Fan Contactor 1	0	1
2	FAN_CON2	Off_On	0	—	Fan Contactor 2	0	1
3	FAN_CON3	Off_On	0	—	Fan Contactor 3	0	1
4	FAN_CON4	Off_On	0	—	Fan Contactor 4	0	1
5	FAN_CON5	Off_On	0	—	Fan Contactor 5	0	1
6	FAN_CON6	Off_On	0	—	Fan Contactor 6	0	1
7	HGBP_OP	Off_On	0	—	HGBP	0	1
8	VHPA	0 to 100	0	PERCENT	Var Head Press % Cir A	0	100
9	VHPB	0 to 100	0	PERCENT	Var Head Press % Cir B	0	100

Outputs - Outputs Circuit A

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	C_A1_RLY	Off_On	0	—	Compressor A1 Relay	0	1
2	DIG_LOAD	0 to 100	0	PERCENT	Comp A1 Load Percent	0	100
3	C_A2_RLY	Off_On	0	—	Compressor A2 Relay	0	1
4	C_A3_RLY	Off_On	0	—	Compressor A3 Relay	0	1
5	LLSV_A	Off_On	0	—	Liquid Line Solenoid A	0	1
6	LLSV_A2	Off_On	0	—	Liquid Line Solenoid A2	0	1
7	HGBP_OP	Off_On	0	—	HGBP	0	1
8	DGT_OVRA		0	—	Hi DGT Over count cir A	0	0
9	HP_SW_A		0	VOLTS	Discrete Input 9	0	1

Outputs - Outputs Circuit B

LINE	POINT NAME	STATUS	DEFAULT	UNIT	DESCRIPTION	LOW LIMIT	HIGH LIMIT
1	C_B1_RLY	Off_On	0	—	Compressor B1 Relay	0	1
2	C_B2_RLY	Off_On	0	—	Compressor B2 Relay	0	1
3	C_B3_RLY	Off_On	0	—	Compressor B3 Relay	0	1
4	LLSV_B	Off_On	0	—	Liquid Line Solenoid B	0	1
5	LLSV_B2	Off_On	0	—	Liquid Line Solenoid B2	0	1
6	DGT_OVRB		0	—	Hi DGT Over count cir B	0	0
7	HP_SW_B		0	VOLTS	Discrete Input 9	0	1

APPENDIX B — CCN TABLES

CCN Points Table

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
A1_CYC	T12_STRTHOUR	CY_A1	NO
A1_FBK	T12_RUNTEST	K_A1_FBK	NO
A1_HRS	T12_STRTHOUR	HR_A1	NO
A1STAT	T11_OIL_SENS	A1_Compressor_Status	NO
A1SWSTAT	T11_OIL_SENS	A1_OLS_Status	
A2_CYC	T12_STRTHOUR	CY_A2	NO
A2_FBK	T12_RUNTEST	K_A2_FBK	NO
A2_HRS	T12_STRTHOUR	HR_A2	NO
A2STAT	T11_OIL_SENS	A2_Compressor_Status	NO
A2SWSTAT	T11_OIL_SENS	A2_OLS_Status	
A3_CYC	T12_STRTHOUR	CY_A3	NO
A3_FBK	T12_RUNTEST	K_A3_FBK	NO
A3_HRS	T12_STRTHOUR	HR_A3	NO
A3STAT	T11_OIL_SENS	A3_Compressor_Status	NO
A3SWSTAT	T11_OIL_SENS	A3_OLS_Status	
ALM	T11_A_UNIT	A_UNIT_ALM	NO
APP_VER	T11_SYS_INFO	PLTSP_APP_version	NO
B1_CYC	T12_STRTHOUR	CY_B1	NO
B1_FBK	T12_RUNTEST	K_B1_FBK	NO
B1_HRS	T12_STRTHOUR	HR_B1	NO
B1STAT	T11_OIL_SENS	B1_Compressor_Status	NO
B1SWSTAT	T11_OIL_SENS	B1_OLS_Status	
B2_CYC	T12_STRTHOUR	CY_B2	NO
B2_FBK	T12_RUNTEST	K_B2_FBK	NO
B2_HRS	T12_STRTHOUR	HR_B2	NO
B2STAT	T11_OIL_SENS	B2_Compressor_Status	NO
B2SWSTAT	T11_OIL_SENS	B2_OLS_Status	
B3_CYC	T12_STRTHOUR	CY_B3	NO
B3_FBK	T12_RUNTEST	K_B3_FBK	NO
B3_HRS	T12_STRTHOUR	HR_B3	NO
B3STAT	T11_OIL_SENS	B3_Compressor_Status	NO
B3SWSTAT	T11_OIL_SENS	B3_OLS_Status	
BOOT_BUI	T11_SYS_INFO	PLTSP_CoreUboot_buildinf	NO
BOOT_VER	T11_SYS_INFO	PLTSP_CoreUboot_ver	NO
C_A1_RLY	T12_RUNTEST	K_A1_RLY	NO
C_A1_RLY	T11_CIRA	K_A1_RLY	NO
C_A2_RLY	T12_RUNTEST	K_A2_RLY	NO
C_A2_RLY	T11_CIRA	K_A2_RLY	NO
C_A3_RLY	T12_RUNTEST	K_A3_RLY	NO
C_A3_RLY	T11_CIRA	K_A3_RLY	NO
C_B1_RLY	T12_RUNTEST	K_B1_RLY	NO
C_B1_RLY	T11_CIRB	K_B1_RLY	NO
C_B2_RLY	T12_RUNTEST	K_B2_RLY	NO
C_B2_RLY	T11_CIRB	K_B2_RLY	NO
C_B3_RLY	T12_RUNTEST	K_B3_RLY	NO
C_B3_RLY	T11_CIRB	K_B3_RLY	NO
CAP_IMB	T12_CURRMODS	CAP_LOAD_IMBALANCED	NO
CAP_T	T11_A_UNIT	A_UNIT_CAP_T	NO
CAPA_A	T11_CIRCA_AN	CIRCA_AN_CAPA_A	NO
CAPA_A	T12_RUNTEST	CIRCA_AN_CAPA_A	NO
CAPA_T	T11_CIRCA_AN	CIRCA_AN_CAPA_T	NO
CAPA_T	T12_RUNTEST	CIRCA_AN_CAPA_T	NO
CAPB_A	T11_CIRCB_AN	CIRCB_AN_CAPB_A	NO
CAPB_A	T12_RUNTEST	CIRCB_AN_CAPB_A	NO
CAPB_T	T11_CIRCB_AN	CIRCB_AN_CAPB_T	NO
CAPB_T	T12_RUNTEST	CIRCB_AN_CAPB_T	NO
CHIL_S_S	T11_A_UNIT	A_UNIT_CHIL_S_S	YES
CIR_BIAS	T11_A_UNIT	CircuitBias	NO
CIRA_CYC	T12_STRTHOUR	CY_CIRA	NO
CIRA_FRZ	T12_CURRMODS	CAP_FREEZE_CIR_A	NO
CIRA_HRS	T12_STRTHOUR	HR_CIRA	NO
CIRAOIL	T11_OIL_SENS	CIRA_OilReturn	NO
CIRASTAT	T11_OIL_SENS	CIRA_Status	NO
CIRB_CYC	T12_STRTHOUR	CY_CIRB	NO
CIRB_FRZ	T12_CURRMODS	CAP_FREEZE_CIR_B	NO
CIRB_HRS	T12_STRTHOUR	HR_CIRB	NO

APPENDIX B — CCN TABLES (cont)

CCN Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
CIRBOIL	T11_OIL_SENS	CIRB_OilReturn	NO
CIRBSTAT	T11_OIL_SENS	CIRB_Status	NO
CLSP_TYP	T10_OPTIONS1	CLSP_TYP	NO
CMP_FBK	T10_OPTIONS1	COMP_FBK_ENABLE	NO
CMP_OMAP	T10_OPTIONS1	COMP_OUT_OF_MAP	NO
COIL	T11_CURCONF	UNIT_COIL	NO
COMP	T11_CURCONF	UNIT_COMP	NO
CondSP	T12_FAN_TEST	HEADCTRL_condsp	NO
CondSP_A	T12_FAN_TEST	HEADCTRL_condspA	NO
CondSP_B	T12_FAN_TEST	HEADCTRL_condspB	NO
CONF_002	T12_VFD_CONF	VFANA_CONF_002	NO
CONF_103	T12_VFD_CONF	VFANA_CONF_103	NO
CONF_120	T12_VFD_CONF	VFANA_CONF_120	NO
CONF_122	T12_VFD_CONF	VFANA_CONF_122	NO
CONF_123	T12_VFD_CONF	VFANA_CONF_123	NO
CONF_124	T12_VFD_CONF	VFANA_CONF_124	NO
CONF_125	T12_VFD_CONF	VFANA_CONF_125	NO
CONF_173	T12_VFD_CONF	VFANA_CONF_173	NO
CONF_180	T12_VFD_CONF	VFANA_CONF_180	NO
CONF_190	T12_VFD_CONF	VFANA_CONF_190	NO
CONF_191	T12_VFD_CONF	VFANA_CONF_191	NO
CONF_193	T12_VFD_CONF	VFANA_CONF_193	NO
CONF_302	T12_VFD_CONF	VFANA_CONF_302	NO
CONF_303	T12_VFD_CONF	VFANA_CONF_303	NO
CONF_313	T12_VFD_CONF	VFANA_CONF_313	NO
CONF_315	T12_VFD_CONF	VFANA_CONF_315	NO
CONF_316	T12_VFD_CONF	VFANA_CONF_316	NO
CONF_341	T12_VFD_CONF	VFANA_CONF_341	NO
CONF_342	T12_VFD_CONF	VFANA_CONF_342	NO
CONF_410	T12_VFD_CONF	VFANA_CONF_410	NO
CONF_412	T12_VFD_CONF	VFANA_CONF_412	NO
CONF_414	T12_VFD_CONF	VFANA_CONF_414	NO
CONF_416	T12_VFD_CONF	VFANA_CONF_416	NO
CONF_418	T12_VFD_CONF	VFANA_CONF_418	NO
CONF_419	T12_VFD_CONF	VFANA_CONF_419	NO
CONF_512	T12_VFD_CONF	VFANA_CONF_512	NO
CONF_801	T12_VFD_CONF	VFANA_CONF_801	NO
CONF_802	T12_VFD_CONF	VFANA_CONF_802	NO
CONF_803	T12_VFD_CONF	VFANA_CONF_803	NO
CONF_804	T12_VFD_CONF	VFANA_CONF_804	NO
CONF_805	T12_VFD_CONF	VFANA_CONF_805	NO
CONF_810	T12_VFD_CONF	VFANA_CONF_810	NO
CONF_830	T12_VFD_CONF	VFANA_CONF_830	NO
CONF_831	T12_VFD_CONF	VFANA_CONF_831	NO
CONF_832	T12_VFD_CONF	VFANA_CONF_832	NO
CONF_833	T12_VFD_CONF	VFANA_CONF_833	NO
CONF_834	T12_VFD_CONF	VFANA_CONF_834	NO
CONF_837	T12_VFD_CONF	VFANA_CONF_837	NO
CONF1401	T12_VFD_CONF	VFANA_CONF_1401	NO
CONF1403	T12_VFD_CONF	VFANA_CONF_1403	NO
CONF1440	T12_VFD_CONF	VFANA_CONF_1440	NO
CONF1460	T12_VFD_CONF	VFANA_CONF_1460	NO
CONF1461	T12_VFD_CONF	VFANA_CONF_1461	NO
CONTROLS	T11_CURCONF	UNIT_CONTROLS	NO
COOL_MA	T11_A_UNIT	A_UNIT_COOL_MA	NO
CPA1TYPE	T10_UNIT	UNIT_CPA1TYPE	NO
CRST_TYP	T10_RESTCON	RESETCON_CRST_TYP	NO
CSP_OFST	T12_VFD_TEST	CodSP_Offset	NO
CSP1	T17_SETPOINT	SETPOINT_CSP1	NO
CSP2	T17_SETPOINT	SETPOINT_CSP2	NO
CSP3	T17_SETPOINT	SETPOINT_CSP3	NO
CSP4	T17_SETPOINT	SETPOINT_CSP4	NO
CTRL_MOD	T10_OPTIONS2	OPTIONS2_CTRL_MODE	NO
CTRL_PNT	T11_A_UNIT	A_UNIT_CTRL_PNT	YES
CTRLPNT2	T11_A_UNIT	A_UNIT_CTRL_PNT2	YES
CTRLTYPE	T10_OPTIONS2	OPTIONS2_CTRLTYPE	NO
DEG	T10_RESTCON	RESETCON_420_DEG	NO

APPENDIX B — CCN TABLES (cont)

CCN Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
DELAY	T10_OPTIONS2	OPTIONS2_DELAY	NO
DEM_LIM	T11_A_UNIT	A_UNIT_DEM_LIM	YES
DGT_A	T11_RFGTEMP	AIRTEMP_DGT_A	NO
DGT_B	T11_RFGTEMP	AIRTEMP_DGT_B	NO
DGT_OVRA	T11_CIRA	DGT_OVR_COUNT_A	NO
DGT_OVRB	T11_CIRB	DGT_OVR_COUNT_B	NO
DGTA	T11_CIRCA_AN	AIRTEMP_DGT_A	NO
DGTB	T11_CIRCB_AN	AIRTEMP_DGT_B	NO
DIG_LOAD	T11_CIRA	DIGITAL_LOAD	NO
DIG_XTND	T10_UNIT	UNIT_DIG_XTND	NO
DIGCMPDT	T12_RUNTEST	CIRCA_AN_DIGCMPDT	NO
DISCNCT	T11_CURCONF	UNIT_DISCONNECT	NO
DLSWSP1	T10_RESTCON	RESETCON_DLSWSP1	NO
DLSWSP2	T10_RESTCON	RESETCON_DLSWSP2	NO
DMD_CTRL	T10_RESTCON	RESETCON_DMD_CTRL	NO
DMD_SW1	T11_OPTIONS	Demand Limit Switch 1	NO
DMD_SW2	T11_OPTIONS	Demand Limit Switch 2	NO
DMDHCON	T17_SETPOINT	SETPOINT_DMDHCON	NO
DMDLCOFF	T17_SETPOINT	SETPOINT_DMDLCOFF	NO
DMDLCON	T17_SETPOINT	SETPOINT_DMDLCON	NO
DMT20MA	T10_RESTCON	RESETCON_DMT20MA	NO
DP_A	T11_CIRCA_AN	CIRCA_AN_DP_A	NO
DP_A	T12_RUNTEST	CIRCA_AN_DP_A	NO
DP_B	T11_CIRCB_AN	CIRCB_AN_DP_B	NO
DP_B	T12_RUNTEST	CIRCB_AN_DP_B	NO
DPA	T11_RFGPRESS	CIRCA_AN_DP_A	NO
DPB	T11_RFGPRESS	CIRCB_AN_DP_B	NO
DT_THRSH	T11_A_UNIT	dt_threshold	YES
EMSTOP	T11_A_UNIT	A_UNIT_EMSTOP	YES
ENABLEA1	T12_SERVICE1	SERVICE_ENABLEA1	YES
ENABLEA2	T12_SERVICE1	SERVICE_ENABLEA2	YES
ENABLEA3	T12_SERVICE1	SERVICE_ENABLEA3	YES
ENABLEB1	T12_SERVICE1	SERVICE_ENABLEB1	YES
ENABLEB2	T12_SERVICE1	SERVICE_ENABLEB2	YES
ENABLEB3	T12_SERVICE1	SERVICE_ENABLEB3	YES
FAN_CON1	T12_RUNTEST	FAN_CONTACTOR1	NO
FAN_CON1	T11_GENOP	FAN_CONTACTOR1	NO
FAN_CON2	T12_RUNTEST	FAN_CONTACTOR2	NO
FAN_CON2	T11_GENOP	FAN_CONTACTOR2	NO
FAN_CON3	T12_RUNTEST	FAN_CONTACTOR3	NO
FAN_CON3	T11_GENOP	FAN_CONTACTOR3	NO
FAN_CON4	T12_RUNTEST	FAN_CONTACTOR4	NO
FAN_CON4	T11_GENOP	FAN_CONTACTOR4	NO
FAN_CON5	T12_RUNTEST	FAN_CONTACTOR5	NO
FAN_CON5	T11_GENOP	FAN_CONTACTOR5	NO
FAN_CON6	T12_RUNTEST	FAN_CONTACTOR6	NO
FAN_CON6	T11_GENOP	FAN_CONTACTOR6	NO
FAN_TYPE	T10_UNIT	UNIT_FAN_TYPE	NO
FanSpeed	T12_VFD_TEST	HEADCTRL_fan	NO
GEN_OCC	T11_A_UNIT	GENUNIT_OCCUPIED	NO
GRILLE	T11_CURCONF	UNIT_GRILLE	NO
GRP_ID	T11_SYS_INFO	CSM_group_id	NO
HGBP_OP	T12_RUNTEST	DISCOUT_HGBP	NO
HGBP_OP	T11_GENOP	DISCOUT_HGBP	NO
HGBP_OP	T11_CIRA	DISCOUT_HGBP	NO
HGBP_V	T10_OPTIONS1	HGBP_Valve	NO
Hi_DGTA	T12_CURRMODS	CURRMODS_MODE_Hi_DGTA	NO
Hi_DGTB	T12_CURRMODS	CURRMODS_MODE_Hi_DGTB	NO
Hi_OVRA	T12_CURRMODS	HI_PRESSURE_OVERRIDE_A	NO
Hi_OVRB	T12_CURRMODS	HI_PRESSURE_OVERRIDE_B	NO
HP_SW_A	T11_CIRA	DISCIN_HP_SW	NO
HP_SW_B	T11_CIRB	HIGH_PRESS_SWB	NO
IDFA_FS	T11_INPUTS	TSTAT_IN_IDFA_FS	NO
IDFB_FS	T11_INPUTS	TSTAT_IN_IDFB_FS	NO
IN_A1	T12_TESTMODE	S_A1_RLY	NO
IN_A2	T12_TESTMODE	S_A2_RLY	NO
IN_A3	T12_TESTMODE	S_A3_RLY	NO

APPENDIX B — CCN TABLES (cont)

CCN Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
IN_ALM	T12_TESTMODE	S_ALM	NO
IN_AULTM	T12_TESTMODE	S_A1ULTM	NO
IN_B1	T12_TESTMODE	S_B1_RLY	NO
IN_B2	T12_TESTMODE	S_B2_RLY	NO
IN_B3	T12_TESTMODE	S_B3_RLY	NO
IN_FAN1	T12_TESTMODE	S_FAN_1	NO
IN_FAN2	T12_TESTMODE	S_FAN_2	NO
IN_FAN3	T12_TESTMODE	S_FAN_3	NO
IN_FAN4	T12_TESTMODE	S_FAN_4	NO
IN_FAN5	T12_TESTMODE	S_FAN_5	NO
IN_FAN6	T12_TESTMODE	S_FAN_6	NO
IN_HGBP	T12_TESTMODE	QUICKTEST_HGBP_VALVE	NO
IN_LLSVA	T12_TESTMODE	S_LLSV_A	NO
IN_LLSVB	T12_TESTMODE	S_LLSV_B	NO
IN_LSVA2	T12_TESTMODE	S_LLSVA2	NO
IN_LSVB2	T12_TESTMODE	S_LLSVB2	NO
IN_VFAN	T12_TESTMODE	QCK_TEST_Q_VFAN	NO
IN_VHPA	T12_TESTMODE	S_VHPA	NO
IN_VHPB	T12_TESTMODE	S_VHPB	NO
INTERFCE	T11_CURCONF	UNIT_INTERFACE	NO
IOT_VER	T11_SYS_INFO	PLTSP_IOT_version	NO
Kd_Gain	T12_VFD_TEST	test_PID_Kd_gain	NO
Ki_Gain	T12_VFD_TEST	test_PID_Ki_gain	NO
Kp_Gain	T12_VFD_TEST	test_PID_Kp_gain	NO
Lead_Cir	T10_OPTIONS2	LEAD_TYP	NO
LLSV_A	T11_LLSV_STS	LLSV_A	NO
LLSV_A	T11_CIRA	LLSV_A	NO
LLSV_A2	T11_LLSV_STS	LLSV_A2	NO
LLSV_A2	T11_CIRA	LLSV_A2	NO
LLSV_B	T11_LLSV_STS	LLSV_B	NO
LLSV_B	T11_CIRB	LLSV_B	NO
LLSV_B2	T11_LLSV_STS	LLSV_B2	NO
LLSV_B2	T11_CIRB	LLSV_B2	NO
LLSVACON	T11_LLSV_STS	LLSV_A_Control_State	NO
LLSVBCON	T11_LLSV_STS	LLSV_B_Control_State	NO
LMT_MA	T11_OPTIONS	4-20 mA Demand Limit Signal	NO
LONGLINE	T11_CURCONF	UNIT_LONG_LINE	NO
LOW_SCT	T12_FAN_TEST	Lowest_sct	NO
LOWOIL_A	T12_CURRMODS	MODE_LOW_OIL_A	NO
LOWOIL_B	T12_CURRMODS	MODE_LOW_OIL_B	NO
LOWSOUND	T11_CURCONF	UNIT_LOW_SOUND	NO
LWABIENT	T11_CURCONF	UNIT_LOWAMBIENT	NO
MACH_CYC	T12_STRTHOUR	CY_MACH	NO
MACH_HRS	T12_STRTHOUR	HR_MACH	NO
MAXULTME	T10_UNIT	UNIT_MAXULTME	NO
MIN_LEFT	T11_A_UNIT	A_UNIT_MIN_LEFT	NO
MODE	T11_A_UNIT	A_UNIT_MODE	NO
MODE_10	T12_CURRMODS	CURRMODS_MODE_10	NO
MODE_14	T12_CURRMODS	CURRMODS_MODE_14	NO
MODE_15	T12_CURRMODS	CURRMODS_MODE_15	NO
MODE_17	T12_CURRMODS	CURRMODS_MODE_17	NO
MODE_18	T12_CURRMODS	CURRMODS_MODE_18	NO
MODE_21	T12_CURRMODS	CURRMODS_MODE_21	NO
MODE_22	T12_CURRMODS	CURRMODS_MODE_22	NO
MODE_23	T12_CURRMODS	CURRMODS_MODE_23	NO
MODE_25	T12_CURRMODS	CURRMODS_MODE_25	NO
MODE_5	T12_CURRMODS	CURRMODS_MODE_5	NO
MODE_6	T12_CURRMODS	CURRMODS_MODE_6	NO
MODE_9	T12_CURRMODS	CURRMODS_MODE_9	NO
MODE_B_5	T12_CURRMODS	CURRMODS_MODE_B_5	NO
MODE_B_9	T12_CURRMODS	CURRMODS_MODE_B_9	NO
MODE_B17	T12_CURRMODS	CURRMODS_MODE_B_17	NO
MODE_B18	T12_CURRMODS	CURRMODS_MODE_B_18	NO
MODE_B23	T12_CURRMODS	CURRMODS_MODE_B_23	NO
MODE_DFL	T12_CURRMODS	CURRMODS_MODE_DFL	NO
MODE_TG	T12_CURRMODS	CURRMODS_MODE_TG	NO
MODEL	T11_CURCONF	UNIT_MODEL	NO

APPENDIX B — CCN TABLES (cont)

CCN Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
NUMCKTS	T10_UNIT	UNIT_NUMCKTS	NO
NUMCKTS	T11_CURCONF	UNIT_NUMCKTS	NO
OAT	T12_FAN_TEST	OPTIONS_OAT	NO
OAT	T11_AIRTEMP	OPTIONS_OAT	YES
OAT	T11_OPTIONS	Outside Air Temperature	NO
OATLMODE	T12_CURRMODS	CURRMODS_OATLMODE	NO
OATLOCK	T17_SETPOINT	SETPOINT_OATLOCK	NO
OIL_SENS	T10_OPTIONS1	OIL_SENSW_DISABLE	NO
OLS_A1	T11_OIL_SENS	OLSA1	
OLS_A2	T11_OIL_SENS	OLSA2	
OLS_A3	T11_OIL_SENS	OLSA3	
OLS_B1	T11_OIL_SENS	OLSB1	
OLS_B2	T11_OIL_SENS	OLSB2	
OLS_B3	T11_OIL_SENS	OLSB3	
OLSAMGMT	T11_OIL_SENS	OLS_Management_CircuitA	NO
OLSBMGMT	T11_OIL_SENS	OLS_Management_CircuitB	NO
OS_BUILD	T11_SYS_INFO	PLTSP_CoreOs_buildinfo	NO
OS_VER	T11_SYS_INFO	PLTSP_CoreOs_ver	NO
OUT_MAPA	T12_CURRMODS	Outof_MapA_OnOff	NO
OUT_MAPB	T12_CURRMODS	Outof_MapB_OnOff	NO
OUT_OFST	T12_VFD_TEST	Outof_Map_tmr_offset	NO
PACKING	T11_CURCONF	UNIT_PACKAGING	NO
PID_SMZ	T11_A_UNIT	SMZ_POINT	NO
PREDELAY	T12_VFD_TEST	DELAY_TIME	NO
QCK_TST	T12_TESTMODE	QUICK_TST_ENABLE	NO
RAMP_ENA	T10_OPTIONS2	UNIT_RAMP_ENABLE	NO
Rat_tem	T12_RUNTEST	RAT	NO
RAT2	T11_AIRTEMP	RAT2	YES
RAT2	T11_A_UNIT	RAT2	YES
RATTYPE	T10_OPTIONS1	OPTIONS1_RATTYPE	NO
REM_DEG	T10_RESTCON	RESETCON_REM_DEG	NO
REM_FULL	T10_RESTCON	RESETCON_REM_FULL	NO
REM_NO	T10_RESTCON	RESETCON_REM_NO	NO
RETURN_T	T11_A_UNIT	A_UNIT_RETURN_T	YES
RETURNT	T11_AIRTEMP	A_UNIT_RETURN_T	YES
REVISION	T11_CURCONF	UNIT_REVISION	NO
REVR_VER	T12_SERVICE1	SERVICE_REVR_VER	YES
ROOT_VER	T11_SYS_INFO	PLTSP_ROOTFS_version	NO
RTN_DEG	T10_RESTCON	RESETCON_RTN_DEG	NO
RTN_FULL	T10_RESTCON	RESETCON_RTN_FULL	NO
RTN_NO	T10_RESTCON	RESETCON_RTN_NO	NO
Sat_tem	T12_RUNTEST	SAT	NO
SAT2	T11_AIRTEMP	SAT2	YES
SAT2	T11_A_UNIT	SAT2	YES
SATTYPE	T10_OPTIONS1	OPTIONS1_SATTYPE	NO
SCTA	T11_CIRCA_AN	CIRCA_AN_SCTA	NO
SCTA	T12_RUNTEST	CIRCA_AN_SCTA	NO
SCTA_AVG	T11_A_UNIT	SCTA_2_Min_Avg	NO
SCTB	T11_CIRCB_AN	CIRCB_AN_SCTB	NO
SCTB	T12_RUNTEST	CIRCB_AN_SCTB	NO
SCTB_AVG	T11_A_UNIT	SCTB_2_Min_Avg	NO
SDK_VER	T11_SYS_INFO	PLTSP_SDK_version	NO
SEQ_TYPE	T10_OPTIONS2	OPTIONS2_SEQ_TYPE	NO
SH_A	T11_CIRCA_AN	CIRCA_AN_SH_A	NO
SH_A	T12_RUNTEST	CIRCA_AN_SH_A	NO
SH_B	T11_CIRCB_AN	CIRCB_AN_SH_B	NO
SH_B	T12_RUNTEST	CIRCB_AN_SH_B	NO
SHED_DEL	T10_RESTCON	RESETCON_SHED_DEL	NO
SHED_TIM	T10_RESTCON	RESETCON_SHED_TIM	NO
SIZE	T10_UNIT	UNIT_SIZE	NO
SIZE_A1	T10_UNIT	UNIT_SIZE_A1	NO
SIZE_A1	T12_RUNTEST	UNIT_SIZE_A1	NO
SIZE_A2	T10_UNIT	UNIT_SIZE_A2	NO
SIZE_A2	T12_RUNTEST	UNIT_SIZE_A2	NO
SIZE_A3	T10_UNIT	UNIT_SIZE_A3	NO
SIZE_A3	T12_RUNTEST	UNIT_SIZE_A3	NO
SIZE_B1	T10_UNIT	UNIT_SIZE_B1	NO

APPENDIX B — CCN TABLES (cont)

CCN Points Table (cont)

CCN VARIABLE ALIAS NAME	SUPERVISOR CCN TABLE NAME	DATABASE POINT ALIAS NAME	CCN FORCE
SIZE_B1	T12_RUNTEST	UNIT_SIZE_B1	NO
SIZE_B2	T10_UNIT	UNIT_SIZE_B2	NO
SIZE_B2	T12_RUNTEST	UNIT_SIZE_B2	NO
SIZE_B3	T10_UNIT	UNIT_SIZE_B3	NO
SIZE_B3	T12_RUNTEST	UNIT_SIZE_B3	NO
SOFT_NB	T11_SYS_INFO	CTRLID_SOFT_NB	NO
SP	T11_A_UNIT	A_UNIT_SP	NO
SP_A	T11_CIRCA_AN	CIRCA_AN_SP_A	NO
SP_A	T12_RUNTEST	CIRCA_AN_SP_A	NO
SP_B	T11_CIRCB_AN	CIRCB_AN_SP_B	NO
SP_B	T12_RUNTEST	CIRCB_AN_SP_B	NO
SP2	T11_A_UNIT	A_UNIT_SP2	NO
SPA	T11_RFGPRESS	CIRCA_AN_SP_A	NO
space	T12_RUNTEST	SPACE_T	NO
Space_te	T12_RUNTEST	SPT	NO
SPB	T11_RFGPRESS	CIRCB_AN_SP_B	NO
SPSP_PO	T17_SETPOINT	SETPOINT_SPSP_PO	NO
SPT	T11_AIRTEMP	OPTIONS_SPT	YES
SPT	T11_OPTIONS	Space Temperature	NO
SPT_SP	T17_SETPOINT	SETPOINT_SPT_SP	NO
SPTMODE	T11_A_UNIT	A_UNIT_SPTMODE	NO
SPTO	T17_SETPOINT	SETPOINT_SPTO	NO
SPTOSENS	T10_OPTIONS1	SETPOINT_SPTOSENS	NO
SPTSENS	T10_OPTIONS1	SPTSENS	NO
SSTA	T11_CIRCA_AN	CIRCA_AN_SSTA	NO
SSTA	T12_RUNTEST	CIRCA_AN_SSTA	NO
SSTB	T11_CIRCB_AN	CIRCB_AN_SSTB	NO
SSTB	T12_RUNTEST	CIRCB_AN_SSTB	NO
STAGE	T11_A_UNIT	A_UNIT_STAGE	NO
STAGEDEL	T10_OPTIONS2	STAGE_DELAY	NO
STAT	T11_A_UNIT	A_UNIT_STAT	NO
STG_DLT	T11_A_UNIT	stage_delta	NO
SUCT_A	T11_RFGTEMP	AIRTEMP_SUCT_A	NO
SUCT_B	T11_RFGTEMP	AIRTEMP_SUCT_B	NO
SUM	T11_A_UNIT	SUM	NO
SUPPLY_T	T11_A_UNIT	A_UNIT_SUPPLY_T	YES
SUPPLYT	T11_AIRTEMP	A_UNIT_SUPPLY_T	YES
TCOM_EBL	T12_SERVICE1	SERVICE_TCOM_EBL	YES
UNITFREQ	T11_CURCONF	UNITFREQ	NO
UNITSIZE	T11_CURCONF	UNIT_SIZE	NO
VFANSPD	T12_FAN_TEST	OUTPUTS_VFAN	NO
VFANSPDB	T12_FAN_TEST	OUTPUTS_VFAN_B	NO
VFD_FAN	T12_RUNTEST	HEADCTRL_fan	NO
VFDSpdB	T12_FAN_TEST	VFAN_B_STS_rlhz	NO
VFDSpeed	T12_FAN_TEST	VFAN_A_STS_rlhz	NO
VHPA	T11_GENOP	VHPA_ACT	NO
VHPB	T11_GENOP	VHPB_ACT	NO
VOLTAGE	T11_CURCONF	UNITVOLT	NO
WSCT	T12_FAN_TEST	WSCT	NO
Y1	T11_INPUTS	TSTAT_IN_Y1	NO
Y2	T11_INPUTS	TSTAT_IN_Y2	NO
Y3	T11_INPUTS	TSTAT_IN_Y3	NO
Y4	T11_INPUTS	TSTAT_IN_Y4	NO
Z_GAIN	T10_OPTIONS2	UNIT_Z_GAIN	NO

APPENDIX C — BACNET OPTION (IP AND MS/TP)

Network Points List[a]

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COV INCREMENT	ACCESS	DESCRIPTION
A_UNIT_ALM	A_UNIT_ALM	MV	1	0	2	Type 4	0	RO	Alarm State
A_UNIT_CAP_T	A_UNIT_CAP_T	AV	3	0	100	Type 4	0	RO	Percent Total Capacity
A_UNIT_CHIL_S_S	A_UNIT_CHIL_S_S	BV	4	0	1	Type 4	0	RW	CCN Chiller
A_UNIT_COOL_MA	A_UNIT_COOL_MA	AV	6	0	22	Type 4	0	RO	4-20 mA Setpoint Signal
A_UNIT_CTRL_PNT	A_UNIT_CTRL_PNT	AV	5	–20	140	Type 2	0	RW	Control Point
A_UNIT_CTRL_PNT2	A_UNIT_CTRL_PNT2	AV	2923	–20	140	Type 2	0	RW	Control Point AHU2
A_UNIT_DEM_LIM	A_UNIT_DEM_LIM	AV	2	0	100	Type 2	0	RW	Active Demand Limit
A_UNIT_EMSTOP	A_UNIT_EMSTOP	BV	6	0	1	Type 4	0	RW	Emergency Stop
A_UNIT_MIN_LEFT	A_UNIT_MIN_LEFT	AV	32	0	1	Type 4	0	RO	Minutes Left for Start
A_UNIT_MODE	A_UNIT_MODE	BV	5	0	9	Type 4	0	RO	Override Modes in Effect
A_UNIT_OCC	A_UNIT_OCC	BV	2008	0	1	Type 4	0	RO	Occupied
A_UNIT_RETURN_T	A_UNIT_RETURN_T	AV	1010	–45	320	Type 2	0	RW	Return Air Temperature
A_UNIT_SP	A_UNIT_SP	AV	4	0	100	Type 4	0	RO	Active Setpoint
A_UNIT_SP2	A_UNIT_SP2	AV	2922	0	100	Type 4	0	RO	Active Setpoint 2
A_UNIT_SPTMODE	A_UNIT_SPTMODE	AV	52	0	3	Type 4	0	RO	Space Temp Control Mode
A_UNIT_SPTMODE2	A_UNIT_SPTMODE2	AV	2921	0	3	Type 4	0	RW	Space Temp Control Mode AH2
A_UNIT_STAT	A_UNIT_STAT	AV	8	0	10	Type 4	0	RO	Control Mode
A_UNIT_SUPPLY_T	A_UNIT_SUPPLY_T	AV	1008	–45	320	Type 2	0	RW	Supply Air Temperature
AIRTEMP_DGT_A	AIRTEMP_DGT_A	AV	2928	–40	304	Type 4	0	RW	CirA Discharge Gas Temp
AIRTEMP_DGT_B	AIRTEMP_DGT_B	AV	2929	–40	304	Type 4	0	RW	Circ B Discharge Temp
CIRCA_AN_CAPA_A	CIRCA_AN_CAPA_A	AV	12	0	100	Type 4	0	RO	Percent Available Cap.
CIRCA_AN_CAPA_T	CIRCA_AN_CAPA_T	AV	11	0	100	Type 4	0	RO	Percent Total Capacity
CIRCA_AN_DIGCMPDT	CIRCA_AN_DIGCMPDT	AV	7	–40	356	Type 4	0	RO	Discharge Gas Temp
CIRCA_AN_DP_A	CIRCA_AN_DP_A	AV	13	0	725	Type 4	0	RO	Circ A Disc Pressure
CIRCA_AN_SCTA	CIRCA_AN_SCTA	AV	40	–47.2	158	Type 4	0	RO	Saturated Condensing Tmp
CIRCA_AN_SH_A	CIRCA_AN_SH_A	AV	44	–100	200	Type 4	0	RO	Suction Superheat Temp
CIRCA_AN_SP_A	CIRCA_AN_SP_A	AV	14	0	725	Type 4	0	RO	Circ A Suction Pressure
CIRCA_AN_SSTA	CIRCA_AN_SSTA	AV	17	–47.2	158	Type 4	0	RO	Saturated Suction Temp
CIRCB_AN_CAPB_A	CIRCB_AN_CAPB_A	AV	22	0	100	Type 4	0	RO	Percent Available Cap.
CIRCB_AN_CAPB_T	CIRCB_AN_CAPB_T	AV	21	0	100	Type 4	0	RO	Percent Total Capacity
CIRCB_AN_DP_B	CIRCB_AN_DP_B	AV	23	0	725	Type 4	0	RO	Circ B Disc Pressure
CIRCB_AN_SCTB	CIRCB_AN_SCTB	AV	39	–47.2	158	Type 4	0	RO	Saturated Condensing Tmp
CIRCB_AN_SH_B	CIRCB_AN_SH_B	AV	45	–100	200	Type 4	0	RO	Suction Superheat Temp
CIRCB_AN_SP_B	CIRCB_AN_SP_B	AV	24	0	725	Type 4	0	RO	Circ B Suction Pressure
CIRCB_AN_SSTB	CIRCB_AN_SSTB	AV	26	–47.2	158	Type 4	0	RO	Saturated Suction Temp
CURRMODS_MODE_10	CURRMODS_MODE_10	BV	38	0	1	Type 4	0	RO	Minimum OFF time active
CURRMODS_MODE_14	CURRMODS_MODE_14	BV	40	0	1	Type 4	0	RO	Temperature Reset
CURRMODS_MODE_15	CURRMODS_MODE_15	BV	41	0	1	Type 4	0	RO	Demand Limited
CURRMODS_MODE_17	CURRMODS_MODE_17	BV	43	0	1	Type 4	0	RO	Low Temperature Cooling
CURRMODS_MODE_18	CURRMODS_MODE_18	BV	44	0	1	Type 4	0	RO	High Temperature Cooling
CURRMODS_MODE_21	CURRMODS_MODE_21	BV	47	0	1	Type 4	0	RO	High SCT Circuit A
CURRMODS_MODE_22	CURRMODS_MODE_22	BV	48	0	1	Type 4	0	RO	High SCT Circuit B
CURRMODS_MODE_23	CURRMODS_MODE_23	BV	49	0	1	Type 4	0	RO	Minimum Comp On Time
CURRMODS_MODE_25	CURRMODS_MODE_25	BV	51	0	1	Type 4	0	RO	Low Sound Mode
CURRMODS_MODE_5	CURRMODS_MODE_5	BV	33	0	1	Type 4	0	RO	Ramp Load Limited
CURRMODS_MODE_6	CURRMODS_MODE_6	BV	34	0	1	Type 4	0	RO	Timed Override in effect
CURRMODS_MODE_9	CURRMODS_MODE_9	BV	37	0	1	Type 4	0	RO	Slow Change Override
CURRMODS_MODE_B_17	CURRMODS_MODE_B_17	BV	2918	0	1	Type 4	0	RO	Low Temp Cooling AHU2
CURRMODS_MODE_B_18	CURRMODS_MODE_B_18	BV	2919	0	1	Type 4	0	RO	High Temp Cooling AHU2
CURRMODS_MODE_B_23	CURRMODS_MODE_B_23	BV	2920	0	1	Type 4	0	RO	Min Comp On Time AHU2
CURRMODS_MODE_B_5	CURRMODS_MODE_B_5	BV	2916	0	1	Type 4	0	RO	Ramp Load Ltd AHU2
CURRMODS_MODE_B_9	CURRMODS_MODE_B_9	BV	2917	0	1	Type 4	0	RO	Slow Chng Override AHU2
CURRMODS_MODE_TG	CURRMODS_MODE_TG	BV	67	0	1	Type 4	0	RO	Time Guard Active
CY_A1	CY_A1	AV	68	0	999999	Type 4	0	RO	Compressor A1 Starts
CY_A2	CY_A2	AV	69	0	999999	Type 4	0	RO	Compressor A2 Starts
CY_A3	CY_A3	AV	70	0	999999	Type 4	0	RO	Compressor A3 Starts
CY_B1	CY_B1	AV	72	0	999999	Type 4	0	RO	Compressor B1 Starts
CY_B2	CY_B2	AV	73	0	999999	Type 4	0	RO	Compressor B2 Starts
CY_B3	CY_B3	AV	74	0	999999	Type 4	0	RO	Compressor B3 Starts
CY_CIRA	CY_CIRA	AV	67	0	999999	Type 4	0	RO	Circuit A Starts
CY_CIRB	CY_CIRB	AV	71	0	999999	Type 4	0	RO	Circuit B Starts
CY_MACH	CY_MACH	AV	58	0	1000000	Type 4	0	RO	Machine Starts
DIGITAL_LOAD	DIGITAL_LOAD	AV	34	0	100	Type 4	0	RO	Comp A1 Load Percent
FAN_CONTACTOR1	FAN_CONTACTOR1	BV	60	0	1	Type 4	0	RO	Fan Contactor 1
FAN_CONTACTOR2	FAN_CONTACTOR2	BV	61	0	1	Type 4	0	RO	Fan Contactor 2
FAN_CONTACTOR3	FAN_CONTACTOR3	BV	62	0	1	Type 4	0	RO	Fan Contactor 3

APPENDIX C — BACNET OPTION (IP AND MS/TP) (cont)

Network Points List[a] (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COV INCREMENT	ACCESS	DESCRIPTION
FAN_CONTACTOR4	FAN_CONTACTOR4	BV	63	0	1	Type 4	0	RO	Fan Contactor 4
FAN_CONTACTOR5	FAN_CONTACTOR5	BV	64	0	1	Type 4	0	RO	Fan Contactor 5
FanStageA	FanStageA	AV	35	0	0	Type 4	0	RO	FanStageA
FanStageB	FanStageB	AV	15	0	0	Type 4	0	RO	FanStageB
GENUNIT_BAC_OCC	GENUNIT_BAC_OCC	BV	2400	0	1	Type 4	0	RO	BACnet Occupied
GENUNIT_OCCUPIED	GENUNIT_OCCUPIED	BV	2401	0	1	Type 4	0	RO	Occupied
HGBP_Valve	HGBP_Valve	BV	79	0	1	Type 4	0	RO	HGBP Valve Select
HR_A1	HR_A1	AV	60	0	999999	Type 4	0	RO	Compressor A1 Run Hours
HR_A2	HR_A2	AV	61	0	999999	Type 4	0	RO	Compressor A2 Run Hours
HR_A3	HR_A3	AV	62	0	999999	Type 4	0	RO	Compressor A3 Run Hours
HR_B1	HR_B1	AV	64	0	999999	Type 4	0	RO	Compressor B1 Run Hours
HR_B2	HR_B2	AV	65	0	999999	Type 4	0	RO	Compressor B2 Run Hours
HR_B3	HR_B3	AV	66	0	999999	Type 4	0	RO	Compressor B3 Run Hours
HR_CIRA	HR_CIRA	AV	59	0	999999	Type 4	0	RO	Circuit A Run Hours
HR_CIRB	HR_CIRB	AV	63	0	999999	Type 4	0	RO	Circuit B Run Hours
HR_MACH	HR_MACH	AV	57	0	999999	Type 4	0	RO	Machine Operating Hours
K_A1_FBK	K_A1_FBK	BV	16	0	1	Type 4	0	RO	Compressor A1 Feedback
K_A1_RLY	K_A1_RLY	BV	13	0	1	Type 4	0	RO	Compressor A1 Relay
K_A2_FBK	K_A2_FBK	BV	17	0	1	Type 4	0	RO	Compressor A2 Feedback
K_A2_RLY	K_A2_RLY	BV	14	0	1	Type 4	0	RO	Compressor A2 Relay
K_A3_FBK	K_A3_FBK	BV	18	0	1	Type 4	0	RO	Compressor A3 Feedback
K_A3_RLY	K_A3_RLY	BV	15	0	1	Type 4	0	RO	Compressor A3 Relay
K_B1_FBK	K_B1_FBK	BV	22	0	1	Type 4	0	RO	Compressor B1 Feedback
K_B1_RLY	K_B1_RLY	BV	19	0	1	Type 4	0	RO	Compressor B1 Relay
K_B2_FBK	K_B2_FBK	BV	23	0	1	Type 4	0	RO	Compressor B2 Feedback
K_B2_RLY	K_B2_RLY	BV	20	0	1	Type 4	0	RO	Compressor B2 Relay
K_B3_FBK	K_B3_FBK	BV	24	0	1	Type 4	0	RO	Compressor B3 Feedback
K_B3_RLY	K_B3_RLY	BV	21	0	1	Type 4	0	RO	Compressor B3 Relay
LEAD_TYP	LEAD_TYP	AV	43	1	3	Type 4	0	RW	Lead/Lag Circuit Select
LLSV_A	LLSV_A	BV	8	0	1	Type 4	0	RO	Liquid Line Solenoid A
LLSV_A2	LLSV_A2	BV	2402	0	1	Type 4	0	RO	Liquid Line Solenoid A2
LLSV_B	LLSV_B	BV	9	0	1	Type 4	0	RO	Liquid Line Solenoid B
LLSV_B2	LLSV_B2	BV	2403	0	1	Type 4	0	RO	Liquid Line Solenoid B2
OPTIONS_DL_STAT	OPTIONS_DL_STAT	AV	37	0	2	Type 4	0	RO	CCN Loadshed Signal
OPTIONS_DMD_SW1	OPTIONS_DMD_SW1	BV	25	0	1	Type 4	0	RO	Demand Limit Switch 1
OPTIONS_DMD_SW2	OPTIONS_DMD_SW2	BV	26	0	1	Type 4	0	RO	Demand Limit Switch 2
OPTIONS_LMT_MA	OPTIONS_LMT_MA	AV	36	0	22	Type 4	0	RO	4-20 mA Demand Signal
OPTIONS_OAT	OPTIONS_OAT	AV	1003	–45	320	Type 2	0	RW	Outside Air Temperature
OPTIONS_RST_MA	OPTIONS_RST_MA	AV	33	0	22	Type 4	0	RO	4-20 ma Reset Signal
OPTIONS_SPT	OPTIONS_SPT	AV	2007	–45	320	Type 2	0	RW	SpaceTemperature
OPTIONS2_CTRL_MODE	OPTIONS2_CTRL_MODE	MV	5	0	3	Type 4	0	RO	Control Method
OPTIONS2_CTRLTYPE	OPTIONS2_CTRLTYPE	MV	3	1	9	Type 4	0	RO	Machine Control Type
OPTIONS2_DELAY	OPTIONS2_DELAY	AV	42	0	15	Type 4	0	RW	Minutes Off Time
OPTIONS2_SEQ_TYPE	OPTIONS2_SEQ_TYPE	AV	77	1	2	Type 4	0	RW	Loading Sequence Select
RAT2	RAT2	AV	2925	–45	320	Type 2	0	RO	Return Air Temp AHU2
RESETCON_CRST_TYP	RESETCON_CRST_TYP	MV	7	0	4	Type 4	0	RO	Cooling Reset Type
RESETCON_DMD_CTRL	RESETCON_DMD_CTRL	MV	8	0	3	Type 4	0	RO	Demand Limit Select
SAT2	SAT2	AV	2924	–45	320	Type 2	0	RO	Supply Air Temp AHU2
SETPOINT_CSP1	SETPOINT_CSP1	AV	53	35	80	Type 4	0	RW	Cooling setpoint 1
SETPOINT_CSP2	SETPOINT_CSP2	AV	54	35	80	Type 4	0	RW	Cooling setpoint 2
SETPOINT_CSP3	SETPOINT_CSP3	AV	2926	35	80	Type 4	0	RW	Cooling setpoint 3
SETPOINT_CSP4	SETPOINT_CSP4	AV	2927	35	80	Type 4	0	RW	Cooling setpoint 4
SETPOINT_DMDHCON	SETPOINT_DMDHCON	AV	25	0.5	20	Type 4	0	RW	HI Cool On Setpoint
SETPOINT_DMDLCOFF	SETPOINT_DMDLCOFF	AV	30	0.5	2	Type 4	0	RW	Lo Cool Off Setpoint
SETPOINT_DMDLCON	SETPOINT_DMDLCON	AV	31	–1	2	Type 4	0	RW	Lo Cool On Setpoint
SETPOINT_SPSP_PO	SETPOINT_SPSP_PO	AV	76	–10	100	Type 4	0	RW	Space T SP Plus Offset
SETPOINT_SPT_SP	SETPOINT_SPT_SP	AV	51	65	80	Type 4	0	RW	Space T Cool Setpoint
SETPOINT_SPTO	SETPOINT_SPTO	AV	55	–10	10	Type 4	0	RW	Space Temp Offset
SETPOINT_SPTOSENS	SETPOINT_SPTOSENS	BV	10	0	1	Type 4	0	RW	Space Temp Offset Enable
SPTSENS	SPTSENS	BV	11	0	1	Type 4	0	RO	Space Temp Sensor
STAGE	STAGE	AV	9	0	99	Type 4	0	RO	Requested Stage
TSTAT_IN_IDFA_FS	TSTAT_IN_IDFA_FS	BV	2	0	1	Type 4	0	RO	Indoor Fan Status CIRA
TSTAT_IN_IDFB_FS	TSTAT_IN_IDFB_FS	BV	3	0	1	Type 4	0	RO	Indoor Fan Status CIRB
TSTAT_IN_Y1	TSTAT_IN_Y1	BV	27	0	1	Type 4	0	RO	Y1 Thermostat Input
TSTAT_IN_Y2	TSTAT_IN_Y2	BV	28	0	1	Type 4	0	RO	Y2 Thermostat Input
TSTAT_IN_Y3	TSTAT_IN_Y3	BV	29	0	1	Type 4	0	RO	Y3 Thermostat Input

APPENDIX C — BACNET OPTION (IP AND MS/TP) (cont)

Network Points List[a] (cont)

OBJECT NAME	DATABASE ALIAS NAME	TYPE	INSTANCE	LOW LIMIT	HIGH LIMIT	OPTION	COV INCREMENT	ACCESS	DESCRIPTION
TSTAT_IN_Y4	TSTAT_IN_Y4	BV	30	0	1	Type 4	0	RO	Y4 Thermostat Input
UNIT_COOLING_RAMP	UNIT_COOLING_RAMP	AV	56	0.2	2	Type 4	0	RW	Cooling Ramp Loading
VHPA_ACT	VHPA_ACT	AV	19	0	100	Type 4	0	RO	Var Head Press % Cir A
VHPB_ACT	VHPB_ACT	AV	83	0	100	Type 4	0	RO	Var Head Press % Cir B

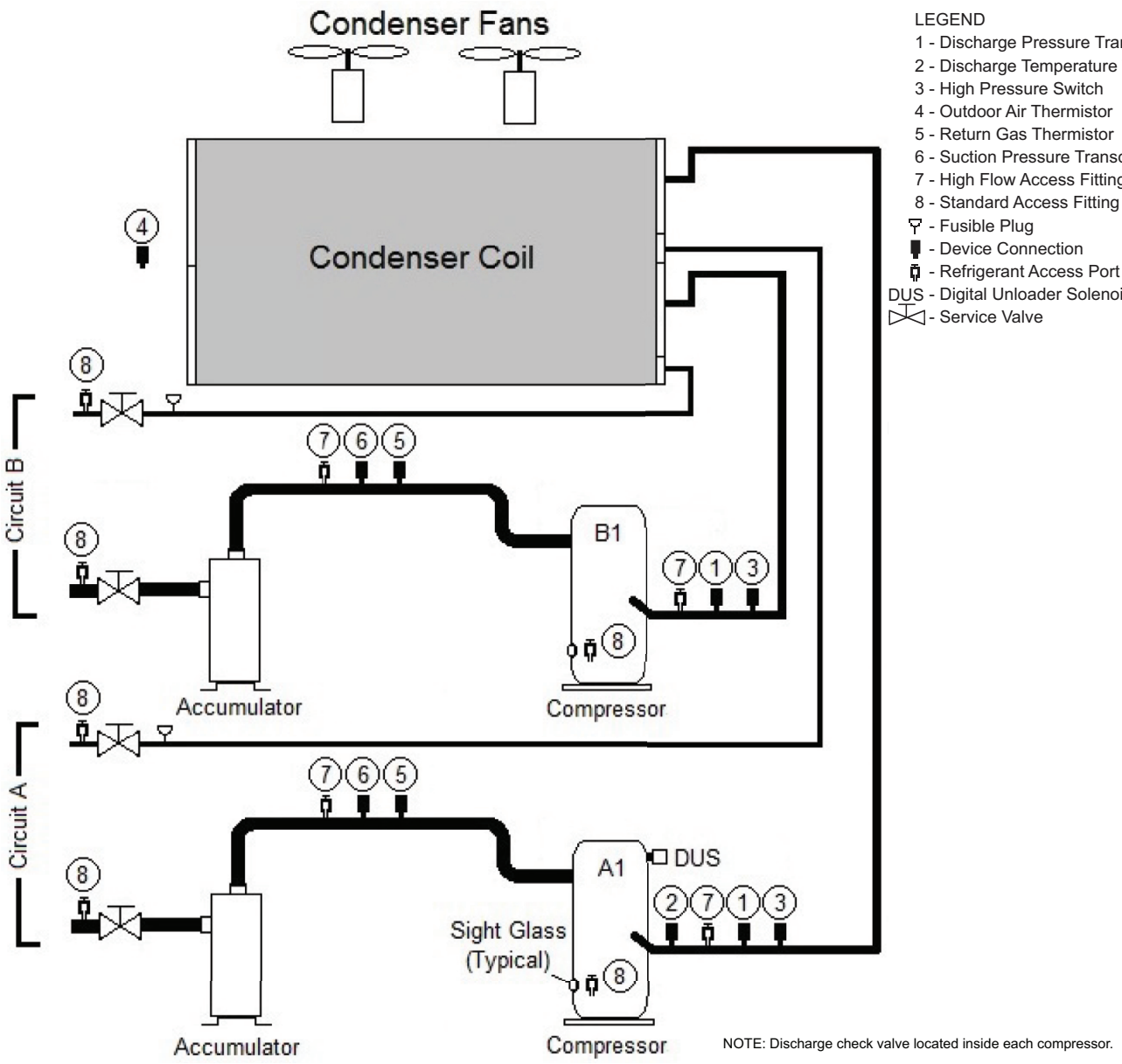
NOTE(S):

a. To enable BACnet MSTP, follow the path ***Configuration Menu → HMI Configuration → BACnet Configuration → BACnet Data Link Layer → MS/TP.***

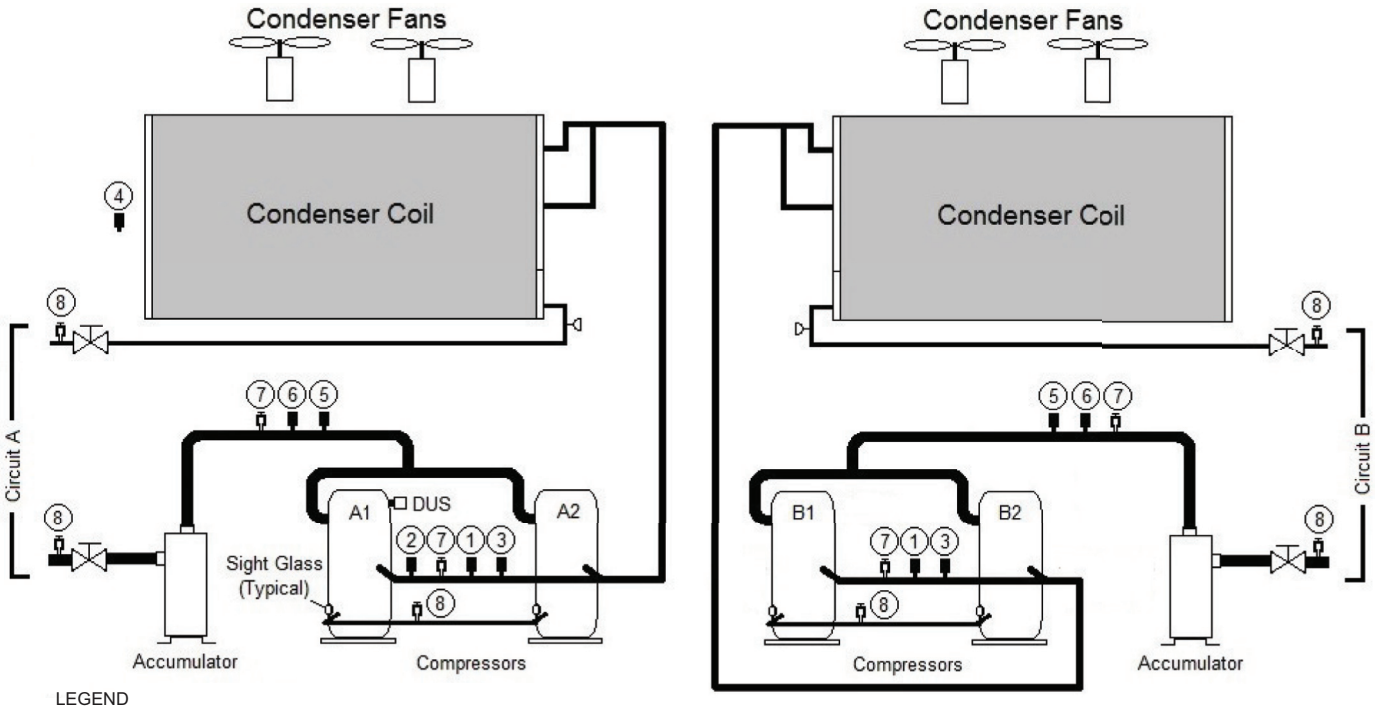
LEGEND

AV — Analog Value
BV — Binary Value
MV — Multistate Value
RO — Read Only
RW — Read/Write

APPENDIX D — PIPING AND INSTRUMENTATION DIAGRAMS



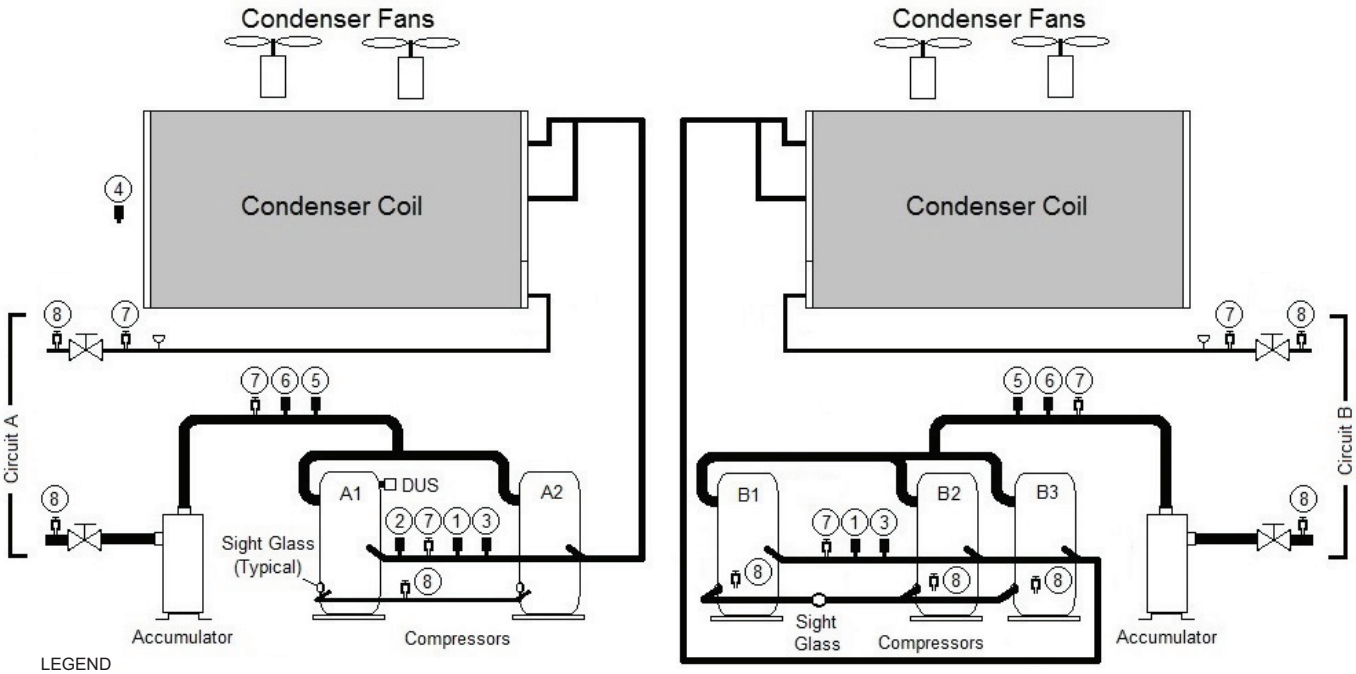
38RCD025-030 Piping and Instrumentation



LEGEND
1 - Discharge Pressure Transducer
2 - Discharge Temperature Thermistor
3 - High Pressure Switch
4 - Outdoor Air Thermistor
5 - Return Gas Thermistor
6 - Suction Pressure Transducer
7 - High Flow Access Fitting
8 - Standard Access Fitting
- Fusible Plug
- Device Connection
- Refrigerant Access Port
DUS - Digital Unloader Solenoid
- Service Valve

NOTE: Discharge check valve located inside each compressor.

38RCD040-060 Piping and Instrumentation

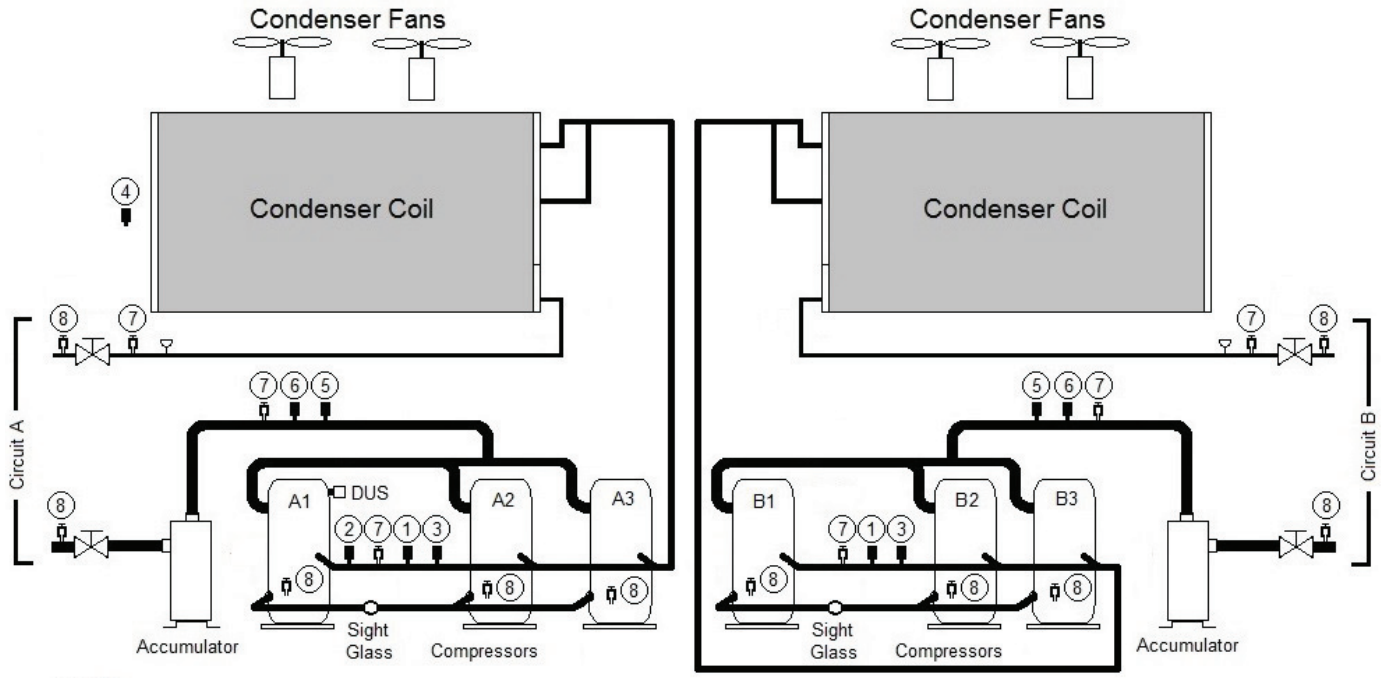


LEGEND
1 - Discharge Pressure Transducer
2 - Discharge Temperature Thermistor
3 - High Pressure Switch
4 - Outdoor Air Thermistor
5 - Return Gas Thermistor
6 - Suction Pressure Transducer
7 - High Flow Access Fitting
8 - Standard Access Fitting
- Fusible Plug
- Device Connection
- Refrigerant Access Port
DUS - Digital Unloader Solenoid
- Service Valve

NOTE: Discharge check valve located inside each compressor.

38RCD070,080 Piping and Instrumentation

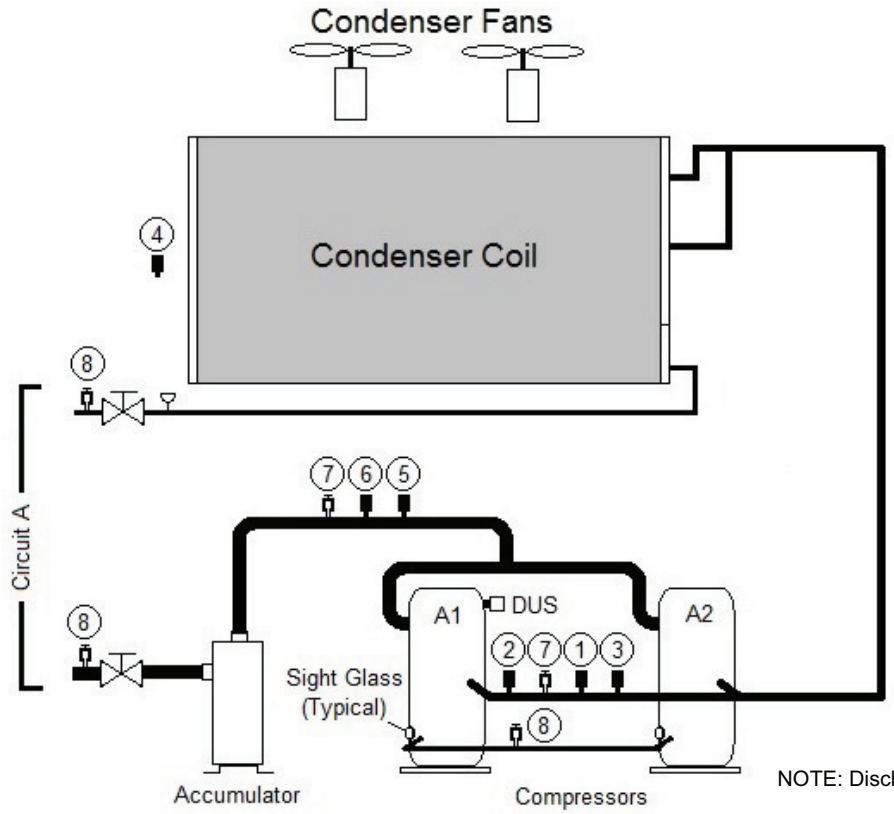
APPENDIX D — PIPING AND INSTRUMENTATION DIAGRAMS (cont)



NOTE: Discharge check valve located inside each compressor.

LEGEND
1 - Discharge Pressure Transducer
2 - Discharge Temperature Thermistor
3 - High Pressure Switch
4 - Outdoor Air Thermistor
5 - Return Gas Thermistor
6 - Suction Pressure Transducer
7 - High Flow Access Fitting
8 - Standard Access Fitting
▽ - Fusible Plug
▮ - Device Connection
⊽ - Refrigerant Access Port
DUS - Digital Unloader Solenoid
⋈ - Service Valve

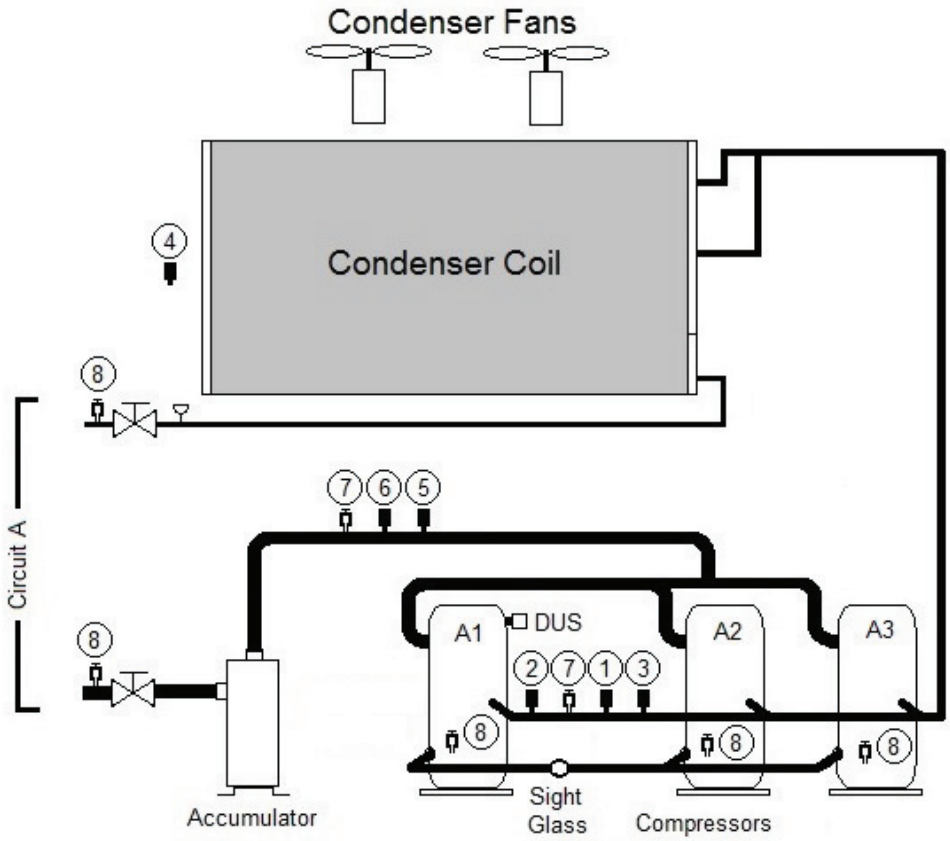
38RCD090-130 Piping and Instrumentation



LEGEND
1 - Discharge Pressure Transducer
2 - Discharge Temperature Thermistor
3 - High Pressure Switch
4 - Outdoor Air Thermistor
5 - Return Gas Thermistor
6 - Suction Pressure Transducer
7 - High Flow Access Fitting
8 - Standard Access Fitting
- Fusible Plug
- Device Connection
- Refrigerant Access Port
DUS - Digital Unloader Solenoid
- Service Valve

NOTE: Discharge check valve located inside each compressor.

38RCS025-030 Piping and Instrumentation



LEGEND
1 - Discharge Pressure Transducer
2 - Discharge Temperature Thermistor
3 - High Pressure Switch
4 - Outdoor Air Thermistor
5 - Return Gas Thermistor
6 - Suction Pressure Transducer
7 - High Flow Access Fitting
8 - Standard Access Fitting
- Fusible Plug
- Device Connection
- Refrigerant Access Port
DUS - Digital Unloader Solenoid
- Service Valve

NOTE: Discharge check valve located inside each compressor.

38RCS040-050 Piping and Instrumentation

APPENDIX E — MODBUS POINTS (IP AND RTU)

DATABASE ALIAS NAME	DESCRIPTION	MEDIA TYPE	ACCESS	OFFSET	DATABASE DATA FORMAT	DISPLAY MODE
A_UNIT_ALM	Alarm State	INPUT_REG_MEDIA	RW	8	CHAR	16bits INT
A_UNIT_CAP_T	Percent Total Capacity	INPUT_REG_MEDIA	RW	150	CHAR	16bits INT
A_UNIT_CHIL_S_S	CCN Chiller	HOLDING_REG_MEDIA	RW	2	UNSIGNED CHAR	16bits UINT
A_UNIT_COOL_MA	4-20 mA Setpoint Signal	INPUT_REG_MEDIA	RW	0	FLOAT	16bits FLOAT
A_UNIT_CTRL_PNT	Control Point	HOLDING_REG_MEDIA	RW	4	FLOAT	16bits FLOAT
A_UNIT_CTRL_PNT2	Control Point AHU2	HOLDING_REG_MEDIA	RW	40	FLOAT	16bits FLOAT
A_UNIT_DEM_LIM	Active Demand Limit	HOLDING_REG_MEDIA	RW	0	FLOAT	16bits FLOAT
A_UNIT_EMSTOP	Emergency Stop	HOLDING_REG_MEDIA	RW	12	CHAR	16bits INT
A_UNIT_MIN_LEFT	Minutes Left for Start	INPUT_REG_MEDIA	RW	140	CHAR	16bits INT
A_UNIT_MODE	Override Modes in Effect	INPUT_REG_MEDIA	RW	144	UNSIGNED CHAR	16bits UINT
A_UNIT_OCC	Occupied	INPUT_REG_MEDIA	RW	142	UNSIGNED CHAR	16bits UINT
A_UNIT_RETURN_T	Return Air Temperature	HOLDING_REG_MEDIA	RW	32	FLOAT	16bits FLOAT
A_UNIT_SP	Active Setpoint	INPUT_REG_MEDIA	RW	6	FLOAT	16bits FLOAT
A_UNIT_SP2	Active Setpoint 2	INPUT_REG_MEDIA	RW	218	FLOAT	16bits FLOAT
A_UNIT_SPTMODE	Space Temp Control Mode	INPUT_REG_MEDIA	RW	170	UNSIGNED CHAR	16bits UINT
A_UNIT_SPTMODE2	Space Temp Control Mode AH2	INPUT_REG_MEDIA	RW	216	UNSIGNED CHAR	16bits UINT
A_UNIT_STAT	Control Mode	INPUT_REG_MEDIA	RW	76	UNSIGNED CHAR	16bits UINT
A_UNIT_SUPPLY_T	Supply Air Temperature	HOLDING_REG_MEDIA	RW	38	FLOAT	16bits FLOAT
CIRCA_AN_CAPA_A	Percent Available Cap.	INPUT_REG_MEDIA	RW	146	UNSIGNED CHAR	16bits UINT
CIRCA_AN_CAPA_T	Percent Total Capacity	INPUT_REG_MEDIA	RW	152	UNSIGNED CHAR	16bits UINT
CIRCA_AN_DIGCMPDT	Discharge Gas Temp	INPUT_REG_MEDIA	RW	88	FLOAT	16bits FLOAT
CIRCA_AN_DP_A	Circ A Disc Pressure	INPUT_REG_MEDIA	RW	90	FLOAT	16bits FLOAT
CIRCA_AN_SCTA	Saturated Condensing Tmp	INPUT_REG_MEDIA	RW	160	FLOAT	16bits FLOAT
CIRCA_AN_SH_A	Suction Superheat Temp	INPUT_REG_MEDIA	RW	182	FLOAT	16bits FLOAT
CIRCA_AN_SP_A	Circ A Suction Pressure	INPUT_REG_MEDIA	RW	180	FLOAT	16bits FLOAT
CIRCA_AN_SSTA	Saturated Suction Temp	INPUT_REG_MEDIA	RW	164	FLOAT	16bits FLOAT
CIRCB_AN_CAPB_A	Percent Available Cap.	INPUT_REG_MEDIA	RW	148	UNSIGNED CHAR	16bits UINT
CIRCB_AN_CAPB_T	Percent Total Capacity	INPUT_REG_MEDIA	RW	154	UNSIGNED CHAR	16bits UINT
CIRCB_AN_DP_B	Circ B Disc Pressure	INPUT_REG_MEDIA	RW	92	FLOAT	16bits FLOAT
CIRCB_AN_SCTB	Saturated Condensing Tmp	INPUT_REG_MEDIA	RW	162	FLOAT	16bits FLOAT
CIRCB_AN_SH_B	Suction Superheat Temp	INPUT_REG_MEDIA	RW	186	FLOAT	16bits FLOAT
CIRCB_AN_SP_B	Circ B Suction Pressure	INPUT_REG_MEDIA	RW	184	FLOAT	16bits FLOAT
CIRCB_AN_SSTB	Saturated Suction Temp	INPUT_REG_MEDIA	RW	166	FLOAT	16bits FLOAT
CURRMODS_MODE_10	Minimum OFF time active	INPUT_REG_MEDIA	RW	138	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_14	Temperature Reset	INPUT_REG_MEDIA	RW	188	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_15	Demand Limited	INPUT_REG_MEDIA	RW	86	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_17	Low Temperature Cooling	INPUT_REG_MEDIA	RW	126	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_18	High Temperature Cooling	INPUT_REG_MEDIA	RW	114	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_21	High SCT Circuit A	INPUT_REG_MEDIA	RW	110	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_22	High SCT Circuit B	INPUT_REG_MEDIA	RW	112	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_23	Minimum Comp On Time	INPUT_REG_MEDIA	RW	134	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_25	Low Sound Mode	INPUT_REG_MEDIA	RW	124	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_5	Ramp Load Limited	INPUT_REG_MEDIA	RW	156	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_6	Timed Override in effect	INPUT_REG_MEDIA	RW	192	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_9	Slow Change Override	INPUT_REG_MEDIA	RW	168	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_B_17	Low Temp Cooling AHU2	INPUT_REG_MEDIA	RW	210	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_B_18	High Temp Cooling AHU2	INPUT_REG_MEDIA	RW	212	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_B_23	Min Comp On Time AHU2	INPUT_REG_MEDIA	RW	214	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_B_5	Ramp Load Ltd AHU2	INPUT_REG_MEDIA	RW	206	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_B_9	Slow Chng Override AHU2	INPUT_REG_MEDIA	RW	208	UNSIGNED CHAR	16bits UINT
CURRMODS_MODE_TG	Time Guard Active	INPUT_REG_MEDIA	RW	190	UNSIGNED CHAR	16bits UINT
CY_A1	Compressor A1 Starts	INPUT_REG_MEDIA	RW	32	FLOAT	16bits FLOAT
CY_A2	Compressor A2 Starts	INPUT_REG_MEDIA	RW	40	FLOAT	16bits FLOAT
CY_A3	Compressor A3 Starts	INPUT_REG_MEDIA	RW	48	FLOAT	16bits FLOAT
CY_B1	Compressor B1 Starts	INPUT_REG_MEDIA	RW	56	FLOAT	16bits FLOAT
CY_B2	Compressor B2 Starts	INPUT_REG_MEDIA	RW	64	FLOAT	16bits FLOAT
CY_B3	Compressor B3 Starts	INPUT_REG_MEDIA	RW	72	FLOAT	16bits FLOAT
CY_CIRA	Circuit A Starts	INPUT_REG_MEDIA	RW	16	FLOAT	16bits FLOAT
CY_CIRB	Circuit B Starts	INPUT_REG_MEDIA	RW	18	FLOAT	16bits FLOAT
CY_MACH	Machine Starts	INPUT_REG_MEDIA	RW	132	FLOAT	16bits FLOAT
DIGITAL_LOAD	Comp A1 Load Percent	INPUT_REG_MEDIA	RW	20	FLOAT	16bits FLOAT
FAN_CONTACTOR1	Fan Contactor 1	INPUT_REG_MEDIA	RW	94	UNSIGNED CHAR	16bits UINT
FAN_CONTACTOR2	Fan Contactor 2	INPUT_REG_MEDIA	RW	96	UNSIGNED CHAR	16bits UINT
FAN_CONTACTOR3	Fan Contactor 3	INPUT_REG_MEDIA	RW	98	UNSIGNED CHAR	16bits UINT
FAN_CONTACTOR4	Fan Contactor 4	INPUT_REG_MEDIA	RW	100	UNSIGNED CHAR	16bits UINT
FAN_CONTACTOR5	Fan Contactor 5	INPUT_REG_MEDIA	RW	102	UNSIGNED CHAR	16bits UINT
FanStageA	FanStageA	HOLDING_REG_MEDIA	RW	16	CHAR	16bits INT
FanStageB	FanStageB	HOLDING_REG_MEDIA	RW	18	CHAR	16bits INT
HGBP_Valve	HGBP Valve Select	INPUT_REG_MEDIA	RW	136	UNSIGNED CHAR	16bits UINT

APPENDIX E — MODBUS POINTS (IP AND RTU) (cont)

DATABASE ALIAS NAME	DESCRIPTION	MEDIA TYPE	ACCESS	OFFSET	DATABASE DATA FORMAT	DISPLAY MODE
HR_A1	Compressor A1 Run Hours	INPUT_REG_MEDIA	RW	30	FLOAT	16bits FLOAT
HR_A2	Compressor A2 Run Hours	INPUT_REG_MEDIA	RW	38	FLOAT	16bits FLOAT
HR_A3	Compressor A3 Run Hours	INPUT_REG_MEDIA	RW	46	FLOAT	16bits FLOAT
HR_B1	Compressor B1 Run Hours	INPUT_REG_MEDIA	RW	54	FLOAT	16bits FLOAT
HR_B2	Compressor B2 Run Hours	INPUT_REG_MEDIA	RW	62	FLOAT	16bits FLOAT
HR_B3	Compressor B3 Run Hours	INPUT_REG_MEDIA	RW	70	FLOAT	16bits FLOAT
HR_CIRA	Circuit A Run Hours	INPUT_REG_MEDIA	RW	12	FLOAT	16bits FLOAT
HR_CIRB	Circuit B Run Hours	INPUT_REG_MEDIA	RW	14	FLOAT	16bits FLOAT
HR_MACH	Machine Operating Hours	INPUT_REG_MEDIA	RW	130	FLOAT	16bits FLOAT
K_A1_FBK	Compressor A1 Feedback	INPUT_REG_MEDIA	RW	26	UNSIGNED CHAR	16bits UINT
K_A1_RLY	Compressor A1 Relay	INPUT_REG_MEDIA	RW	28	UNSIGNED CHAR	16bits UINT
K_A2_FBK	Compressor A2 Feedback	INPUT_REG_MEDIA	RW	34	UNSIGNED CHAR	16bits UINT
K_A2_RLY	Compressor A2 Relay	INPUT_REG_MEDIA	RW	36	UNSIGNED CHAR	16bits UINT
K_A3_FBK	Compressor A3 Feedback	INPUT_REG_MEDIA	RW	42	UNSIGNED CHAR	16bits UINT
K_A3_RLY	Compressor A3 Relay	INPUT_REG_MEDIA	RW	44	UNSIGNED CHAR	16bits UINT
K_B1_FBK	Compressor B1 Feedback	INPUT_REG_MEDIA	RW	50	UNSIGNED CHAR	16bits UINT
K_B1_RLY	Compressor B1 Relay	INPUT_REG_MEDIA	RW	52	UNSIGNED CHAR	16bits UINT
K_B2_FBK	Compressor B2 Feedback	INPUT_REG_MEDIA	RW	58	UNSIGNED CHAR	16bits UINT
K_B2_RLY	Compressor B2 Relay	INPUT_REG_MEDIA	RW	60	UNSIGNED CHAR	16bits UINT
K_B3_FBK	Compressor B3 Feedback	INPUT_REG_MEDIA	RW	66	UNSIGNED CHAR	16bits UINT
K_B3_RLY	Compressor B3 Relay	INPUT_REG_MEDIA	RW	68	UNSIGNED CHAR	16bits UINT
LEAD_TYP	Lead/Lag Circuit Select	HOLDING_REG_MEDIA	RW	20	UNSIGNED CHAR	16bits UINT
LLSV_A	Liquid Line Solenoid A	INPUT_REG_MEDIA	RW	120	UNSIGNED CHAR	16bits UINT
LLSV_B	Liquid Line Solenoid B	INPUT_REG_MEDIA	RW	122	UNSIGNED CHAR	16bits UINT
OPTIONS_DL_STAT	CCN Loadshed Signal	INPUT_REG_MEDIA	RW	10	UNSIGNED CHAR	16bits UINT
OPTIONS_DMD_SW1	Demand Limit Switch 1	INPUT_REG_MEDIA	RW	82	UNSIGNED CHAR	16bits UINT
OPTIONS_DMD_SW2	Demand Limit Switch 2	INPUT_REG_MEDIA	RW	84	UNSIGNED CHAR	16bits UINT
OPTIONS_LMT_MA	4-20 mA Demand Signal	INPUT_REG_MEDIA	RW	2	FLOAT	16bits FLOAT
OPTIONS_OAT	Outside Air Temperature	HOLDING_REG_MEDIA	RW	30	FLOAT	16bits FLOAT
OPTIONS_RST_MA	4-20 ma Reset Signal	INPUT_REG_MEDIA	RW	4	FLOAT	16bits FLOAT
OPTIONS_SPT	SpaceTemperature	INPUT_REG_MEDIA	RW	172	FLOAT	16bits FLOAT
OPTIONS2_CTRL_MODE	Control Method	INPUT_REG_MEDIA	RW	74	UNSIGNED CHAR	16bits UINT
OPTIONS2_CTRLTYPE	Machine Control Type	INPUT_REG_MEDIA	RW	128	UNSIGNED CHAR	16bits UINT
OPTIONS2_DELAY	Minutes Off Time	HOLDING_REG_MEDIA	RW	28	UNSIGNED CHAR	16bits UINT
OPTIONS2_SEQ_TYPE	Loading Sequence Select	HOLDING_REG_MEDIA	RW	26	UNSIGNED CHAR	16bits UINT
RAT2	Return Air Temp AHU2	INPUT_REG_MEDIA	RW	222	FLOAT	16bits FLOAT
RESETCON_CRST_TYP	Cooling Reset Type	INPUT_REG_MEDIA	RW	78	UNSIGNED CHAR	16bits UINT
RESETCON_DMD_CTRL	Demand Limit Select	INPUT_REG_MEDIA	RW	80	UNSIGNED CHAR	16bits UINT
SAT2	Supply Air Temp AHU2	INPUT_REG_MEDIA	RW	220	FLOAT	16bits FLOAT
SETPOINT_CSP1	Cooling setpoint 1	HOLDING_REG_MEDIA	RW	8	FLOAT	16bits FLOAT
SETPOINT_CSP2	Cooling setpoint 2	HOLDING_REG_MEDIA	RW	10	FLOAT	16bits FLOAT
SETPOINT_CSP3	Cooling setpoint 3	HOLDING_REG_MEDIA	RW	42	FLOAT	16bits FLOAT
SETPOINT_CSP4	Cooling setpoint 4	HOLDING_REG_MEDIA	RW	44	FLOAT	16bits FLOAT
SETPOINT_DMDHCON	HI Cool On Setpoint	INPUT_REG_MEDIA	RW	108	FLOAT	16bits FLOAT
SETPOINT_DMDLCOFF	Lo Cool Off Setpoint	HOLDING_REG_MEDIA	RW	22	FLOAT	16bits FLOAT
SETPOINT_DMDLCON	Lo Cool On Setpoint	HOLDING_REG_MEDIA	RW	24	FLOAT	16bits FLOAT
SETPOINT_SPSP_PO	Space T SP Plus Offset	HOLDING_REG_MEDIA	RW	36	FLOAT	16bits FLOAT
SETPOINT_SPT_SP	Space T Cool Setpoint	HOLDING_REG_MEDIA	RW	34	FLOAT	16bits FLOAT
SETPOINT_SPTO	Space Temp Offset	INPUT_REG_MEDIA	RW	174	FLOAT	16bits FLOAT
SETPOINT_SPTOSENS	Space Temp Offset Enable	INPUT_REG_MEDIA	RW	176	UNSIGNED CHAR	16bits UINT
SPTSENS	Space Temp Sensor	INPUT_REG_MEDIA	RW	178	UNSIGNED CHAR	16bits UINT
STAGE	Requested Stage	INPUT_REG_MEDIA	RW	158	UNSIGNED CHAR	16bits UINT
TSTAT_IN_IDFA_FS	Indoor Fan Status CIRA	INPUT_REG_MEDIA	RW	116	UNSIGNED CHAR	16bits UINT
TSTAT_IN_IDFB_FS	Indoor Fan Status CIRB	INPUT_REG_MEDIA	RW	118	UNSIGNED CHAR	16bits UINT
TSTAT_IN_Y1	Y1 Thermostat Input	INPUT_REG_MEDIA	RW	198	UNSIGNED CHAR	16bits UINT
TSTAT_IN_Y2	Y2 Thermostat Input	INPUT_REG_MEDIA	RW	200	UNSIGNED CHAR	16bits UINT
TSTAT_IN_Y3	Y3 Thermostat Input	INPUT_REG_MEDIA	RW	202	UNSIGNED CHAR	16bits UINT
TSTAT_IN_Y4	Y4 Thermostat Input	INPUT_REG_MEDIA	RW	204	UNSIGNED CHAR	16bits UINT
UNIT_COOLING_RAMP	Cooling Ramp Loading	HOLDING_REG_MEDIA	RW	6	FLOAT	16bits FLOAT
VHPA_ACT	Var Head Press % Cir A	INPUT_REG_MEDIA	RW	194	FLOAT	16bits FLOAT
VHPB_ACT	Var Head Press % Cir B	INPUT_REG_MEDIA	RW	196	FLOAT	16bits FLOAT

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.

NOTE: Machine Start/Stop is not authorized through a web connection for security reasons.

IMPORTANT: Use firewalls and VPN for a secure connection.

MINIMUM WEB BROWSER CONFIGURATION

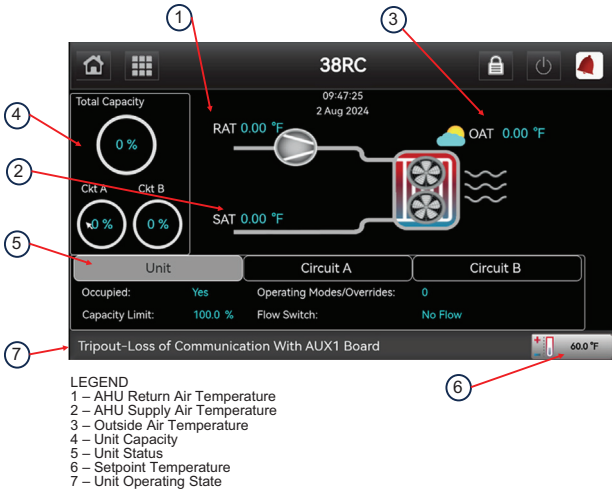
Use Google Chrome (Version 65.0 or Higher), Mozilla Firefox (Version 65.0 or Higher), or Internet Explorer (Version 11.0 or Higher). Google Chrome is the recommended browser.

Web Browser Access

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

To verify the unit IP address:

1. Begin by navigating to the System Menu on the upper right corner of the display. The System Menu can be accessed from any screen except for the individual login screens: User, Service, and Factory. See Fig. A.



LEGEND
1 – AHU Return Air Temperature
2 – AHU Supply Air Temperature
3 – Outside Air Temperature
4 – Unit Capacity
5 – Unit Status
6 – Setpoint Temperature
7 – Unit Operating State

Fig. A — Home Screen

2. From the home screen navigate to the Domain Name System icon (***Configuration Menu → HMI Configuration → Network Wizard → Network Wizard – eth0***). The screen shows the settings in Fig. B.

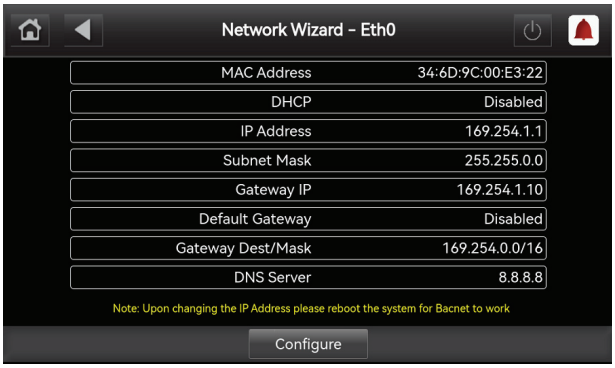


Fig. B — Network Screen

3. To change the settings, select the Configure tab at the bottom of the screen. This screen is shown in Fig. C. Select the entry to change; a text box will appear.
4. Enter the new value and select the checkmark.
5. Select the Apply icon at the bottom of the screen to initiate the setting.
6. Verify address under Ethernet 0 (J5). See Fig. C for an example.

   – Unit default address: 169.254.1.1

   – The unit IP address can be changed. See Network Settings below.

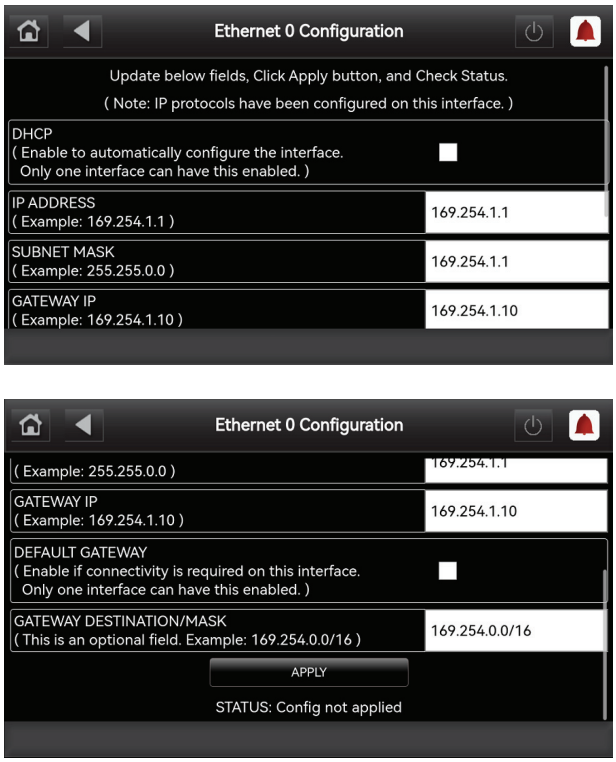


Fig. C — Ethernet 1 Configuration

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.

Network Settings

Request an IP address, subnet mask, and default gateway from the system administrator before connecting the unit to the local Ethernet network. The Network Screen (see Fig. C) allows the user to define network parameters, including TCP/IP address. Each parameter is editable and can be changed by selecting the outlined box and entering the desired address once the alpha-numeric keyboard displays. Click the save button after entering address.

Once this is complete, the setup of the Carrier Controller is complete. The computer or network that the Carrier Controller is being connected to may need to have some settings changed in order to communicate between them. See the next section.

ETHERNET/IP CONNECTION

If the unit is point-to-point to a PC and the unit is energized, it may be necessary to check the Ethernet connection and/or configure the PC network board. Refer to the following instructions to verify PC settings and connection to the Carrier Controller.

To verify the unit's IP address, perform the following steps:

1. From the computer connected to the controller, go to Local Area Connection Properties and select Internet Protocol (TCP/IP). See Fig. D.

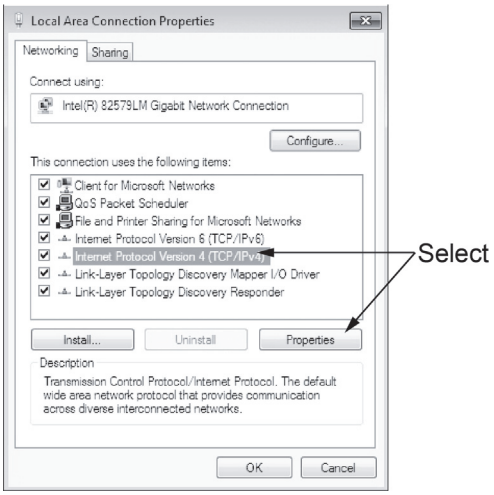


Fig. D — Local Area Connection Properties Screen

2. Once the Properties button is selected the Internet Protocol Properties Window opens. See Fig. E.
3. The IP address of the Carrier Controller must have matching system and subsystem fields in order for the 2 to communicate. In addition the last part of the IP address must be unique for both on the network.
   For example, Carrier Controller IP address: 172.30.101.11 and the PC address: 172.30.101.182.
   In this example 172.30 corresponds to the network and 101 corresponds to the subsystem and they must match. The last part of the IP address, 11 and 182, must be unique on the network.
4. Confirm that Carrier Controller IP address and PC IP address meet the above criteria and select OK on the PC.

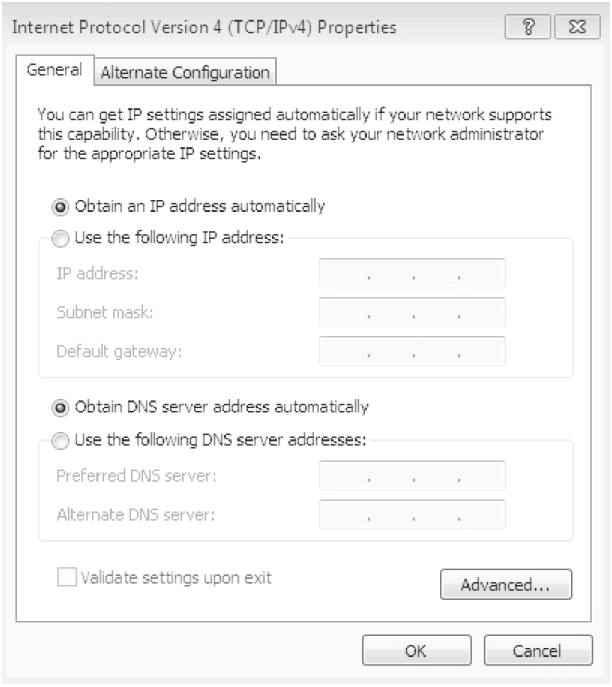


Fig. E — Internet Protocol Properties Screen

5. Communication between the Carrier Controller and the PC should be active. Using a standard Web Browser, with minimum versions shown above and with Java installed, type in the IP address of the Carrier Controller. The display on the PC should look very similar to what is on the Carrier Controller display.

If issues still exist with accessing the Carrier Controller using the web browser, try to ping the Carrier Controller by using the following steps:

1. Open a command prompt using one of the following methods:
   a. Window logo key + R to access the run command. Then type CMD and press enter.
   OR
   b. Click start button and then click run. Then type CMD and press enter.
2. At the command prompt, type the ping command followed by the unit IP address.
3. As shown in Fig. F, the device attached to IP address 161.145.71.145 communicated successfully. The IP address for the Carrier Controller should return a similar confirmation if the system is configured properly. If it does not additional IT assistance may be necessary.

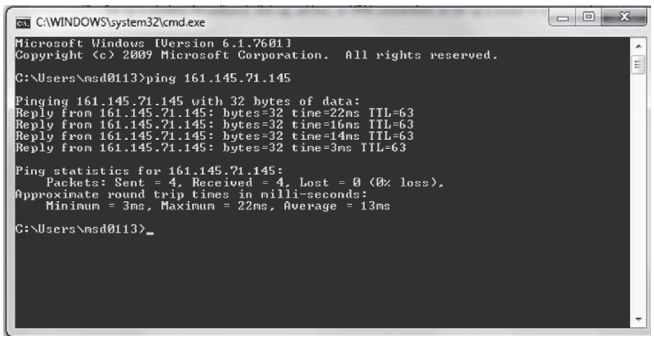


Fig. F — Ping Response Screen

INDEX

START-UP CHECKLIST

FOR 38RC SPLIT SYSTEM CONDENSING UNIT
(Remove and use for Job File)

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 the preceding sections of this Controls, Start-Up, Operation and Troubleshooting document.

I. Project Information

JOB NAME _____

ADDRESS _____

CITY _____ PROVINCE/STATE_____ ZIP_____

INSTALLING CONTRACTOR _____

SALES OFFICE _____

START-UP PERFORMED BY _____

DESIGN INFORMATION

SYSTEM INFORMATION

CAPACITY	OUTDOOR AIR TEMPERATURE	SUPPLY AIR TEMPERATURE	RETURN AIR TEMPERATURE	EVAPORATOR COIL SIZE (sq ft)

ROWS	FINS PER INCH	COIL CIRCUITING	ROW/FACE SPLIT	CFM

CONTROL INFORMATION

CONSTANT VOLUME OR VARIABLE AIR VOLUME	CONTROL TYPE (1-9) (*Configuration → OPT2 → C.TYP*)

PIPING INFORMATION (Be sure to include units of measure)

SUCTION LINE DIAMETER	LIQUID LINE DIAMETER	TOTAL INTERCONNECTING PIPE LENGTH	CONDENSER EQUAL, ABOVE, OR BELOW EVAPORATOR	DOUBLE SUCTION RISER USED? (Y/N)

RISER A DIAMETER	RISER B DIAMETER	REDUCED RISER USED? (Y/N)	REDUCED RISER DIAMETER	REDUCED RISER LENGTH

CONDENSING UNIT:

MARK FOR _____

UNIT MODEL_____

SERIAL _____

AIR-HANDLING UNIT(S):

MARK FOR _____ _____

MANUFACTURER_____ _____

UNIT MODEL_____ _____

SERIAL _____ _____

II. Preliminary Equipment Check

A. CONDENSING UNIT

1. Is there any physical damage?		☐ YES	☐ NO
Description _____			
Will this damage prevent start-up?		☐ YES	☐ NO
2. Unit is installed level as per the installation instructions.		☐ YES	☐ NO
3. Power supply agrees with the unit nameplate.		☐ YES	☐ NO
4. Electrical power wiring is sized and installed properly.		☐ YES	☐ NO
5. Unit is properly grounded.		☐ YES	☐ NO
6. Electrical circuit protection has been sized and installed properly.		☐ YES	☐ NO
7. All terminals are tight.		☐ YES	☐ NO
8. All plug assemblies are tight.		☐ YES	☐ NO
9. ALL cables and thermistors have been inspected for crossed wires.		☐ YES	☐ NO
10. Return gas thermistor(s) is/are fully inserted into wells.		☐ YES	☐ NO
11. Greenspeed fan VFD is/are connected to proper fans, if equipped.	☐ N/A	☐ YES	☐ NO
Are wind baffles installed?		☐ YES	☐ NO
12. Return and supply air thermistors (rat and sat) or communication provisions made for control types (***CONFIGURATION*** → ***OPT2*** → ***C.TYP***) 1, 3, 5 OR 9.	☐ N/A	☐ YES	☐ NO
13. Space temperature sensor (spt) or communication provisions made for control type (***CONFIGURATION*** → ***OPT2*** → ***C.TYP***) 5.	☐ N/A	☐ YES	☐ NO
14. Long line option kit (long line check valve) required.		☐ YES	☐ NO
15. Long line option kit (long line check valve) installed properly, at the condensing unit and with flow in the correct direction.	☐ N/A	☐ YES	☐ NO
16. All service valves open.		☐ YES	☐ NO
17. All piping is properly connected.		☐ YES	☐ NO
18. Crankcase heaters are tight.		☐ YES	☐ NO
19. Crankcase heaters are operational and have been energized for 24 hours to remove any liquid refrigerant from the compressor.		☐ YES	☐ NO

B. AIR-HANDLING UNIT

1. All service valves open. ☐ YES ☐ NO
2. All piping is properly connected. ☐ YES ☐ NO
3. Only bleed port TXVs are installed. ☐ YES ☐ NO

CIRCUIT A			CIRCUIT B		
TXV	MFR	PART NUMBER	TXV	MFR	PART NUMBER

4. TXVS are properly installed, equalizer lines properly located, bulbs properly located and insulated. ☐ YES ☐ NO
5. Liquid line solenoid valve(s) are near the evaporator and installed with proper flow direction, if required. ☐ N/A ☐ YES ☐ NO
6. Liquid line solenoid valve manual lift stems disengaged, if equipped. ☐ N/A ☐ YES ☐ NO
7. Filter driers and sight glasses are installed near the TXV(s). ☐ YES ☐ NO
8. Evaporator fans are turning in the proper direction. ☐ YES ☐ NO
9. The fan and motor pulleys of the indoor fan have been checked for proper alignment. ☐ YES ☐ NO
10. Fan belts have the proper tension. ☐ YES ☐ NO
11. Evaporator fan status switch(es) installed. ☐ YES ☐ NO
12. Evaporator fan status switch(es) operational. ☐ N/A ☐ YES ☐ NO
13. Water has been placed in the drain pan to confirm proper drainage. ☐ YES ☐ NO
14. Air filters have been installed. ☐ YES ☐ NO
15. Verify proper evaporator cfm. ☐ YES ☐ NO

C. REFRIGERATION CIRCUIT

1. All service valves open. ☐ YES ☐ NO
2. All piping has been checked for leaks with a leak detector. ☐ YES ☐ NO
3. Locate, repair, and report any leaks. _____

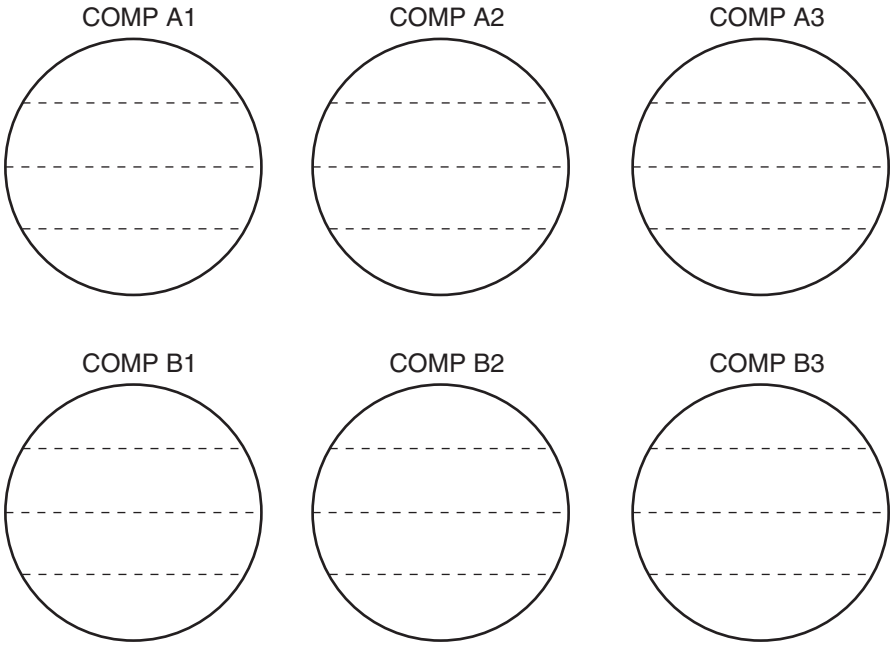
_____

4. The system has been charged with the appropriate initial refrigerant charge. ☐ YES ☐ NO

CIRCUIT A PRELIMINARY REFRIGERANT CHARGE CALCULATION		CIRCUIT B PRELIMINARY REFRIGERANT CHARGE CALCULATION	
BASE UNIT, WITH 25 ft (7.6 m) INTERCONNECTING PIPING		BASE UNIT, WITH 25 ft (7.6 m) INTERCONNECTING PIPING	
EVAPORATOR COIL		EVAPORATOR COIL	
ADDITIONAL PIPING CHARGE, MORE THAN 25 ft (7.6 m) INTERCONNECTING PIPING		ADDITIONAL PIPING CHARGE, MORE THAN 25 ft (7.6 m) INTERCONNECTING PIPING	
TOTAL PRELIMINARY CHARGE	☐ lb ☐ kg	TOTAL PRELIMINARY CHARGE	☐ lb ☐ kg

C. REFRIGERATION CIRCUIT (cont)

5. Additional oil added to the circuits, if required. ☐ N/A ☐ YES ☐ NO
   Circuit A _____ ☐ oz ☐ ml
   Circuit B _____ ☐ oz ☐ ml
6. Oil is visible in the compressor sight glasses, at least 1/8 to 3/8 full, after crankcase has been energized for a minimum of 24 hours ☐ YES ☐ NO
7. Record oil levels below. Compressors must be off.



PROJECT INFORMATION AND PRELIMINARY EQUIPMENT CHECK PERFORMED BY:

_____

COMPANY _____

ADDRESS _____

CITY, STATE/PROVINCE: _____ DATE _____

III. SYSTEM START-UP (to be completed by the start-up technician)

A. PRE-START CHECK

1. All service valves open. ☐ YES ☐ NO
2. Compressor oil level is correct. ☐ YES ☐ NO
3. Verify compressor mounting bolt torque is 7.5 to 10.5 ft-lb (10.2 to 14.1 n-m) for 025 to 130 unit sizes. ☐ YES ☐ NO
4. Locate, repair, and report any leaks. _____

_____

5. Supply voltage is within unit nameplate range. ☐ YES ☐ NO
6. Control transformer(s) primary connection set for proper voltage. ☐ YES ☐ NO
7. Control transformer (tran1) secondary voltage _____ vac

   Control transformer (tran2) secondary voltage _____ vac
8. Check voltage phase imbalance:

   AB: _____ V AC: _____ V BC: _____ V

   AVERAGE VOLTAGE (AB + AC + BC)/3: _____ V

   MAXIMUM DEVIATION FROM AVERAGE VOLTAGE: _____ V

   VOLTAGE IMBALANCE: MAXIMUM DEVIATION/AVERAGE VOLTAGE x 100 _____ %
9. Voltage imbalance less than 2%. ☐ YES ☐ NO

   Do not start unit if voltage imbalance is greater than 2%. Contact local utility for assistance.
10. Evaporator fan switch(es) operational, if installed. ☐ N/A ☐ YES ☐ NO
11. Proper condenser fan rotation confirmed. ☐ YES ☐ NO
12. Proper evaporator fan rotation confirmed. ☐ YES ☐ NO
13. Record software version, ***Main Menu → Status Tables → System Information***:
    SDK Version _____
    UI Version _____
    Controller App Version _____
14. TIME AND DATE SET PROPERLY. ☐ YES ☐ NO

B. START AND OPERATE THE SYSTEM. Complete the following:

1. Complete component test. ☐ YES ☐ NO
2. Check refrigerant and oil charge. ☐ YES ☐ NO
3. Trim refrigerant per charging chart. ☐ YES ☐ NO

CIRCUIT A FINAL REFRIGERANT CHARGE		CIRCUIT B FINAL REFRIGERANT CHARGE	
PRELIMINARY CHARGE		PRELIMINARY CHARGE	
TRIM CHARGE		TRIM CHARGE	
TOTAL CHARGE	☐ lb ☐ kg	TOTAL CHARGE	☐ lb ☐ kg

4. Record compressor current at full load.

COMPRESSOR	L1	L2	L3
COMPRESSOR A1			
COMPRESSOR A2			
COMPRESSOR A3			
COMPRESSOR B1			
COMPRESSOR B2			
COMPRESSOR B3			

5. Record condenser fan motor current.

CONDENSER FAN MOTOR	L1	L2	L3
FAN MOTOR 1			
FAN MOTOR 2			
FAN MOTOR 3			
FAN MOTOR 4			
FAN MOTOR 5			
FAN MOTOR 6			
FAN MOTOR 7			
FAN MOTOR 8			

B. START AND OPERATE THE SYSTEM (cont):

6. Record configuration mode settings.

SUBMODE	ITEM	ITEM DESCRIPTION	VALUE
DISP	DISPLAY CONFIGURATION		
	TEST	Test Display LEDs	
	METR	Metric Display	
	LANG	Language Selection	
	PAS.E	Password Enable	
	PASS	Service Password	
UNIT	UNIT CONFIGURATION		
	SIZE	Unit Size	
	NCKT	Number of Refrig Ckts	
	SZ.A1	Compressor A1 Size	
	SZ.A2	Compressor A2 Size	
	SZ.A3	Compressor A3 Size	
	SZ.B1	Compressor B1 Size	
	SZ.B2	Compressor B2 Size	
	SZ.B3	Compressor B3 Size	
	FAN.S	Fan Sequence Number	
	A1.TY	Compressor A1 Digital?	
	MAX.T	Maximum A1 Unload Time	
CCN	CCN NETWORK CONFIGS		
	CCNA	CCN Address	
	CCNB	CCN Bus Number	
	BAUD	CCN Baud Rate	
OPT1	UNIT OPTIONS 1 HARDWARE		
	HOT GAS BYPASS	HGBP Valve Select	
	Space Temp Sensor	Space Temp Sensor	
	Space Temp Offset Enable	Space Temp Offset Enable	
	Space Temp Offset Range	Space Temp Offset Range	
	RAT Thermistor Type	RAT Thermistor Type 1	
	SAT Thermistor Type	SAT Thermistor Type 1	
	RAT thermistor Type2	RAT thermistor 2	
	SAT thermistor Type2	SAT thermistor 2	
	Cooling Setpoint Select	Use Space Temperature or 4-20mA signal	
OPT2	UNIT OPTIONS 2 CONTROLS		
	C.TYP	Machine Control Type	
	CTRL	Control Method	
	LOAD	Loading Sequence Select	
	LLCS	Lead/Lag Circuit Select	
	DELY	Minutes Off Time	
	Deadband Multiplier	1-4 default is 1	

B. START AND OPERATE THE SYSTEM (cont):

6. Record configuration mode settings (cont).

SUBMODE	ITEM	ITEM DESCRIPTION	VALUE
RSET	RESET COOL TEMP		
	CRST	Cooling Reset Type	
	MA.DG	4-20 — Degrees Reset	
	RM.NO	Remote - No Reset Temp	
	RM.F	Remote - Full Reset Temp	
	RM.DG	Remote - Degrees Reset	
	RT.NO	Return - No Reset Temp	
	RT.F	Return - Full reset Temp	
	RT.DG	Return - Degrees Reset	
	DMDC	Demand Limit Select	
	DM20	Demand Limit at 20 mA	
	SHNM	Loadshed Group Number	
	SHDL	Loadshed Demand Delta	
	SHTM	Maximum Loadshed Time	
	DLS1	Demand Limit Switch 1	
	DLS2	Demand Limit Switch 2	

B. START AND OPERATE THE SYSTEM (cont):

6. Record configuration mode settings (cont).

SUBMODE	ITEM	ITEM DESCRIPTION	VALUE
SERV	SERVICE CONFIGURATION		
	EN.A1	Enable Compressor A1	
	EN.A2	Enable Compressor A2	
	EN.A3	Enable Compressor A3	
	EN.B1	Enable Compressor B1	
	EN.B2	Enable Compressor B2	
	EN.B3	Enable Compressor B3	
	REV.R	Reverse Rotation Enable	
	TCOM	Two Comp Ckt Oil Mgmt	
BCST	BROADCAST CONFIGURATION		
	T.D.BC	CCN Time/Date Broadcast	
	OAT.B	CCN OAT Broadcast	
	G.S.BC	Global Schedule Broadcst	
	BC.AK	CCN Broadcast Ack'er	

7. Record set points mode settings

SUBMODE	ITEM	ITEM DESCRIPTION	VALUE
COOL	COOLING SET POINTS		
	Cooling Setpoint 1	Cooling Setpoint 1	
	Cooling Setpoint 2	Cooling Setpoint 2	
	Cooling Setpoint 3	Cooling Setpoint 3	
	Cooling Setpoint 4	Cooling Setpoint 4	
	SPS.P	Space T Cool Setpoint	
	SPT.O	Space Temperature Offset	
	ST.P.O	Space T SP Plus Offset	
	P.CAP	Percent Cap. Requested	
	L.C.ON	Lo Cool On Setpoint	
	H.C.ON	Hi Cool On Setpoint	
	L.C.OF	Lo Cool Off Setpoint	
	OAT.L	OAT Lockout Temperature	

B. START AND OPERATE THE SYSTEM (cont):

8. Record operating temperatures and pressures when stable operation has been confirmed.

UNIT DATA	
CONTROL POINT (***Main Menu → Status Tables → General Unit Parameters***)	
TOTAL CAPACITY (***Main Menu → Status Tables → General Unit Parameters***)	
RETURN AIR TEMPERATURE (***Main Menu → Status Tables → General Unit Parameters***)[a]	
SUPPLY AIR TEMPERATURE (***Main Menu → Status Tables → General Unit Parameters***)[a]	
OUTSIDE AIR TEMPERATURE (***Main Menu → Status Tables → Unit Parameters***)	
SPACE TEMPERATURE (***Main Menu → Status Tables → Unit Parameters***)	
CIRCUIT A DATA	
SATURATED CONDENSING TEMP (***Main Menu → Status Tables → Circuit A Parameters***)	
SATURATED SUCTION TEMP (***Main Menu → Status Tables → Circuit A Parameters***)	
RETURN GAS TEMPERATURE (***Main Menu → Status Tables → Circuit A Parameters***)	
DISCHARGE GAS TEMPERATURE (***Main Menu → Status Tables → Circuit A Parameters***)[a]	
SUCTION SUPERHEAT TEMP (***Main Menu → Status Tables → Circuit A Parameters***)	
DISCHARGE PRESSURE (***Main Menu → Status Tables → Circuit A Parameters***)	
SUCTION PRESSURE (***Main Menu → Status Tables → Circuit A Parameters***)	
LIQUID LINE TEMPERATURE AT SERVICE VALVE[a]	
LIQUID LINE PRESSURE AT SERVICE VALVE	
CIRCUIT B DATA	
SATURATED CONDENSING TEMP (***Main Menu → Status Tables → Circuit B Parameters***)	
SATURATED SUCTION TEMP (***Main Menu → Status Tables → Circuit B Parameters***)	
RETURN GAS TEMPERATURE (***Main Menu → Status Tables → Circuit B Parameters***)	
DISCHARGE GAS TEMPERATURE (***Main Menu → Status Tables → Circuit B Parameters***)[a]	
SUCTION SUPERHEAT TEMP (***Main Menu → Status Tables → Circuit B Parameters***)	
DISCHARGE PRESSURE (***Main Menu → Status Tables → Circuit B Parameters***)	
SUCTION PRESSURE (***Main Menu → Status Tables → Circuit B Parameters***)	
LIQUID LINE TEMPERATURE AT SERVICE VALVE[a]	
LIQUID LINE PRESSURE AT SERVICE VALVE	
READINGS IN: ☐ °F ☐ °C ☐ psi ☐ kPa	

NOTE(S):

a. Taken with a digital thermometer if sensors are unavailable.

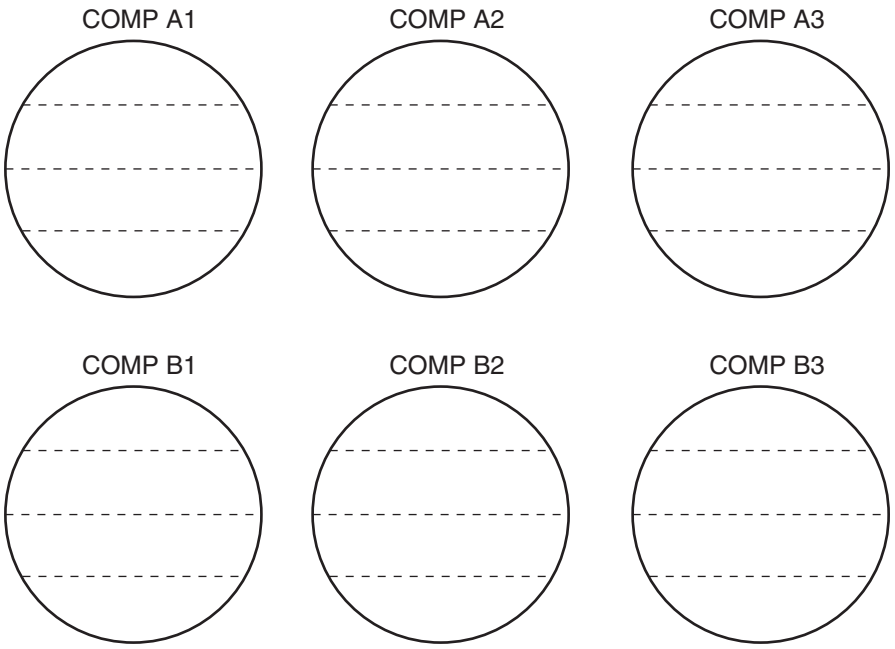
B. START AND OPERATE THE SYSTEM (cont):

9. Provide operating instructions to owner's personnel. ☐ YES ☐ NO

   Instruction time _____ HOURS

10. After 20 minutes of operation, oil level is correct in sightglass. ☐ YES ☐ NO

11. Record oil levels below. compressors must be off.



COMMENTS:

SIGNATURES:

START-UP TECHNICIAN _____

COMPANY _____

DATE _____

CUSTOMER REPRESENTATIVE _____

COMPANY _____

ADDRESS _____

_____

CITY, STATE/PROVINCE _____

DATE _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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

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